

DEPARTMENT OF CIVIL ENGINEERING

CURRICULUM AND SYLLABUS

Under CBCS

(Applicable for Students admitted from Academic Year 2018-19)

B. TECH. CIVIL ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING SCHOOL OF BUILDING SCIENCES

HITS, PADUR

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE VISION AND MISSION

ΜΟΤΤΟ

"TO MAKE EVERY MAN A SUCCESS AND NO MAN A FAILURE."

VISION

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

MISSION

- To create an ecosystem for learning and world class research.
- To nurture a sense of creativity and innovation.
- To instill highest ethical standards and values with a sense of professionalism.
- To take up activities for the development of Society.
- To develop national and international collaboration and strategic partnership with industry and institutes of excellence.
- To enable graduates to become future leaders and innovators.

VALUE STATEMENT

• Integrity, Innovation, Internationalization

DEPARTM ENT OF CIVILENGINEERING

VISION AND MISSION

VISION:

To be a globally competent Premier Academic Centre for quality education and research in the diverse areas of Civil Engineering with social commitment.

MISSION

- M1. To inculcate comprehensive principles to produce highly competent and technologically capable professional engineers, academicians and entrepreneurs.
- M2. To impart quality education with strong emphasis on social commitment and sustainability, with ethical standards.
- M3. To provide a scholastic environment for state-of the-art research.
- M4. To conduct Knowledge transfer programs to enhance technical knowledge.

Program Educational Objectives (PEOs)

- **PEO 1:** The graduates will become experts in Planning, Designing and executing any infrastructural Development project.
- **PEO 2:** The Graduates will be able to learn and adopt new technologies evolving in the field of Civil Engineering.
- **PEO 3:** The Graduates will become globally competent Civil Engineering Professionals

Programme Outcomes Defined (POs)

- **PO 1:** To apply the knowledge of Mathematics, Science and Engineering fundamentals to solve complex Civil Engineering Problems.
- **PO 2:** Graduate will attain the ability to identify, formulate, analyze and find suitable solutions for complex Engineering problems using basic principles of Science and Engineering.
- **PO 3:** Graduates will be able to design Civil Engineering System Components and Processes considering public health, safety and Environmental issues to meet the needs of the society.
- **PO 4**: Graduates will be able to conduct investigations of complex problems in Civil Engineering using Research based knowledge and Research.
- **PO 5:** Graduate will exhibit skills to use modern Engineering tools, software and equipment to analyze various problems in Civil Engineering Domain.
- PO 6: To practice as an efficient Civil Engineer to assess and manage the societal needs
- **PO 7:** Graduate will understand the impact of Engineering solutions based on the Sustainable Concepts.
- PO 8: Graduate will be aware of their Professional and ethical responsibilities to the society.
- **PO 9:** Graduate will be able to work individually or as a team member or leader in uniform and multidisciplinary settings

P10: Graduate will be able to communicate effectively in both verbal and written forms.

PO11: Graduate will have an understanding of Engineering and Management Principles and apply this to one's own work, as a member and a leader in a team, to manage projects.

PO12 Graduate will develop confidence for self-education and ability for lifelong learning.

Program Specific Outcomes: (PSOs)

The Graduates will be able to

- **PSO 1:** Apply mathematical and basic science knowledge to analyze, and interpret societal problems pertaining to civil engineering.
- **PSO 2:** Exhibit ability to design a system, component or a process in various domains of civil engineering such as structural, environmental and transportation engineering.
- **PSO 3:** Apply the construction management techniques such as planning, scheduling, quality control and cost control for various construction projects.

ACADEMIC REGULATIONS FOR

B. TECH. / B. TECH. (HONS.) DEGREE PROGRAMME

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I. PREAMBLE

As per the recommendations of UGC, the Hindustan Institute of Technology and Science (HITS) has introduced Choice Based Credit System (CBCS) from the academic year 2015-16. Choice Based Credit System (CBCS) is a proven, flexible mode of learning in higher education which facilitates a student to have guided freedom in selecting his/her own choices of courses in the curriculum for completing a degree program. This revision of regulations, curriculum and syllabi has been carried out further to make it more flexible and adaptive to the technology advancements happening in the world. CBCS offers a flexible system of learning.

The system permits a student to

- (i) Learn at their own pace through flexible registration process
- (ii) Choose electives from a wide range of courses offered within and outside their departments
- (iii) Undergo additional courses and acquire more than required number of credits to obtain B. Tech (Hons)
- (iv) Undergo additional courses in their special areas of interest and earn additional credits to obtain B. Tech with Minor Specialization
- (v) Adopt an interdisciplinary approach in learning
- (vi) Avail transfer of Credits
- (vii) Gain Non CGPA credits to enhance skill/employability by taking up additional project work, entrepreneurship, co-curricular and vocational training.
- (viii) Make the best use of the expertise of available faculty.
- (ix) Learn and earn credits through MOOC and Project Based Learning
- (x) Enhance their Knowledge, Skill and Attitude through participation in innovative Curriculum Design, Delivery and Assessments.

The Curriculum is designed to take into the factors listed in the Choice Based Credit System (CBCS) with focus on Project Based Learning and Industrial Training so as to enable the students become eligible and fully equipped for employment in industries choose higher studies or entrepreneurship.

II. DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

- 1. "Programme" means Degree Programme like B.Tech. Degree Programme.
- 2. "Discipline" means specialization or branch of B.Tech. Degree Programme, (e.g. Civil Engineering).

- 3. "Course" means a theory or practical subject that is normally studied in a semester, (e.g., Mathematics, Physics, etc.).
- 4. "Vice Chancellor of HITS" means the Head of the Institution.
- 5. "Registrar" is the Head of all Academic and General Administration of the Institute.
- 6. "Dean Academics" means the authority of the University who is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the Academic Programmes.
- 7. "Controller of Examinations" means the authority of the University who is responsible for all activities related to the University Examinations, publication of results, award of grade sheets and degrees.
- 8. "Dean Student Affairs" is responsible for all student related activities including student discipline, extra and co curricular activities, attendance and meetings with class representatives, Student Council and parent teacher meet.
- 9. "HoD" means the Head of the Department concerned.
- 10. "Institute" means Hindustan Institute of Technology and Science (HITS), Chennai.
- 11. "TCH" means Total Contact Hours refers to the teaching learning periods.
- 12. "DEC" means Department Exam Committee.
- 13. "BoS" means Board of Studies.
- 14. "BoM" means Board of Management.
- 15. "ACM" means Academic Council meeting the highest authoritative body for approval for all Academic Policies.
- 16. "Class Teacher" is a faculty of the class who takes care of the attendance, academic performance and the general conduct of the students of that class.
- 17. "CIA" is Continuous Internal Assessment which is assessed for every student for every course during the semester.
- 18. "ESE" is End Semester Examination conducted by the Institute at the End of the Semester for all the courses of that semester.
- 19. "AICTE" means All India Council for Technical Education.
- 20. "UGC" means University Grants Commission.
- 21. "MHRD" means Ministry of Human Resource Development, Govt. of India.

ACADEMIC REGULATIONS FOR B. Tech. / B.Tech. (Hons.)

Under Choice Based Credit System (CBCS)

(Effective from Academic year 2018 - 19)

Vision, Mission and Objectives

The Vision of the Institute is "To make every man a success and no man a failure". The Mission of the institute is

- To create an ecosystem that promotes learning and world class research.
- To nurture creativity and innovation.
- To instil highest ethical standards and values.
- To pursue activities for the development of the Society.
- To develop national and international collaborations with institutes and industries of eminence.
- To enable graduates to become future leaders and innovators. **Value Statement**

Integrity, Innovation, Internationalization

Further, the Institute always strives

- To train our graduates with the latest and the best in the rapidly changing fields of Architecture, Engineering, Technology, Management studies, Science and Humanities and Liberal Arts.
- To develop graduates, with a global outlook, possessing Knowledge, Skills and Attitude and capable of taking up challenging responsibilities in the respective fields.
- To mould our graduates as citizens with moral, ethical and social values so as to fulfil their obligations to the nation and the society.
- To promote research in the field of Architecture, Engineering, Technology, Management studies, Science and Humanities and Liberal Arts and Allied disciplines.

Aims and Objectives of the Institute are focused on

- Providing state of the art education in Engineering, Technology, Applied Sciences and Management studies.
- Keeping pace with the ever changing technological scenario and help the graduates to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and the nation.
- To inculcate a flair for Research, Development and Entrepreneurship.

2.0 Admission

The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, based on the guidelines issued by the UGC/ Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each of the B. Tech. degree programme will be decided by the Board of Management of the Institute as per the directives of AICTE/ UGC / MHRD, Government of India, taking into account, the market demands. Seats are also made available up to 20% of the sanctioned intake for Non – Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the Institute.

2.1. Eligibility for Admission

(i) Regular Entry

Passed 10 + 2 examination with Physics and Mathematics as compulsory subjects along with one of the other subjects as Chemistry/ Biotechnology/ Biology/ Technical Vocational course.

The candidates should have obtained the minimum marks as per AICTE norms.

(ii) Lateral Entry

The candidates possessing a Diploma in Engineering/Technology in the relevant discipline of specialization with minimum 50% marks awarded by the State Boards of Technical Education, India or any other competent authority as accepted by the Board of Management of the Institute as equivalent thereto are eligible for admission to the 3rd Semester of the B. Tech degree programme.

2.2 The candidate has to fulfil all the prescribed admission requirements / norms

of the Institute.

- In all matters relating to admission to the B. Tech degree programme, the decision of the Board of Management of the Institute shall be final.
- At any time after admission, if found that a candidate has not fulfilled one or many of the requirements stipulated by the Institute, or submitted forged certificates, the Institute has the right to revoke the admission and forfeit the fee paid. In addition, legal action may be taken against the candidate as decided by the Board of Management.

Student Discipline

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the Institute.

Any act of indiscipline of a student reported to the Dean (Student affairs) and Head of the Department will be referred to a Discipline Committee constituted for the purpose. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Student Affairs) to recommend to the Vice-Chancellor for the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

Ragging in any form is a criminal and non-bailable offence in our country. The current State and Central legislations provide stringent punishments including imprisonment. Once the involvement of a student(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff etc. the student(s) will be liable to be dismissed from the Institute, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student of the Institute, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

Structure of the B. Tech Degree Programme

All B. Tech. degree Programmes will have the curriculum and syllabi (for 4 years) as approved by the respective Board of Studies and Academic Council of the Institute.

Credits are the weightages, assigned to the courses based on the following general pattern:

One Lecture / Tutorial period per week	1 Credit Up
to Three periods of Practical per week	1 Credit Up
to 4 periods of Practical per week	2 Credits

The curriculum for B. Tech. programme is designed to have a minimum of **165 credits + 4 Non – CGPA credits** that are distributed across eight semesters of study for the award of degree.

Choice Based Credit System (CBCS) was introduced from the Academic year 2015-16 in the curriculum to provide the students, a balanced approach to their educational endeavor.

Under CBCS, the degree programme will consist of the following categories of courses:

i) General Core foundation (CF) courses comprising of

- Humanities courses;
- Basic Sciences (BS)including Physics, Chemistry and Mathematics;
- Engineering Sciences (ES), including Basic Engineering courses such as Material Science, Basic Workshop, Engineering Drawing, Engineering Graphics, Digital systems, etc.

ii) Compulsory Courses (CC) consist of the following.

- a. **Professional Core (PC)** courses: These courses expose the students to the foundation of Engineering topics related to the chosen programme of study comprising of theory and Practical/ field work/ Design project/ Project.
- b. **Departmental Elective** (**DE**): These courses enable the students to take up a group of courses of their interest in the area of specialization offered by the parent Department / School.
- iii) Non –Departmental Electives (NE): These courses are offered by Engineering and Non-Engineering departments (across the disciplines) other than their parent Department. Two groups of Electives are available under NE namely, Engineering Electives, offered by the Engineering Departments and Open Electives, offered by the Non – Engineering departments.
- iv) Indexed Journal / Conference Publications: If a student publishes a research paper as main author in indexed Journal / Conference, the same can be considered as equivalent to two credit course under NE.
- v) Non-CGPA courses: These courses are offered in certain semesters are compulsory, but are not used for calculation of GPA and CGPA. However, the credits will be mentioned in the grade sheet.

Non – CGPA courses

The student shall select any two courses /activity listed in **Table 1** during the course of study. The student has to make his / her own efforts for earning the credits. The grades given will be Pass / Fail (P/F). The respective class teachers have to encourage, monitor and record the relevant activities of the students, based on the rules issued from time to time by the Institute and submit the End semester report to the Head of the Department.

No.	Course / Activity	Credits
1.	Start ups	2
2.	Industrial Training	2
3.	Technical conference, seminar, competitions, Professional	2
	Societies	
4.	Management courses	2
5.	Technical Certification Course	2
6.	Sports	2
7.	NCC	2
8.	NSS	2
9.	YRC	2
10.	Art and Cultural activities	2
11.	English Proficiency Certification	2
12.	Aptitude Proficiency Certification	2
13.	Foreign Languages Level II and above	2
14.	Publication in Conferences / Seminar	2

Table 1. Non – CGPA Courses

A student must earn compulsorily, the credits mentioned under each category shown in **Table 2** and also a minimum total of **169 credits - 165 credits (CGPA) + 4 credits (Non CGPA)** for the award of B. Tech. degree. For Lateral entry students, the 41 credits required for first and second semester of B. Tech shall be deemed to have been earned based on their curriculum in the diploma course. They have to earn a minimum of **128 credits (124 credits + 4 Non CGPA credits)** for the award of B. Tech. degree.

Students are eligible for award of **B.Tech.(Hons)** upon successful completion of **181 credits (165 regular credits + 12 Additional Credits+ 4 Non CGPA credits)** maintaining a CGPA of 8.0 during their period of study (4 years) and no history of arrears as detailed in clause 7.0.

Students are eligible for the award of **B.Tech. with Minor specialization** upon successful completion of 12 additional credits totalling**181 credits (165 regular credits + 12 Additional Credits+ 4 Non – CGPA credits)** as detailed in clause 8.0

No.	Category	Credits	Percentage
1	Basic Sciences (BS)	32	20
2	Humanities Courses (HS)	7	4
3	Professional Core (PC)	90	53
4	Department Elective (DE)	15	9
5	Non – Department Electives (NE)	10	6
6	Design Project	3	2
7	Internship	1	0.5
8	Project	8	5
9	Comprehension	1	0.5
	Total Credits	165	100
	NON – CGPA		
10	Professional Development	4	

Table 2. Distribution of Credits

The medium of instruction is English for all courses, examinations, seminar presentations and project reports.

Faculty Advisor

To help the students in planning their selection of courses and programme of study and for getting general advice on the academic programme, the concerned department will assign a certain number of students to a faculty member who will be called their Faculty Advisor. Such Faculty Advisor will continue to mentor the students assigned to him/her for the entire duration of the programme.

Class Committee

Every section / batch of the B. Tech. Degree programme will have a Class Committee consisting of Faculty and students.

The constitution of the Class Committee will be as follows:

a. One Professor not associated with teaching the particular class shall be nominated by the Head of the Department to act as the Chairman of the Class Committee as approved by the Dean Academics.

- b. Course coordinator of each of the lecture based courses (for common courses).
- c. Class teacher of the class.
- d. All Faculty handling the courses for that class in the semester.
- e. Workshop Superintendent (for first two semesters); as applicable.
- f. Four students from the respective class nominated by Head of the Department
- g. Faculty Advisors of the respective class.

Course committee

A course committee shall be constituted by the HOD for all the common courses, with the faculty who are teaching the courses and with a Professor of the core department as the Chairman. The Course committee shall meet periodically to ensure the quality of progression of the course in the semester.

The basic responsibilities of the Class Committee and Course committee are

- a. To review periodically the progress of the students.
- b. To discuss issues concerning curriculum and syllabi and the conduct of the classes.
- c. To inform the students about the method of assessment as recommended by the Department Exam Committee ("DEC") at the beginning of the semester. Each class committee / course committee will communicate its recommendations and the minutes of the meetings to the Head of the Department, Dean (Academics) and the Dean (Student Affairs).
- d. To conduct meetings at least thrice in a semester as per the Academic Plan issued by the Dean Academics.
- e. To review the academic performance of the students including attendance, internal assessment and other issues like discipline, maintenance etc.

Registration for courses in a Semester

A student will be eligible for registration of courses only if he/she satisfies the regulation clause 12.0 (progression), and clause 13.0 (maximum duration) and has cleared all dues to the Institute, Hostel and Library up to the end of the previous semester provided that student is not debarred from enrolment on disciplinary grounds.

The institute follows a flexible Choice Based Credit System and Slot based table. Accordingly, the students shall be given the option for selecting their courses, credits, teachers, slots and create their time table. The student is given the option of selecting the number of credits to undergo in a semester, subject to the curriculum requirements of minimum and maximum. Except for the first-year courses, registration for a semester will be done during a specified week before the start of the semester as per the Academic Schedule.

Late registration /enrolment will be permitted by the Dean – Academics for genuine cases, on recommendation by the Head of the respective department, with a late fee as decided from time to time.

The student shall make the choice of course in consultation with the Faculty Advisor and as stipulated from time to time.

Students shall have to pay additional fee as prescribed, for registering in certain elective courses under Non - Departmental Electives courses offered by certain specific Departments and for higher level Foreign Languages, as decided from time to time.

B. Tech, (Honours) Programme

A new academic programme B.Tech. (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area. The features of the new programme, include:

- a. B.Tech. students in regular stream can opt for B.Tech. (Hons.), provided they have a CGPA of 8.0 up to the end of fourth semester without any history of arrears.
- b. The students opting for this program have to take four additional courses of their specialization of a minimum of 3 credits each from 5th to 8th semesters with not more than 2 additional courses in a semester.
- c. The list of such additional courses offered by the various Departments of the respective school will be announced in the beginning of the academic year to facilitate the registration process.
- d. The student can also opt for post graduate level courses
- e. The faculty advisor will suggest the additional courses to be taken by the students based on their choice and level of their academic competence.
- f. Students who have obtained "E" or "U" or "RC" / "RA" grade or "DE" category (vide clause 16.0 Grading) in any course, including the additional credit courses, are not eligible for B.Tech. (Hons) degree.
- g. The students have to pay the requisite fee for the additional courses.

B. Tech with Minor specialization:

Students, who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering / Technology/ Arts/ Fashion/ Humanities/ Management/ Basic Sciences, may opt for additional courses in minor specialization groups offered by a department other than their parent department. Such students shall select the stream of courses offered with pre – requisites by the respective departments and earn a Minor Specialization.

a. The number of credits to be earned for Minor specialization is 12 credits.

- **b.** The students are permitted to register for their minor specialization courses from the V semester onwards subject to a maximum of two additional courses per semester.
- **c.** The list of such additional courses offered by the various departments and the schedule will be announced in the beginning of the academic year to facilitate the registration process.
- **d.** The students have to pay the requisite fee for the additional courses.

Attendance

The faculty handling a course must finalize the attendance, 3 calendar days before the last instructional day of the course and submit to the HoD through the class teacher.

- a. A student with less than 75% attendance (Total Contact Hours "TCH") in any course, will **not** be permitted to appear for the end-semester examination in that particular course, irrespective of the reason for the shortfall of the attendance. The student is however permitted to avail **Academic Leave** up to 10% for attending academic related activities like, Industrial Visits, Seminars, Conferences, Competitions etc., with the prior approval of the HoD. After the event, the student should submit the relevant documents for proof to the HoD for approval of the Academic Leave.
- b. The remaining 25% allowance in attendance is given to account for activities under NCC / NSS / Cultural / Sports/ Minor Medical exigencies etc.
- c. A student with an attendance ("TCH" Total Contact Hours) between 40% and 75% in any course will fall under the category "RC", which means Repeat the Course during the Summer / Winter break. Students under "RC" category will **not** be permitted to attend the Regular End Semester Examinations for that course. During the Summer / Winter break, the regular courses of the respective semester will be offered as Summer/Winter Courses, to enable the students to get required attendance and internal assessment marks to appear in the Repeat examination.
- d. Students under "RC" category in any course shall attend, the immediately following Summer / Winter course as detailed in clause 11.1. The detailed schedule of the Summer / Winter courses offered in every semester will be announced during the end of that semester. The student who has obtained "RC" has to select their appropriate slots and courses, optimally to attend the courses.
- e. The student, whose attendance falls below 40% for a course in any semester, will be categorized as "RA", meaning detained in the particular course for want of attendance and they will not be permitted to write the End semester exam for that course. The procedure for repeating the course categorized as "RA" is mentioned in Clause 11.2.

ACADEMIC

- Additional condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization.
- For such select NCC / Sports Camps prior permission for leave shall be obtained by the respective faculty coordinator / Director of sports from the designated authority, before deputing the students.
- For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Student Affairs) is mandatory. The assessment of such cases will be done by the attendance sub committee on the merit of the case and put-up recommendations to the Vice Chancellor. Such condonation is permitted **only twice** for a student in the entire duration of the programme.
- The Vice-Chancellor, based on the recommendation of the attendance sub committee may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

Assessment Procedure

Every course shall have two components of assessment namely,

- a. Continuous Internal Assessment "CIA": This assessment will be carried out throughout the semester as per the Academic Schedule.
- b. End Semester Examination "ESE": This assessment will be carried out at the end of the Semester as per the Academic Schedule.

Table 3 Weightage of the CIA and ESE for various categories of the courses

No.	Category of Courses	CIA weightage	CIA Minimum	ESE	ESE Minimum	Passing minimum (CIA+ESE)
1	Theory Course	50%	40%	50%	50%	45%
2	Practical Course	80%	50%	20%	50%	50%
3	Theory Course with Practical Components	60%	40%	40%	50%	45%
4	Department Elective (DE)/ Non – Department Elective (NE)	50%	40%	50%	50%	45%
5	Design Project	100%	50%			50%
6	Comprehension	100%	50%			50%
7	Internship	100%	50%			50%
8	Project and Viva Voce	50%	50%	50%	50%	50%

Theory Course / DE / NE Assessment weightages

The general guidelines for the assessment of Theory Courses, Department Electives "DE" and Non – Department Electives "NE" shall be done on a continuous basis is given in Table 4.

No.		Assessment Theory, DE, NE courses	Weightage Theory, DE, NE courses	Duration
1.		First Periodical Assessment	5%	1 period
2.		Second Periodical Assessment	10%	1 Period
3.		Third Periodical Assessment	10%	1Period
4.	CIA	Seminar/Assignments/Project	15%	
5.		Surprise Test / Quiz etc.,	10%	
6.	ESE	End Semester Exam	50%	2 to 3
				hours

Table 4(a): Weightage for Assessment

Practical Course: For practical courses, the assessment will be done by the course teachers as below:

Weekly assignment/Observation / lab records and viva as approved by the Department Exam Committee "DEC"

a. Continuous Internal Assessment	 80%
b. End Semester Examination	 20%

Theory courses with practical Component: For theory courses with practical

component the assessment will be calculated as follows as approved by the "DEC".

a. Continuous Internal Assessment	 60%
b. End Semester Exam	 40%

No.		Assessment Theory, DE, NE	Weightage Theory, DE,	Duration
		courses	NE COURSES	
1.		First Periodical Assessment	10%	1 period
2.		Second Periodical Assessment	10%	1 Period
3.	CIA	Third Periodical Assessment	10%	1Period
4.	CIA	Practical Assessment	30%	
	ESE	End Semester Exam	40%	2to 3hours

Table 4(b): Weightage for Assessment

Design Project – Assessment

The general guidelines for assessment of is given in Table 5.

Table 5: Assessment pattern for Design Project

No.	Review / Examination scheme	Broad Guidelines	Weightage
1.	First Review	Concept	20%
2.	Second Review	Design	30%
3.	Third Review	Experiment/Analysis	20%
4.	Project report	Results and Conclusion	30%
	and Viva – Voce		

Comprehension – Assessment

The general guidelines for assessment of Comprehension is given in Table 6.

No.	Review / Examination scheme	Broad Guidelines	Weightag e
1.	First Periodical Assessment – MCQ	Basic Sciences	20%
2.	Second Periodical Assessment – MCQ	Core Engineering	50%
3.	Third Periodical Assessment – Presentation	Emerging Areas	30%

Table 6: Assessment pattern for Comprehension

Internship

A student has to compulsorily attend Summer / Winter internship during 3rd year for a minimum period of one month.

In lieu of Summer / Winter internship, the student is permitted to register for undertaking case study / project work under an engineering faculty of the Institute and carry out the project for minimum period of one month.

In both the cases, the internship report in the prescribed format duly certified by the faculty in-charge shall be submitted to the HoD. The evaluation will be done through presentation and viva. The course will have a weightage of one credit or as defined in the respective curriculum.

For final year Project / Dissertation / Design Project/ Internship, the assessment will be done on a continuous basis as given in Table 7

No.	Review / Examination scheme	Weightage
1.	First Review	10%
2.	Second Review	20%
3.	Third Review	20%
4.	Project report and Viva – Voce	50%

Table 7: Assessment of Project work

For the final year project and Viva – Voce end semester examination, the student shall submit a Project Report in the prescribed format issued by the Institute. The first three reviews will be conducted by a committee constituted by the Head of the Department. The end – semester assessment will be based on the project report and a viva on the project conducted by a committee constituted by the Registrar / Controller of examination.

For Non – CGPA courses, the assessment will be graded "Satisfactory/Not Satisfactory" and grades as Pass/Fail will be awarded.

Flexibility in Assessment

The respective Departments under the approval of the Department Exam Committee (DEC) may decide the mode of assessment, based on the course requirements.

A student securing **less than the minimum** specified internal assessment marks in any course (clause 10.0, Table 3), will **not be permitted** to appear for the end-semester examination in that particular course and will be graded under "**RC**" category for that course. This will be denoted in the grade sheet as "RC", till the course is successfully completed in the subsequent semester(s).

Procedures for Course Repetition / Repeat Examinations

Summer / Winter Course: - for "RC" Category

- a. Students under RC category i.e.
- i. Attendance between 40% and 75% in any course(s) OR
- ii. CIA marks less than the prescribed minimum as specified in 10.0 Table 3 in any

course(s) OR

iii. Falls under both 1 and 2 above

are eligible for registering for the **Summer / Winter Course** which will be conducted during the Summer / Winter break, to improve their Attendance and/or CIA marks in the courses, by paying the **prescribed registration fee fixed from time to time.**

b. The Odd semester regular courses will be offered only in the Winter and the even semester

ACADEMIC

regular courses will be offered only in the Summer.

- c. RC students shall register by payment of prescribed fee and attend the classes during the summer / winter break and take assessments to earn minimum internal marks (clause 10.0, Table 3) and/or required attendance, to become eligible for writing the Repeat Examinations (Clause 11.3).
- d. The revised CIA marks shall not exceed 60% of the total internal weightage for any repeat course.

e. Re- Registration for 'RC' category

The students under "RC" category who <u>fail to improve</u> their attendance and/or CIA marks and **not** become eligible to write the Repeat Examination through the immediate summer/winter course are permitted to **re – register** for the Summer/Winter course again under "RC" category whenever it is offered in the subsequent semester(s) during their period of study by **paying 50% of the prescribed registration fee** as mentioned in Clause 11.1 (a). It is the responsibility of the student to fix the appropriate slots in the Summer / Winter course time table. The student will not be able to register if he/she is unable to fix the slots in the time table. The course will remain in the "RC" category until he / she successfully completes that course.

Course – Repetition - "RA" Category

- a. Students who secure attendance less than **40%** in any course(s) in a semester will be categorized under "RA" meaning **Repeat the course(s)** for want of minimum attendance. The CIA marks obtained by the students placed under RA category will become null and void.
- b. "RA" category students shall re-register for the same course once again whenever it is offered in the subsequent regular semesters and has to secure required minimum attendance and minimum internal assessment marks to become eligible to appear in the end semester examination for that course, by paying the requisite fee.
- c. It is the responsibility of the student to schedule their time table to include the "RA" courses without affecting the attendance of the regular courses of the current semester.
- d. Normally, a student will be permitted to register for not more than 3 "RA" courses in a semester. However, the students who wish to register for more than 3 "RA" courses are permitted to register only if the student finds suitable slots for doing the course within the framework of the time table for the regular semester. Request for registrations of additional RA courses over and above 3 in a semester shall be got approved by the respective HoD's.
- e. The student has the option to drop their regular courses proportionally in their regular semester during the course registration process without affecting the minimum credit requirement specified. Such dropped courses will be categorized as "RA". However, the student has to complete the dropped courses in the subsequent semesters.

f. It is the responsibility of the student to fix the slots for "RA" courses within the framework of the time table and slot availability without affecting his/her regular courses.

g. Detention

A student who secure RC or RA or both in all the theory courses prescribed in a semester shall repeat the semester by registering for the semester in the next academic year. However, he/she is permitted to appear for arrear examination as pereligibility.

Repeat Examinations

- a) Normally, the results of the End Semester Examinations for Regular Theory courses are announced within a period of 10 days after the last regular examination.
- b) During the even semester, the Repeat Examinations will be conducted for even semester courses and during the odd semester the Repeat Examinations will be conducted for odd semester courses.
- c) The schedule for the Repeat Examinations will be notified through the Academic Calendar which will be published at the beginning of every academic year.
- d) The students under "RC" category, who have secured the requisite attendance and internal assessment marks as applicable, by successfully completing the Summer/Winter course, are eligible to register for the Repeat Examinations.
- e) The students who fail to secure a pass or being absent for genuine reasons in their End Semester Examination for the regular courses are permitted to appear for the Repeat Exams by paying the prescribed fee.
- f) For the **Supplementary examinations (refer: Clause 15.2)**, the students with "U" grade in any course (refer clause 10.0 Table 3 and Clause 16.1) shall register by paying requisite fee and appear in the Repeat Examinations.
- g) The students who wish to apply for the revaluation of their answer scripts (Regular/ Supplementary / Repeat Examinations) should apply immediately after the announcement of results.

ACADEMIC Progression to higher semester

B.Tech.– Regular: Student has to satisfy the following conditions as laid down in Table 8 for progression from one academic year to next.

To enroll for semester	Minimum no. of credits to be earned for progression
3	NIL
5	15 credits*in Theory courses in 1 st , 2 nd and 3 rd Semesters
7	30 credits* in Theory courses up to 5th Semester

Table 8. Minimum Eligibility for progression B.Tech.- Regular

* Credit calculation is applicable for Theory / Theory integrated lab only

If a student fails to satisfy the above clause 12.1 in an academic year, the student has to take a break in study until they become eligible for progression

B.Tech.- Lateral Entry

Student has to satisfy the following conditions as laid down in Table 9 for progression from one academic year to next.

Table 9. Minimum Eligibility for progression B.Tech.- Lateral Entry

To enroll for semester	Minimum no. of credits to be earned
5	NIL
7	15credits* in Theory coursesin 3rd,4th and 5thSemesters

*Credit calculation is applicable for Theory / Theory integrated lab only

If a student fails to satisfy the above clause 12.2 in an academic year, the student has to take a break in study until they become eligible for progression

If a student is in **RC** category (due to lack of minimum CIA marks **as specified in clause no. 10. Table 3**) or **RA** category (due to lack of minimum attendance as specified in clause 9.0 e) **in all theory courses prescribed in a semester**, he/she will be detained and will not be allowed to proceed to the next semester. He/she has to re-register for all the courses in the following academic year only.

13.0 Maximum Duration of the Programme

A student may complete the programme at a slower pace than the regular pace, but in any case, in not more than 6 years for B. Tech, and not more than 5 years for lateral entry students excluding the semesters withdrawn as per clause 14.0.

A student completing the B.Tech. programme during the extended period will not be eligible for Institute ranking.

Temporary Withdrawal from the Programme

A student is permitted to take a break, up to a maximum of 2 semesters, during the entire programme to clear the backlog of arrears.

A student may be permitted by the Vice- Chancellor to withdraw from the entire programme for a maximum of two semesters for reasons of ill health, start – up venture or other valid reasons as recommended by a committee consisting of Head of Department, Dean (Academic) and Dean (Student Affairs).

Declaration of results

A student shall secure the minimum marks as prescribed in Clause 10.1(Table 3) in all categories of courses in all the semesters to secure a pass in that course.

Supplementary Examinations: If a candidate fails to secure a pass in a course and gets a "U" grade as per clause 16.1 he/she shall register and pay the requisite fee for re-appearing in the End Semester Examination during the following semester(s). Such examinations are called Supplementary Examinations and will be conducted along with the Regular /Repeat Examinations. The Supplementary Exams for the Odd semester courses will be conducted during the odd semester and supplementary exams for the even semester courses will be conducted during the even semester only. The student need not attend any contact course. The Internal Assessment marks secured by the candidate will be retained for all such attempts.

A candidate can apply for the revaluation of his/her end semester examination answer script in a theory course, after the declaration of the results, on payment of a prescribed fee.

If a candidate fails to secure a pass in Practical/Theory with Practical component / Design Project / Internship / Comprehension courses, due to not satisfying the minimum passing requirement ("U" grade) – as per clause 16.1 he/she shall register for the courses by paying the prescribed fee in the subsequent semester when offered by the departments.

Revaluation is **not** permitted for Practical/Theory with Practical component/Design Project / Internship / Comprehension courses. However, only for genuine grievances as decided by the Exam Grievance Committee a student may be permitted to apply for revaluation.

After 5 years, i.e., completion of one year (2 semesters) from the normal duration of the programme, the internal assessment marks obtained by the candidate will not be considered in calculating the passing requirement. A candidate who secures 50% in the end semester examination will be declared to have passed the course and earned the specified credits for the course irrespective of the score in internal assessment marks earned in that course.

Candidate who earns required credits for the award of degree after 5 years for B.Tech. programme (on expiry of extended period of 2 semesters over and above normal duration of course) he/she will be awarded only second class irrespective of his/her CGPA. However, the period approved under temporary withdrawal, if any, from the programme (13.0) will be excluded from the maximum duration as mentioned above.

Semester Abroad Programme: Students who are allowed to undergo internship or Training in Industries in India or abroad during their course work or attend any National/ International Institute under semester abroad programme (SAP) up to a maximum of 2 semesters will be granted credit transfer for the Course Work/project work done by them in the Industry /Foreign Institute as per the recommendations of the credit transfer committee. The leave period of the students for international internships / Semester Abroad programme etc., will be accounted for attendance.

A grading system as shown in Table 10 will be followed.

Range of Marks	Letter Grade	Grade Points	Remarks
90 - 100	S	10	Outstanding
80-89	А	09	Excellent
70-79	В	08	Very Good
60-69	С	07	Good
50-59	D	06	Average
45-49	Е	05	Pass
<45	U	00	To Reappear for end-semester examination
	RC	00	Repeat Course (Summer / Winter) due to Attendance deficiency (between 40% and 75%) and/or I. Lack of minimum CIA marks as specified in clause 10.0 Table 3
	RA	00	Repeat the course due to (i) Lack of minimum attendance (Below 40%) in regular course
		00	DETAINED "RC" or "RA" or both in all registered theory courses of a semester. The student is detained and has to repeat the entire semester. Clause 12.3

Table 10: Grading system

GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i "and the grade points P_i earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \sum_{i=1}^{n} C_{i} P_{i}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

- The Grade card will not include the computation of GPA and CGPA for courses with letter grade **RA**, **RC** and **U** until those grades are converted to the regular grades.
- A course successfully completed cannot be repeated.

Grade Sheet

Letter grade

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in Table 10.

A student is considered to have completed a course successfully and earned credits if he/she secures a letter grade other than **U**, **RC**, **RA** in that course.

After results are declared, grade sheet will be issued to each student which will contain the following details:

- a. Program and discipline for which the student has enrolled.
- b. Semester of registration.
- c. The course code, name of the course, category of course and the credits for each course registered in that semester
- d. The letter grade obtained in each course
- e. Semester Grade Point Average (GPA)
- f. The total number of credits earned by the student up to the end of that semester in each of the course categories.
- g. The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.
- h. Credits earned under Non CGPA courses.
- i. Additional credits earned for B. Tech (Hons.) and B. Tech with Minor specialization.

Class/Division

Classification is based on CGPA and is as follows:

CGPA ≥ 8.0 : First Class with distinction

 $6.5 \le CGPA < 8.0$: First Class

 $5.0 \leq CGPA < 6.5$: Second Class.

- (i) Further, the award of **'First class with distinction'** is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.
- (ii) The award of 'First Class 'is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 5 years for B. Tech programmes
- (iii) The period of authorized break of the programme (vide clause 14.0) will not be counted for the purpose of the above classification.
- (iv) To be eligible for award of B. Tech (Hons.) the student must have earned additional 12 credits in the relevant Engineering courses offered by the Departments of the respective Schools, thereby a total of 181 credits (165 regular credits + 12 additional credits + 4 Non CGPA credits) and should have 8.0 CGPA without any history of arrears and should not have secured E, RC, RA, U, in any course during the entire programme.
- (v) To be eligible for award of B. Tech with Minor Specialization, the student must have earned additional 12 credits in the relevant courses offered by other than the parent department and has successfully earned 181 credits (165 regular credits + 12 Additional credits + 4 Non CGPA Credits)
 19.0 Transfer of credits
- **19.1.** Within the broad framework of these regulations, the Academic Council, based on the recommendation of the Credit Transfer Committee so constituted may permit students to transfer part of the credit earned in other approved Universities of repute & status in the India or abroad.

The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under lateral entry based on the recommendation of the credit transfer committee on a case-to-case basis.

Admission norms for working Professional:

Separate admission guidelines are available for working / experienced professionals for candidates with the industrial / research experience who desire to upgrade their qualification as per recommendation of Credit Transfer Committee.

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Eligibility for Award of the B.Tech. /B. Tech (Hons)/ B. Tech with Minor Specialization Degree

A student shall be declared to be eligible for award of B. Tech. /B. Tech (Hons) / B. Tech degree with Minor specialization if he/she has satisfied the clauses 4.6 /7.0 /8.0 respectively within the stipulated time (clause 13, 14).

- a. Earned the specified credits in all the categories of courses (video c l a u s e 4.6) as specified in the curriculum corresponding to the discipline of his/ her study;
- b. No dues to the Institute, Hostels, Libraries etc.; and
- c. No disciplinary action is pending against him / her.

The award of the degree shall be recommended by the Academic Council and approved by the Board of Management of the Institute.

Change of Discipline

If the number of students in any discipline of B.Tech. programme as on the last instructional day of the First Semester is less than the sanctioned strength, then the vacancies in the said disciplines can be filled by transferring students from other disciplines subject to eligibility. All such transfers will be allowed on the basis of merit of the students. The decision of the Vice-Chancellor shall be final while considering such requests.

All students who have successfully completed the first semester of the course will be eligible for consideration for change of discipline subject to the availability of vacancies and as per norms.

22.0 Power to modify

Notwithstanding all that has been stated above, the Academic Council isvested with powers to modify any or all of the above regulations from time to time, if required, subject to the approval by the Board of Management.

	B. TECH – CIVIL ENGINEERING											
	(165 CREDIT STRUCTURE)											
SEMESTER – I												
SL NO	COURSE CATEGORY	COURSE CODE	NAME OF THECOURSE	L	т	Ρ	С	S	тсн			
1	BS	MEA4101/ ELA4101	Engineering Graphics and Computer Aided Design / Professional English and soft skills	1	1	2	3	1	4			
2	BS	MAA4101	Matrices and Calculus	3	0	2	4	1	5			
3	BS	PHA4101/ CYA4101	Engineering Physics / Engineering Materials	3	0	0	3	1	3			
4	РС	CSA4101 GEA4102	Problem Solving Using C / Sustainable Engineering Systems	2	0	2	3/2	1	4/3			
5	PC	EEB4101/ CEB4101	Introduction to Digital Systems / Engineering and Design	3	0	0	3	1	3			
Pract	ical											
6	BS	GEA4131	Engineering Immersion Lab	0	0	2	0.5	2	2			
7	BS	PHA4131/ CYA4131	Engineering Physics Lab/ Materials Chemistry Lab	0	0	2	1	0	2			
	Total				1	10	17.5/ 16.5	7	23/22			
L	- Lecture; T - 1	Futorial; P - P	ractical; C- Credit; S- Self Study;	тсн	l- To	otal C	Contact	Ηοι	ırs			

	SEMESTER – II											
SL NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Р	С	S	тсн			
1	BS	MAA4117	Analytical Mathematics	3	0	2	4	0	5			
2	BS	PHA4101/ CYA4101	Engineering Physics / Engineering Materials	3	0	0	3	1	3			
3	BS	ELA4101/ MEA4101	Professional English and soft skills / Engineering Graphics and Computer Aided Design	1	1	2	3	1	4			
4	PC	CSA4101/ GEA4102	Problem Solving Using C / Sustainable Engineering Systems	2	0	2	3/2	1	4/3			
5	РС	EEB4101/ CEB4101	Introduction to Digital Systems / Engineering and Design	3	0	0	3	1	3			
6	PC	CEB4117	Mechanics of Structures - I	3	1	0	4	1	4			
7	PC	CEB4118	Surveying & Geomatics	3	0	0	3	1	3			

CURRICULUM AND SYLLABUS

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B. TECH – CIVIL

Practi	ical											
8	PC	CEB4141	Surveying Lab	0	0	3	1	1	2			
9	BS	GEA4131	Engineering Immersion Lab	0	0	2	0.5	2	2			
10	BS	PHA4131/	Engineering Physics Lab/	0	0	2	1	0	2			
		CYA4131	Materials Chemistry Lab									
Total				18	2	13	24.5/ 25.5	9	32/31			
L	L - Lecture; T - Tutorial; P - Practical; C- Credit; S- Self Study; TCH- Total Contact Hours											

			SEMESTER – III						
SL NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн
1	BS	MAA4201	Partial Differential Equations and Transforms	3	1	0	4	0	5
2	PC	CEB4201	Construction Materials	3	0	0	3	1	3
3	PC	CEB4202	Mechanics of Structures II	3	1	0	4	0	4
4	PC	CEB4203	Mechanics of Fluids	3	1	0	3	1	4
5	DE	CEC42**	Department Elective I	3	0	0	3	0	3
6	NE	CED42**	Non-Department Elective I	2	0	0	2	0	2
Pract	ical					<u> </u>			
7	PC	CEB4231	Construction Materials Lab	0	0	3	1	0	3
8	PC	CEB4232	Mechanics of Fluids Lab	0	0	3	1	0	3
9	РС	CEB4233	Computer Aided Building Drawing	0	0	3	1	0	3
9	PC	CEB4234	Design Project I	0	0	2	1	0	2
	Total					1 1	23	2	32
l	L - Lecture; T -	Tutorial; P - P	ractical; C- Credit; S- Self Study	ν; Τ Ο	H- To	otal	Contac	t Hou	urs

	SEMESTER – IV												
SL			NAME OF THE COURSE	L	т	Р	С	S	тсн				
NO	0,11200111												
1	BS	MAA4216	Probability and Statistics	3	1	0	4	0	5				
2	PC	CEB4216	Structural Analysis I	3	1	0	4	0	4				
3	PC	CEB4217	Construction Techniques, Equipment and Practices	3	0	0	3	1	3				
4	PC	CEB4218	Environmental Engineering	3	0	0	3	1	3				

CUF	RRICULUM AND	SYLLABUS		B. TECH – CIVIL							
5	DE	CEC42**	Department Elective II	3	0	0	3	0	3		
6	NE	CED42**	Non-Department Elective II	2	0	0	2	0	2		
Practi	ical					· · · · ·					
7	PC	CEB4241	Strength of Materials Lab	0	0	3	1	0	3		
8	PC	CEB4242	Environmental Engineering Lab	0	0	3	1	0	3		
9	PC	CEB4243	Design Project II	0	0	2	1	0	2		
		Tot	al	17	0	8	22	2	28		
1	М	CEM4276	Fundamentals of GIS	4	0	0	4	0	4		
I	L - Lecture; T -	Tutorial; P - P	Practical; C- Credit; S- Self Study	; TC	H- To	otal	Contac	t Hou	urs		

	SEMESTER – V										
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	Т	Ρ	С	S	тсн		
1	PC	CEB4301	Design of Concrete Structures	3	1	0	4	1	4		
2	PC	CEB4302	Structural Analysis II	3	1	0	4	1	4		
3	PC	CEB4303	Geotechnical Engineering	3	0	0	3	1	3		
4	PC	CEB4304	Transportation Engineering – I	3	0	0	3	1	3		
5	РС	CEB4305	Construction Management	3	0	0	3	1	3		
6	DE	CEC43**	Department Elective III	3	0	0	3	0	3		
7	NE	CED43**	Non-Department Elective III	2	0	0	2	0	2		
Practi	cal										
8	РС	CEB4331	Transportation Engineering Lab	0	0	3	1	0	3		
9	PC	CEB4332	Geotechnical Engineering Lab	0	0	3	1	0	3		
10	РС	CEB4333	Design Project III	0	0	2	1	0	2		
		То	tal	20	2	8	25	5	30		
1	Н	CEH4361	Construction Planning & Cost Estimation	3	0	0	3	0	3		
2	М	CEM4361	GIS Data Acquisition, Automation, and Applications	3	0	0	3	0	3		
l	Lecture; T - ⁻	Tutorial; P - P	Practical; C- Credit; S- Self Study; 1	ГСН-	Tota	al Co	ontact	t Ho	urs		

	SEMESTER –VI											
SL.	COURSE CATEGORY	COURSE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн			
1	BS	MAA4301	Optimization Techniques	3	1	0	4	0	4			
2	РС	CEB4316	Design of Steel Structures	3	1	0	4	1	4			

CURRICULUM AND SYLLABUS B. TECH – CIVIL									
3	PC	CEB4317	Hydraulic Engineering	3	1	0	4	1	4
4	BS	GEA4316	Professional Ethics & Life Skills	2	0	0	2	1	2
5	DE	CEC43**	Department Elective IV	3	0	0	3	0	3
6	NE	CED43**	Non- Department Elective IV	2	0	0	2	0	2
Practical									
7	PC	CEB4341	Hydraulic Engineering Lab	0	0	3	1	0	3
8	PC	CEB4342	Computer Aided Structural Analysis Lab	0	0	3	1	2	2
9	PC	CEB4343	Design Project IV	0	0	2	1	0	2
Total				16	3	8	22	5	26
2	Н	CEH4376	Project Management & Scheduling	3	0	0	3	0	3
3	Н	CEH4377	Infrastructure Project Management	3	0	0	3	0	3
3	М	CEM4376	Remote Sensing and GIS	3	0	0	3	0	3
L - Lecture; T - Tutorial; P - Practical; C- Credit; S- Self Study; TCH- Total Contact Hours									

SEMESTER –VII										
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн	
1	PC	CEB4401	Foundation Engineering	3	1	0	4	1	4	
2	PC	CEB4402	Transportation Engineering II	3	0	0	3	1	3	
3	PC	CEB4403	Estimation and Quantity Surveying	3	0	0	3	1	3	
4	PC	CEB4404	Quality Control & Assurance in Construction.	3	0	0	3	1	3	
5	BS	GEA4404	Business Economics	2	0	0	2	0	2	
6	DE	CEC44**	Department Elective V	3	0	0	3	0	3	
7	NE	CED44**	Non-Department Elective V	2	0	0	2	0	2	
Practical										
8	PC	CEB4431	Computer Aided Design and Drafting	0	0	3	1	0	3	
9	PC	CEB4432	Comprehension	1	0	0	1	0	1	
10	PC	CEB4433	Design Project / Internship	0	0	2	1	0	2	
Total			20	1	5	23	4	26		
4	Н	CEH4462	Project management for managers	3	0	0	3	0	3	
L - Lecture; T - Tutorial; P - Practical; C- Credit; S- Self Study; TCH- Total Contact Hours										

SEMESTER – VIII									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тс н
1	PC	CEB4441	Project & Viva - voce	0	0	24	8	0	24
Total				0	0	24	8	0	24
LIST O	F DEPARTMEN		ES OFFERED BY DEPARTMENT	OF	CIV	'IL E	NGI	NEE	RING
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SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн
		1	SEMESTER – III						
1	DE	CEC4251	Engineering Geology	3	0	0	3	0	3
2	DE	CEC4252	Irrigation Engineering	3	0	0	3	0	3
3	DE	CEC4253	Renewable Energy	3	0	0	3	0	3
4	DE	CEC4254	Housing Planning and Management	3	0	0	3	0	3
5	DE	CEC4255	Modern Construction Materials	3	0	0	3	0	3
	F	T	SEMESTER – IV				1		
1	DE	CEC4266	Applied Hydrology	3	0	0	3	0	3
2	DE	CEC4267	Remote Sensing Techniques and Applications	3	0	0	3	0	3
3	DE	CEC4268	Air Pollution Management	3	0	0	3	0	3
4	DE	CEC4269	Concrete Technology	3	0	0	3	0	3
5	DE	CEC4270	Water Resources Engineering	3	0	0	3	0	3
6	DE	CEC4271	Building Services	3	0	0	3	0	3
			SEMESTER – V	L	<u> </u>		<u>. </u>	<u> </u>	
1	DE	CEC4351	Concepts in Environment Impact Assessment	3	0	0	3	0	3
2	DE	CEC4352	Geo Environmental Engineering	3	0	0	3	0	3
3	DE	CEC4353	Ground Improvement Techniques	3	0	0	3	0	3
4	DE	CEC4354	Earthquake Engineering	3	0	0	3	0	3
5	DE	CEC4355	Wind Engineering	3	0	0	3	0	3
6	DE	CEC4356	Industrial Waste Management	3	0	0	3	0	3
		1	SEMESTER – VI				Γ	1	
1	DE	CEC4366	Green and Smart Buildings	3	0	0	3	0	3
2	DE	CEC4367	Pre-stressed Concrete	3	0	0	3	0	3
3	DE	CEC4368	Design of Steel Concrete Composite Structures	3	0	0	3	0	3
4	DE	CEC4369	Repair and Rehabilitation of Structures	3	0	0	3	0	3
5	DE	CEC4370	Health and Safety Practices in Construction Industry	3	0	0	3	0	3
6	DE	CEC4371	Pavement Design and Engineering	3	0	0	3	0	3
	<u> </u>		SEMESTER – VII						
1	DE	CEC4451	Traffic Engineering and Management	3	0	0	3	0	3
2	DE	CEC4452	Municipal Solid Waste management	3	0	0	3	0	3
3	DE	CEC4453	Bridge Structures	3	0	0	3	0	3
4	DE	CEC4454	Storage Structures	3	0	0	3	0	3
5	DE	CEC4455	Tall Structures	3	0	0	3	0	3
6	DE	CEC4456	Industrial Structures	3	0	0	3	0	3
7	DE	CEC4457	Prefabricated Structures	3	0	0	3	0	3
8	DE	CEC4458	Basics of Dynamics and Aseismic Design	3	0	0	3	0	3

LI	ST OF NON-D	EPARTMEN	IT ELECTIVES OFFERED BY THE ENGINEERING	E DEF	PAR	ТМЕ	ENT	OF	CIVIL
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн
		I	SEMESTER – III	1	<u> </u>		<u> </u>	<u> </u>	
1	NE	CED4281	Solid waste Management	2	0	0	2	0	2
		-	SEMESTER – IV				<u></u>		
2	NE	CED4291	Air and Noise Pollution Control	2	0	0	2	0	2
			SEMESTER – V						
1	NE	CED4381	Sustainable Engineering Practices	2	0	0	2	0	2
2	NE	CED4382	Environmental Impact Assessment for Engineering Projects	2	0	0	2	0	2
			SEMESTER – VI						
1	NE	CED4391	Project Safety Management	2	0	0	2	0	2
2	NE	CED4392	Introduction to Oceanography	2	0	0	2	0	2
	-		SEMESTER – VII		T			T	
1	NE	CED4481	Intelligent Transportation systems.	2	0	0	2	0	2
2	NE	CED4482	Introduction to Road Safety and Management.	2	0	0	2	0	2
3	NE	CED4483	Standards and Practices in Civil Engineering.	2	0	0	2	0	2

	SEMESTER – I ENGINEERING GRAPHICS AND COMPUTER AIDED														
COURS	E TITLE	E	ENGI	NEERIN	NG GR	APHIC DES	S AND SIGN	СОМР	UTER	AIDED		CRED	ITS	3	
COURS	e cod	E	SEMESTER - I INGINEERING GRAPHICS AND COMPUTER AIDED DESIGN CREDITS 3 MEA4101 COURSE CATEGORY BS L-T-P-S 1-1-2-1 1.0 Approval Details 24 ACM, 30 th May 2018 LEARNING LEVEL BTL-3 Second Periodical Assessment Practical Component ESE sis course broadly introduces the mechanical design using computer aided design ols and fundamentals of free hand sketching. It prepares the students to learn the asic concepts involved in technical drawing skills and computer graphics. It also mphasis on the principles and basic understanding of projections and visualizations pects of component designing. The course should enable the student to, Understand the basics of Engineering graphics and plane curvatures using AutoCAD tool Visualize the free hand sketch and orthographic projections and to solve simple problems Comprehend the various geometrical models and its developments Understand the transformation of 2D drafting to 3D models using CAD tools Generate associated views of 3D models and related geometric dimensioning and												
Ver	sion		1	L.O		Appr	oval D	etails	24 3(4 ACM D th May 2018	,	LEARN LEVI	ING El	BTL	-3
ASSESS	MENT	SCHE	ME												
First Pe	eriodica	l Asse	ssment		Sec	ond Pe Assessn	riodica nent	I		Practic	al Com	ponent	:	ES	E
	15	%				15%	6				20%			509	%
Coı Descr	ırse iption	Tł tc ba ei	nis cou pols an asic co mphasi spects (rse br d fund ncepts is on tl of com	oadly lamen s invo he pri	introd tals of lved ir nciples nt desi	uces the free h techr and ba gning.	he mee and sk nical d asic un	chanic etchin rawinរ្ dersta	al desi g. It pr g skills inding	gn usi epare and of of pro	ng con s the s comput jection	nputer tudent ter gra s and v	aided d s to lear phics. It visualizat	esign n the : also tions
Coı Obje	ırse ctive	1. 2. 3. 4. 5.	 The course should enable the student to, 1. Understand the basics of Engineering graphics and plane curvatures using AutoCAD tool 2. Visualize the free hand sketch and orthographic projections and to solve simple problems 3. Comprehend the various geometrical models and its developments 4. Understand the transformation of 2D drafting to 3D models using CAD tools 5. Generate associated views of 3D models and related geometric dimensioning and tolerancing 												
Cou Outo	ırse come	1. 2. 3. 4. 5.	 Upon completion of this course, the students will be able to, Use the AutoCAD commands to generate simple drawings and understand drafting techniques. Apply the acquired knowledge to solve simple problems involving straight planes and solids. Visualize solid objects and apply AutoCAD commands to generate the models. Recognize and use 3D model commands in AutoCAD tool to generate solid objects. Generate the various views of the geometrical solid model manually and using AutoCAD as well 												
Prerequ	isites:	Nil													
CO, PO	AND	PSO N	IAPPI	NG											
со	РО	PO	PO	PO	PO	PO	РО	PO	PO PO PO PO PSO PSO PSO						PS
<u> </u>	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2	0-3
CO-1	۷	T	-	-	-	1 -	- 1	- 1	- 1	-	-	-	-	1 -	-

CO-2 2 - 3															
CO-2	-	-	2	-	3	-	-	-	-	-	-	-	-	-	-
CO-3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-
CO-5	-	-	3	-	-	-	-	-	-	-	-	1	-	-	-
		1	: Wea	kly rela	ated, 2	2: Mod	leratel	y relat	ed and	d 3: St	rongly	relate	d		
MODU	LE 1: B	ASICS	OF EN	GINEE	RING	GRAPH			NE CU	JRVES			(6	L+6P=12	2)
Importa	nce o	f grap	hics -	BIS co	onvent	ions a	and sp	ecifica	tions	- draw	/ing sl	neet si	zes -		
Letterin	g – Dii	mensio	oning -	Scale	s. Dra	fting n	nethoo	ls - int	roduct	tion to) Com	outer A	Aided		
Drafting	, – Coi	npute	r Hard	ware ·	– Wor	kstatio	on – P	rinter	and P	lotter	– Intr	oductio	on to		
softwar	e for C	omput	er Aid	ed Des	ign an	d Draf	ting – I	Exposu	re to S	olid M	odelliı	ng soft	ware	<u> </u>	1
– Geom	etrical	Const	ructior	n-Coor	dinate	Syste	ms/Ba	sic Ent	ities –	3D pri	nter.			BTI	.2
Practica	l comp	ponent	t:											012	-
AutoCA	D – Sol	id moo	delling	tool -	Basics	•									
Suggest	ed Rea	adings	:												
Basics o	asics of drafting and dimensioning IODULE 2: VISUALIZATION, ORTHOGRAPHIC PROJECTIONS AND FREE HAND SKETCHING														
MODUL	10DULE 2: VISUALIZATION, ORTHOGRAPHIC PROJECTIONS AND FREE HAND SKETCHING (isualization concepts and Free Hand sketching: Visualization principles —														
Visualiz	'isualization concepts and Free Hand sketching: Visualization principles —														
Represe	epresentation of Three-Dimensional objects — Pictorial Projection methods - Layout of														
views- F	ree ha	and ske	etching	g of mu	ultiple	views	from	pictori	al view	/s of o	bjects.	Drafti	ng of		
simple	Geom	etric	Object	s/Editi	ng G	eneral	princ	iples	ot pre	esenta	tion c	of tech	inical		
drawing	gs as pe	er BIS -	- Introc	duction	n to Oi	rthogr	aphic p	project	ions - I	Namin	g view	vs as pe	er BIS		-
- First a	ngle p	rojecti	ion me	ethod.	Conve	ersion		nograp	nic vie	ews tro	om giv	en pic	torial		-2
views o	robjec	ts, inc	luaing	aimer	Isionir	ig – Dr	atting	of Ort	nograp		ews tro		torial	BIL	-2
views.	1.00.000		. .												
2D draf	ting C	onen	ranhic	nroioc	tions										
Suggest	ed Rea	dings	•	projec	tions										
AutoCA	D tool	l – Con	nmano	ls for «	sketch	ing. P	roiecti	ions							
MODUL	E 3: GI	EOME	TRICAL	. MOD	ELLING	G, ISO I	METRI	C AND	DEVE	OPM		F SURF	ACES(6	L+6P=12	2)
Principle	es of is	ometr	ic proj	ection	and so	olid me	odellin	g. Ison	netric (drawin	ıg — İsc	Planes	and		
3D Mod	elling	comma	ands. F	roject	ions o	f Princ	ipal Vi	ews fr	om 3-D) Mod	els. So	lid Mo	deling		
 Types of modelling - Wire frame model, Surface Model and Solid Model – Introduction 															
to graphic software for solid modelling. Development of Surfaces													CO-3		
Practica	l comp	onent	t:											BTL	-3
3D mod	elling a	and su	rface c	levelop	oment										
Suggest	ed Rea	dings	:												
Surface	model	ling ar	nd solid	d mode	elling										
MODUL	E 4: CC	OMPU.	TER AI	DED D	ESIGN	AND	DRAFT	ING						(6L+6P	=12)

Preparation of s bushed bearing, (open type), ver and sectional vi from the 3D m Presentation Te 2D/3D drawing of Practical compo 2D to 3D transfor Suggested Read 3D modelling – V	solid models of machine components like slide block, solid bearing block, gland, wall bracket, guide bracket, shaft bracket, jig plate, shaft support rtical shaft support etc using appropriate modelling software. 2D views ew, computer aided drafting and dimensioning. Generate 2D drawing nodels – generate and develop the lateral surfaces of the objects. chniques of Engineering Drawings – Title Blocks – Printing/Plotting the using printer and printing solid object using 3D printer. Dnent: ormation, plotting of drawings ings: view generations and commands	CO-4 BTL-2
MODULE 5: SIM	PLE DESIGN PROJECTS – COMPUTER AIDED DESIGN	(6L+6P=12)
Creation of eng Frame and sha generation for c solid-modelling assembly levels include: window color coding acc Practical compo 3D solid meshec Suggested Read AutoCAD dimer	sineering models and their presentation in standard 2D form, 3D Wire- aded solids, meshed topologies for engineering analysis, tool-path omponent manufacture, geometric dimensioning and tolerancing. Use of software for creating associative models at the components and in their respective branch of engineering like building floor plans that vs, doors, fixtures such as WC, Sink, shower, slide block, etc. Applying cording to drawing practice. ment: I topology, geometrical dimensioning, simple components ings: nsioning, assembly of solid components	CO-5 BTL-3
TEXT BOOKS		
1.	Jeyapoovan, T. (2016). <i>Engineering Drawing and Graphics Using AutoCAD</i> Vikas Publishing House Pvt Ltd., New Delhi.), 7 th Edition,
REFERENCE BOO	DKS	
1.	Warren J. Luzadder and Jon. M. Duff. (2016). <i>Fundamentals of Engineerin</i> Prentice Hall of India Pvt. Ltd., Eleventh Edition.	ng Drawing,
2.	Jensen, J.D. Helsel, D.R. Short. (2012). <i>Engineering Drawing and Design</i> , N Sixth Edition.	AcGraw-Hill,
E BOOKS		
1.	http://keralatechnologicaluniversity.blogspot.com/2015/06/engineering benjamin-pentex-freeebook-pdf-download.html	g-graphics-j-
2.	http://keralatechnologicaluniversity.blogspot.com/2015/07/engineering varghese.html	g-graphics-p-i-
MOOC		
1.	http://nptel.ac.in/courses/112103019/	
2.	http://nptel.ac.in/courses/105104148/	

COURSE TITLE		MATRICES AND CALCULUS CREDITS 4 COURSE COURSE COURSE COURSE													
COURSE CODE		MAA	4101		CA CA	OURS TEGOI	E RY		BS			L-T-P-S	5	3-0-2	2-1
Version		1.	0		Appro	oval D	etails	30	24 A0 th May	CM / 2018	LE	EARNIN LEVEL	NG	BTL	-3
ASSESSMENT	SCHE	ME													
First Periodical Assessment	Sec	cond P Assess	eriodio ment	cal		Prac	tical c	ompoi	nent				ES	E	
15%		15	%				20	%					50	%	
Course Description	To MA	make TLAB	the	stude	nt und	dersta	nd th	e bas	ic cor	ncepts	of m	natrice	s and	calculu	s using
Course Objective	 Know how to perform some simple operations on matrices Understand effectively the basic concepts of differentiation and partial differentiation and their applications. Perform integration and other operations for certain types of functions and carry out the computation fluently. Classify ordinary differential equations. 														
Course Outcome	1. 2. 3. 4.	Upon Under Under Under Under	comp rstand rstand rstand rstand	l etion I the c I the c I the c I the c	n of th concep concep concep concep	is cou ot of m ot of fe ot of In ot of o	rse, th natrice ature ntegral rdinar	ne stu Is and Is in D I Calcu Y diffe	dents Eigen ifferer ulus erentia	will b Value ntial Ca al equa	e able s. alculu ation	e to, s			
Prerequisites:	Nil														
CO, PO AND P	SO M	APPIN	IG												
со	РО -1	PO -2	РО -3	РО -4	PO -5	РО -6	РО -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2	PSO -3
CO-1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	2 1 1 1														
CO-4	2	1	-	-	1	1	1	-	-	-	-	-	-	-	-
		1: We	akly r	elated	d, 2: M	lodera	tely r	elated	and	3: Stro	ongly	related	ł		
MODULE1: MA	ATRIC	ES (13	BL+2P	=15)											

Characteris theorem (St theorem- D Practical Co • Lab Han Suggested	itic equation – Eigen values and Eigenvectors – Properties – Cayley Hamilton tatement only) – Verification and inverse of the matrix using Cayley Hamilton iagonalization of matrices using similarity transformation. Omponent: 1: Eigen values and Eigenvectors, Verification and inverse using Cayley nilton theorem- Diagonalization Reading: Basics of Matrices	CO-1 BTL-3
MODULE 2:	DIFFERENTIAL CALCULUS (13L+2P=15)	
Methods of trigonomet Total differe Practical Co • Lab Suggested F	f differentiation of functions – Product and Quotient rules – Inverse ric functions – Implicit function – parametric form. Partial differentiation – entiation- Taylor's series – Maxima and minima of functions of two variables omponent: 2: Taylor's series – Maxima and minima of functions of two variables Reading: Basics of Differentiation	CO-2 BTL-3
MODULE 3:	INTEGRAL CALCULUS (13L+2P=15)	
Integration Integration Area, Surfac Practical Co Practical Co Lab3: Appli Suggested	 Methods of integration – Substitution method – Integration by parts – using partial fraction – Bernoulli's formula. Applications of Integral Calculus: ce and Volume. Omponent: Component: Control of Integral Calculus: Area, Surface area and Volume. Reading: Basics of Integrations 	CO-3 BTL-3
MODULE 4	: ORDINARY DIFFERENTIAL EQUATIONS (13L+2P=15)	
equations v Practical Co Suggested	Cosax, $x^m_{,}$ e ^{ax} Cos bx, e ^{ax} Sin bx. Solutions of homogeneous differential vith variable coefficients – Variation of parameters. omponent: Lab 4: Solution of Second order differential equations. Reading : Basics of Differential Equations.	CO-4 BTL-3
TEXT BOOK	S	
1.	Grewal B.S. (2014). <i>Higher Engineering Mathematics,</i> Khanna Publishers, Nev Edition.	w Delhi, 43rd
2.	Bali N. P and Manish Goyal. (2011). A Text book of Engineering Mathematics, Laxmi Publications Pvt Ltd.	, Eighth Edition,
3.	Chandrasekaran A. (2010). <i>A Text book of Engineering Mathematics I,</i> Dhana Chennai.	m Publications,
REFERENCE	BOOKS	
1.	Srimantha Pal and Bhunia, S.C. (2015). Engineering Mathematics, Oxford Uni	versity Press.
2.	Weir, M.D and Joel Hass. (2015). <i>Thomas' Calculus</i> , 12th Edition, Pearson Ind	lia.
3.	Dean G. Duffy. (2011). Advanced Engineering Mathematics with Matlab, Thir CRC Press.	d Edition, by
E BOOKS		
1.	http://nptel.ac.in/courses/111105035/	
2.	https://www.edx.org//introduction-engineering-mathematics-utarlingtonx-e	ngr3
MOOC		
1.	https://www.mooc-list.com/tags/engineering-mathematics	

COURS	SE TITL	.E			ENG	GINEE	RING I	PHYSIC	CS			CRED	DITS		3	
CO CC	URSE DDE		PH	44101		C	COUI ATEG	RSE ORY		BS	5	L-	T-P-S	3-(0-0-0	
Ve	rsion			1.0		Арр	oroval	Detai	ls	24 A 30 th N 201	CM May 18	LEA	RNING EVEL	В	TL-3	
ASSES	SMEN	T SCH	EME													
First Po Asses	eriodic ssment	al	Second Asse	Period ssmen	lical t	As	Semin ssignm Proje	ar/ ents/ ect	:	Surprise Qui	Test / iz	Atte	endance		ESE	
1	5%		1	15%			109	6		5%	6		5%	5	50%	
Co Desci	urse riptio	n Tl ad in N	his cou erivatio coustics this co lechani	urse cons, foi s, ultra ourse. cal bra	leals first y sonics Intend anches	with f vear B. , quan ded fo	^f undaı Tech tum p r Aerc	menta stude hysics onauti	l prir nts; th , cryst cal, A	nciples ne princi ral physi utomob	of ph iples a cs, las ile, Bi	ysics, nd app ers and o tech.	using lication fiber oj , Chemi	mathen s of elas otics are ical, Civ	natical sticity, e dealt ril and	
Cours Object	e tive	1. 2. 3. 4. 5.	 The course should enable the student to, Explain stress, strain and elastic moduli and apply the concepts to solve basic problems Apply principles of acoustics to solve basic problems and use ultrasonics as an engineering tool Explain particle nature of radiation, compute Schrodinger's wave equation and apply it to infinite potential well Identify crystal structures and crystal planes, describe different magnetic materials and hysteresis based on concept of ferromagnetic domains. Discuss the principles, working and applications of lasers and fiber optics 													
Cours Outco Prereq	e me Juisites	1. 2. 3. 4. 5. 5.	 Upon completion of this course, the students will be able to Solve the basic problems in elasticity and explain the properties of matter Apply the knowledge of acoustics in designing acoustical buildings and employing ultrasonic as an engineering tool. Use mathematical derivations to solve quantum problems. Identify the crystal lattice planes, distinguish different magnetic materials, and explain the ferromagnetic domain. Familiarize with the principles, working and applications of lasers and fiber optics. 													
CO, P	PO AN	ID PSO MAPPING														
со	PO	PO	PO-	РО	PO-	PO	PO	PO	PO	PO-	PO	PO-	PSO	PSO	PSO	
CO-1	-1 3	-2 2	3 0	-4 0	5 0	-6 0	-/	-8 0	-9 0	0	-11	3	-1	-2 -	-3 -	
CO-2	3	2	0	0	3	0	0	0	0	0	0	3	-	-	-	
			I	I	I	1	L	1	I	1			1			

CO-3	3	2	0	0	3	0	0	0	0	0	0	3	-	-	-
CO-4	3	2	0	0	2	0	0	0	0	0	0	3	-	-	-
CO-5	3	2	0	0	3	0	0	0	0	0	0	3	-	-	-
			1: We	akly re	lated,	2: Mo	derat	ely rel	ated a	and 3: S	trong	ly relat	ed		
MODU	LE 1:	PROP	ERTIES	OF MA	ATTER		IEAT					()	9L)		
Elastici Bulk mo modulu and noi	ty - H odulu ıs of a n-unil	ooke' s - Tw a wire form k	s law- I visting c - Depr pending	Elastic couple ression g. Ther	Modul on a w of a c mal co	i - You vire - 1 antile onduct	ing's r Forsio ver - y ivity -	nodul nal pe /oung' exper	us of e ndulu s moc riment	elasticit m - det dulus by tal dete	y - Rig ermin / cant rmina	gidity m ation o ilever - ition of	odulus f rigidit uniforr therma	- y n al C	:0-1 TI_3
disc me	thod	for ba	ad cond	luctors			OIDE	5 meti	100 - (5 0	12-3
MODUL	.E 2: /	ACOUS	STICS A	ND UL	TRASC	ONIC						(9	9L)		
Classification of sound - Characteristics of musical sound – intensity - loudness - Weber Fechner law - Decibel - Reverberation - Reverberation time, derivation of Sabine's formula for reverberation time (Jaeger's method) - absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies Ultrasonics- Production – Magnetostriction and Piezoelectric methods – properties – applications MODULE 3: QUANTUM PHYSICS(5L+4L=9)														r a - C - B	:0-2 :TL-3
MODULE 3: QUANTUM PHYSICS(5L+4L=9)															
MODULE 3: QUANTUM PHYSICS(5L+4L=9) Black body radiation- Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jean's law from Planck's theory - Compton effect – Theory and experimental verification Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one-dimensional box - Extension to 3 dimensions (no derivation)													v al C - B	:O-3 ;TL-3	
MODUL	.E 4: 0	CRYST	AL PHY	SICS A	ND MA	AGNET	ISM					(9L)			
MODULE 4: CRYSTAL PHYSICS AND MAGNETISM(9L)Crystal - Lattice - Unit cell - Bravais lattice - Lattice planes - Miller indices - 'd' spacing in cubic lattice - Calculation of number of atoms per unit cell - atomic radius - coordination number - Packing factor for SC, BCC, FCC and HCP structures.Magnetic dipole moment - atomic magnetic moments- magnetic permeability and susceptibility - Types of magnetism: diamagnetism - paramagnetism - ferromagnetism - antiferromagnetism- ferrimagnetism - domain structure - hysteresis - hard and soft magnetic materials - applications.													n n d C	:O-4 TL-3	
MODULE 5: PHOTONICS AND FIBER OPTICS (9L)															
Principle of lasers - Stimulated absorption - Spontaneous emission, stimulated emission - population inversion - pumping action - active medium - laser characteristics – Nd-YAG laser - CO ₂ laser - Semiconductor laser – applications - Optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - types of optical fibers - single and multimode, step index and graded index fibers - fiber optic communication system. TEXT BOOKS												r C s B	:0-5 TL-3		

1.	P.Mani. (2011). Engineering Physics, Voll& II, Dhanam Publications, Chennai.
REFEREN	CE BOOKS
1.	Gaur R.K. and Gupta S.L. (2010). <i>Engineering Physics</i> , 8 th edition, DhanpatRai publications (P) Ltd., New Delhi.
2.	P. Charles, Poople and Frank J. Owens. (2007). <i>Introduction to Nanotechnology</i> , Wiley India.
3.	Arthur Beiser. (2007). Concepts of Modern Physics, Tata McGraw – Hill Publications.
4.	Rajendran V. Marikani A. (2003). <i>Applied Physics for engineers</i> , 3rd edition, Tata McGraw –Hill publishing company Ltd., New Delhi.
E BOOKS	
1	https://books.google.co.in/books?id=w4crDAAAQBAJ&printsec=frontcover#v=onepage&q
1.	<u>&f=false</u>
2.	https://www.goodreads.com/book/show/789047.Physics for Scientists and Engineers
моос	
1.	https://www.coursera.org/learn/how-things-work
2.	https://www.coursera.org/learn/quantum-physics
3.	https://onlinecourses.nptel.ac.in/noc21_ph21
4.	https://onlinecourses.swayam2.ac.in/aic20_sp64

	COUR	SE TITLE		ENGINEERING MATERIALS (Common to ALL Branches of Engineering) COURSE							CRE	DITS		3	
	COUR	SE CODE	:	C	(A41)	01) CA	COURS	E RY		BS	L	-T-P-S	3	-0-0-0
	Ve	ersion			1.0		Appr	oval D	etails	24 30	th ACM - .5.2018	LEA	RNING EVEL	E	STL-3
ASSESS	MENT	SCHEME													
First F	Periodi	cal Asses	ssmen	t Pe Ass	econ riodi essm	d cal ent	Se Assi	emina ignme Projec	r/ nts/ t	Si Tes	urprise st / Quiz	A	ttendan	ice	ESE
	-	15%			15%			10%			5%		5%		50%
C	ourse	Descripti	on	To Ma	make terial	e the s s and	tudent their a	s undo pplica	erstand tions.	d the b	asic coi	ncepts	of Engin	eering	
Course	Object	tive		1. 2. 3. 4. 5.	 phase rule. To provide an exposure on the fundamentals of powder metallurgy and applications of inorganic materials and composites. To give a strong foundation on the basic concepts of nanomaterials, the general synthetic methods with emphasis on their applications. To illustrate the applications of conducting polymers and liquid-crystals, with a good exposure on their basic terminologies. To provide a knowledge on the theoretical basis of the chemical composition, properties and applications of lubricants, adhesives and explosives 									y and ls, the rystals, and	
Course Prerequ	Outco isites:	me Knowled	lge in ⁻	1. 2. 3. 4. 5.	Upor Prop State appli Sugg selec Ident liquid Disti / adh ntals	n comp ose and and s cation est an ct a pro tify the d- crys nguish nesive of che	oletion od justi select a os. appro operty- e mate tals in and se / explo emistry	of this fy suita suitat guided rials w electro elect a osive b	s cours able m ble high techni d mole hich ca bnic de suitab ased o her see	e, the etals/r n-temp que fo cular n an be e vices. le orga <u>n its ap</u> condar	student naterial perature r nanon naterial employe nnic / in- oplicatio	s will b s for al material for a g ed as or organic	e able to loying. ial for ir synthe iven app ganic co materia	o ndustria sis and olication onducto al as lul	al also n. ors and bricant
CO, PO		SO MAP	PING				,	5			-				
со	РО	РО	РО	РО	РО	РО	РО	РО	РО	PO1	PO1	PO1	PSO	PSO	PSO
_	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
CO1	3	2	1	-	-	-	1	-	-	-	-	1	-	-	-
02	3	2	L	-	_	-	2	-	-	-	-	2	-	-	-

CO3	3	2	1	1	-	-	2	-	-	-	-	2	-	-	-
CO4	3	2	1	1	-	-	2	-	-	-	-	2	-	-	-
CO5	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
		2	L: Wea	akly rel	ated, 2	2: Mod	eratel	y relat	ed and	d 3: Str	ongly r	elated			
MODUL	E 1: C	RYSTAL S	TRUC	TURE A	ND PH	ASE R	ULE	(91	_)						
Basic cry diffractic Basic ter Two com Pb syster	vstal s on and minolo poner m, Pb-	ystems - crystal s ogy - Dei nt system Sn systei	– Type tructu rivatio n –- Re n – Ap	es, cha ire. n of Gi duced j oplicatio	racteri: bbs Ph phase r ons of j	stics, e ase ru rule: Si phase	examp le- Pha mple E rule.	les – : ase dia Eutecti	Space Igrams c syste	lattice : One m, exa	, Unit compor mples,	cell – t nent sys Phase c	ypes – stem (w liagram	X-ray ater), : Ag-	CO-1 BTL- 1, 2,3
MODUL	E 2: PC	WDER N	/IETAL	LURGY	, INOR	GANIC		ERIALS	AND (СОМРО	DSITES	(9L)			
Steel – C – Classif Compos Types ar Powder	Compo icatior ites - I nd App Metall	sition, ty n, Proper ntroduct Ilications Iurgy – P	pes, h ties, A ion - E repara	eat-tre pplicat Definitic ntion of	atmen ions. G on – Co metal,	t, Abra lasses onstitue /alloy–	asives - – Prop ents – - Adva	– Class perties, Classif ntages	ificatic , Types icatior and lii	on, Pro s, Spec n - Fibe mitatic	perties, ialty gla r-reinfo ons.	Uses - isses. orced Co	Refract	ories es –	CO-2 BTL- 1,2
MODULI	3: NA	NOMAT	ERIAL	S AND	MOLE	CULAR	SIEVE	S (9	L)					-	
Introduction – Synthesis of Nanomaterials - Bottom-up and Top-down approaches – Methods of preparation – Sol-gel process, Gas-phase condensation, Chemical Vapour Deposition. Properties – Optical, Electrical, Magnetic, Chemical properties (introduction only). Characterization – FE-SEM, TEM (Principle and Applications only). Zeolite Molecular sieves – composition, structure, classification - applications – ion exchange, adsorption, separation, laundry, catalysis.MODULE 4: MATERIALS FOR ELECTRONIC APPLICATONS(9L)														CO-3 BTL- 2, 3	
MODULE 4: MATERIALS FOR ELECTRONIC APPLICATONS(9L)															
Liquid Cu in Therm Liquid Cu Conduct Polycarb Polymer applicati	rystals notrop rystals ing an onate s, Ext ons.	- Introdu ic Liquid - Applica ad Super – Prop rinsic Co	ction Crysta tions. cond erties onduct	– Chara Ils – Mo ucting and u ing Po	acterist blecular Organi uses- (lymers	ics – C r arran c elect Conduc s, App	lassific gementronic cting licatio	cation- nt in va mater Polymo ns - B	Therm irious s ials - A ers: Cl iodegr	notrop states o Applica lassific radable	ic crysta of Liquid ations. I ation, e Polyn	als Po d Crysta Enginee Intrinsio ners, e	olymorp ils, Lyoti ering pla c Condi xamples	hism ropic astics: ucting s and	CO-3 BTL- 1,2
MODULI	5: LU	BRICAN	rs, ad	HESIVE	S AND	EXPLO	OSIVES	6(9L)						-	
Lubricants – Mechanism of Lubrication, Classification and Properties, Semi Solid Lubricants, Solid Lubricants, MoS ₂ and Graphite - Adhesives – Development of Adhesive strength, Physical and Chemical factors influencing adhesive action, Classification of Adhesives – Epoxy Resin (Preparation, Properties and Applications). Explosives – Requisites, Classification, Precautions during storage – Rocket propellants – Requisites - Classification.													CO-4 BTL- 1,2		
TEXT BO	OKS														
1P.C. Jain and Monicka Jain. (2012). Engineering Chemistry, Dhanpat Raj.Publishing Company (P) Ltd, New Delhi.															
2 Puri, Sharma and Pathania. (2004). <i>Principles of Physical Chemistry</i> , Vishal Publis Co. Jalandar.													lishing		
REFERENCE BOOKS															
	1		к.к. с	hawala	. (2012	2). Com	nposite	e mate	rials, S	pringe	r-Verla	g, 3 rd ed	, New Y	ork.	

2.	P. M. Ajayan, L. S. Schadler, P. V. Braun. (2003). <i>Nanocomposite Science and Technology,</i> Wiley-VCH Verlag GmbH Co. KGaA, Weinheim.
3.	V.V. Vasiliev and E.V. Morozov. (2001). <i>Mechanics and Analysis of Composite Materials</i> . Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 IGB, UK.
E BOOKS	
1.	http://www.erforum.net/2016/01/engineering-chemistry-by-jain-and-jain- pdf-free-ebook.html
2.	https://abmpk.files.wordpress.com/2014/02/book maretial-science-callister.pdf/
моос	
1.	https://www.edx.org/course/materials-science-engineering-misisx-mse1x
2.	https://www.mooc-list.com/tags/materials-science

COURSE TITLE	PROFESSIONAL I	ENGLISH AND SOFT	SKILLS	CREDITS	3						
COURSE CODE	ELA4 101	COURSE CATEGORY	HS	L-T-P-S	2-0-2-1						
Version	1.0	Approval Details	24 ACM 30 th May 2018	LEARNING LEVEL	BTL-4						
ASSESSMENT SCHEM	E	-									
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendanc e	ESE						
15%	15%	10%	5%	5%	50%						
Course Description	This course has been c communication needs. skills and knowledge of to communicate accur situations.	designed to meet stud It attempts to develo grammar and vocabu ately, appropriately a	dents' current p their profic Ilary. This cou and fluently i	and future la iency in the fo irse teaches si n professiona	anguage and our language tudents how al and social						
Course Objective	 To acquire s informative language. To provide a levels and us debate. To equip the literary, scier To enhance recommenda writing. To equip the participate in in employabi 	self-confidence by whi listening skills by ar n environment to Spes e it for daily conversa students to Read, com ntific and technological the writing skills of th tions, checklists, proce learners in analyzing brainstorming, mind- lity skills	ch the learne n enhanced a ak in English tion, presenta prehend and a texts. he students v ess-description and applying mapping, audi	r can improve acquisition of at the formal a tion, group di- answer question ia training in h, letter-writin creative thinki ovisual activiti	e upon their the English and informal scussion and ons based on instructions, ag and report ng skills and ies and excel						
Course Outcome	Upon completion of th 1. Demonstrate focus on syn 2. Enrich vocal Derive the o general and ideas. Learn 3. Analyse and essays, read profiles in th 4. Organize and comprehens speaking in f	 participate in brainstorming, mind-mapping, audiovisual activities and excel in employability skills Upon completion of this course, the students will be able to Demonstrate the ability to construct sentences with accuracy with focus on syntax. Enrich vocabulary, use of phrases, expressions, idioms, and proverbs. Derive the contextual meaning through reading and listening from general and academic situations, Identify specific details and general ideas. Learn to give instructions and make suggestions. Analyse and transcode data, construct different types of written essays, read complex passages and summarize ideas, create personal profiles in the form of a resume. Organize and articulate ideas, concepts, and perceptions in a comprehensive manner in written business correspondence, and speaking in formal and informal situations 									

B.TECH – CIVIL ENGINEERING

5. Apply critical thinking skills and participate in brainstorming sessions on general topics, and transact information with an audience. Prepare students for interview questions, presentation skills. Produce complex written documents such as reports, business/scientific documents, and project proposals.

Prerequisites: Plus, Two English-Intermediate Level

CO, PO AND PSO MAPPING

со	PO- 1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	РО- 10	PO- 11	PO- 12	PSO -1	PSO -2	PSO -3
CO-1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO-2	-	-	-	-	-	-	-	2	2	3	-	-	-	-	-
CO-3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO-4	-	-	-	-	-	-	2	-	-	3	2	-	-	-	-
CO-5	-	-	-	-	-	-	-	-	2	3	2	3	-	-	-

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: FUNCTIONAL GRAMMAR AND VOCABULARY	(6L+6P=12)	
 Introduction to communication skills –Self Introduction - Basic grammar (tense agreement) - Basic vocabulary (prefixes, suffixes, roots, phrasal verbs and sentences, paragraph writing Suggested Activities: Short conversations-Situational Communication-Dialogue Writing - Writing sh based on environment protection, societal issues, health, cultural contexts er topic sentences, linking pairs of sentences. Suggested Reading: An Introduction to Professional English and Soft Skills with audio CD by Dr. Bil al. Published by Cambridge University Press. 2009 Professional Speaking Skills by ArunaKoneru, Oxford Press, 2015 Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhan Cambridge University Press 2016. English for Life and the Workplace Through LSRW&T skills, by Dolly John, F Publications, 2014 edition 	s, subject verb idioms)- Topic nort paragraph tc., identifying kram K. Das et nbhani, Pearson	CO-1 BTL-2
MODULE 2 – LISTENING AND SPEAKING SKILLS	(6L+6P=12)	
Academic listening (listening to lectures different topics, audio excerpts a question) - General listening (conversations, speeches: formal and infor instructions and suggestions- Active and Passive Voice Suggested activities: Listen and repeat, listening to audio excerpts-Listening to native speakers - The prepared speeches, Table topics – Speaking in different situations- MCQ's - C Complete the Dialogue Suggested sources: (Listening and Speaking Modules) – Language Lab Professional Speaking ArunaKoneru, Oxford Press	and answering mal) - Giving ED Talks, short loze exercises- ng Skills by	CO-2 BTL-3

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2014 edition								
MODULE – 3:	FUNCTIONAL READING AND WRITING(6L+6P=12)							
Reading comprehension (academic texts and general texts)-Reading and Interpreting visual data, charts, tables and graphs Report writing- accident, industrial, survey, general reports – Direct and Indirect speech Suggested Activities: Identify the errors in sentences, grammar exercise, reading passage for identifying the contextual meaning, interpreting charts, tables and graphs, choose the right meaning of the word given Assignment on suggested reading activity – Book review Suggested sources: Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016.								
MODULE – 4 :	BUSINESS CORRESPONDENCE (6L	+6P=12)						
Memo-Notice - Agenda – Minutes of the Meeting-Action Taken report- Report Writing- Connectives - Cause and effect Suggested activities: Drafting agenda, notice, memo, minutes of the meeting- ATR- Cause and effect exercises - Presentation in the language lab (Technical or Non-technical topic) Suggested sources: Cambridge Advanced English, Newspapers, library books, IELTS , IELTS Academic Writing 1, New Insights into IELTS, CUP								
MODULE 5 – F	PRESENTATION SKILLS AND INTERVIEW SKILLS(6L+6P=	12)						
Presentation Skills - Reading and Interpreting Advertisements—Job Application- Covering Letter -Curriculum Vitae –E-mail - Project proposal –Interview skills (HR questions) – Group DiscussionSuggested Activities: Presentation in the language lab (Technical or Non-technical topic) Group Discussion (Tutorial Classes)Suggested Sources: English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 editionSoft Skills and Employability Skills by Sabina Pillai and Agna Fernandez, Cambridge University Press, 2018. Education and personality development by K. Manoharan, APH Publishing Home, 2016								
Letter -Curricu Discussion Suggested Act Presentation i Group Discuss Suggested Sou English for Life 2014 edition Soft Skills and Press, 2018. Education and	Iskins - Reading and Interpreting Advertisements—Job Application- Covering lum Vitae –E-mail - Project proposal –Interview skills (HR questions) – Group ivities: In the language lab (Technical or Non-technical topic) ion (Tutorial Classes) irces: In the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, Employability Skills by Sabina Pillai and Agna Fernandez, Cambridge University personality development by K. Manoharan, APH Publishing Home, 2016	CO-5 BTL-3						
Letter -Curricu Discussion Suggested Act Presentation i Group Discuss Suggested Sou English for Life 2014 edition Soft Skills and Press, 2018. Education and	Ium Vitae –E-mail - Project proposal –Interview skills (HR questions) – Group ivities: In the language lab (Technical or Non-technical topic) ion (Tutorial Classes) irces: In and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, Employability Skills by Sabina Pillai and Agna Fernandez, Cambridge University personality development by K. Manoharan, APH Publishing Home, 2016	CO-5 BTL-3						
Letter -Curricu Discussion Suggested Act Presentation i Group Discuss Suggested Sou English for Life 2014 edition Soft Skills and Press, 2018. Education and TEXT BOOKS 1.	 Ium Vitae –E-mail - Project proposal –Interview skills (HR questions) – Group ivities: in the language lab (Technical or Non-technical topic) ion (Tutorial Classes) irces: and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, Employability Skills by Sabina Pillai and Agna Fernandez, Cambridge University personality development by K. Manoharan, APH Publishing Home, 2016 Dr. Bikram K. Das et al. (2009). An Introduction to Professional English and Soft S 	CO-5 BTL-3 Skills,						
Letter -Curricu Discussion Suggested Act Presentation i Group Discuss Suggested Sou English for Life 2014 edition Soft Skills and Press, 2018. Education and TEXT BOOKS 1. 2	 Skills - Reading and interpreting Advertisements—Job Application- Covering lum Vitae –E-mail - Project proposal –Interview skills (HR questions) – Group ivities: In the language lab (Technical or Non-technical topic) ion (Tutorial Classes) Inces: In and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, Employability Skills by Sabina Pillai and Agna Fernandez, Cambridge University personality development by K. Manoharan, APH Publishing Home, 2016 Dr. Bikram K. Das et al. (2009). An Introduction to Professional English and Soft S Cambridge University Press. Dolly John. (2014). English for Life and the Workplace Through LSRW&T skills, Pe Publications. 	CO-5 BTL-3 Skills,						

1.	Sabina Pillai and Agna Fernandez. (2018). Soft Skills & Employability Skills, Cambridge University
2.	Steve Hart et al. (2016). English for Undergraduates, Cambridge University Press.
3.	Collins. (2012). Skills for the TOEFL IBT Test, HarperCollins Publisher.
4.	Jeff Butterfield. (2010). Soft Skills for Everyone, Cengage Learning.
5.	ArunaKoneru. (2015). Professional Speaking Skills, Oxford Publications.
E BOOKS	
1.	https://www.britishcouncil.in/english/courses-business
2.	http://www.bbc.co.uk/learningenglish/english/features/pronunciation
3.	http://www.bbc.co.uk/learningenglish/english/
4.	http://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/
5.	https://oneshopenglish.com/
6.	https://breakingnews.com/
моос	
1.	https://www.mooc-list.com/tags/english
2.	https://www.mooc-list.com/course/adventures-writing-stanford-online
3.	http://www.cambridgeenglish.org/learning-english/free-resources/mooc/

B.TECH – CIVIL ENGINEERING

COL TI	JRSE TLE			PRO	BLEM S	OLVIN	CI	REDITS			3				
COL CC	URSE DDE		CSA4	101		COU CATEC	RSE GORY		РС		L-T-	P-S		2-0-2	-1
Ver	rsion		1.()	Ap	prova	l Detail	ls 3	24 ACN 80 th Ma 2018	1 IY	LEARNING LEVEL				4
						ASS	ESSME	NT SCI	HEME						
Fi Perio Asses	irst odical sment	t J	Seco Perioc Assessi	nd lical ment		Prac	ctical C	ompoi	nent				ESE		
1	5%		159	%			20	%					50%		
Co Descr	Course DescriptionTo introduce computers and programming in C and also explore the power of computational techniques that are currently used by engineers and scientists and to develop programming skills with reasonable complexity.														
Co Obje	urse ective	 The course should enable the student to, To acquire the basic knowledge in computer hardware, programming languages and Problem-solving techniques. Learn the fundamentals of C programming. Gain knowledge in Functions, arrays and strings in C programming. Understand the pointers, Structures and Union in C programming 													
Co Outo	urse come	 Gain Knowledge on Embedded Programming Upon completion of this course, the students will be able to, Describe the basics of digital computer and programming languages. Demonstrate problem solving techniques using flowchart, algorithm/pseudo code to solve the given problem. Design and Implement C program using Control Statements and Functions. Design and Implement C program using Pointers and File operations. Identify the need for embedded C in roal time applications. 													
Prere	quisite	es: Nil													
СО, Р	O ANI	D PSO	MAPP	ING											
со	P O- 1	PO- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO- 10	РО- 11	PO- 12	PS 0-1	PS O-2	PS O-3
CO-1	2	2	2	-	-	2	-	2	-	-	1	2	2	-	-
CO-2	3	3	3	2	2	1	-	2	2	1	-	1	2	3	-
CO-3	3	3	3	2	2	2	_	1	3	3	2	1	2	3	-

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 1: Weakly related, 2: Moderately related and 3: Strongly related

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MODULE 1: COMPUTER FUNDAMENTALS

3

2

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CO-4

CO-5

3

(6L+6P=12)

2

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Introduction – Fundamentals of digital computers - Programming languages - Programming Paradigms – Types of Programming Languages – Language Translators – Problem Solving Techniques: Algorithm – Flow Chart - Pseudo code. Practical Component:	CO-1						
• Drawing Flowcharts using E- Chart & Writing pseudo code for the following	BTL-1						
problems							
Greatest of three numbers							
Sum of N numbers							
Computation of nCr							
MODULE 2: PROBLEM SOLVING TECHNIQUES AND LANGUAGES (6L+6P=12)							
Evolution of C -Why C language - Applications of C language - Data Types in C -							
Operators and Expressions – Input and Output statements in C – Decision Statements							
– Loop Control Statements.							
Practical Component:							
 Program to illustrate arithmetic and logical operators 	60 3						
 Program to read and print data of different types 							
 Program to calculate area and volume of various geometrical shapes 	BIL-3						
 Program to compute biggest of three numbers 							
 Program to print multiplication table 							
 Program to convert days to years, months and days 							
 Program to find sum of the digits of an integer 							
MODULE 3: FUNDAMENTALS OF C (6L+6P=12)							
Functions – Storage Class – Arrays – Strings and standard functions - Pre-processor							
Statements.							
Practical Component:							
• Program to compute Factorial, Fibonacci series and sum of n numbers using							
recursion							
 Program to compute sum and average of N Numbers stored in an array 	CO-3						
 Program to sort the given n numbers stored in an array 	BTL-4						
 Program to search for the given element in an array 							
 Program to do word count 							
 Program to insert a substring in a string 							
 Program to concatenate and compare two strings 							
Program using pre-processor statements							
MODULE 4: FUNCTIONS, ARRAYS AND STRINGS (6L+6P=12)							
Pointers – Dynamic Memory allocation – Structure and Union – Files.							
Practical Component:							
• Program to compute sum of integers stored in a 1-D array using pointers and							
dynamic memory allocation	CO 4						
 Program to read and print records of a student/payroll database using 	CU-4 RTI 2						
structures	DIL-3						
Program to simulate file copy							
 Program to illustrate sequential access file 							
 Program to illustrate random access file 							
MODULE 5: POINTERS, STRUCTURES AND UNION (6L+6P=12)							
Structure of embedded C program - Data Types - Operators - Statements - Functions							
- Keil C Compiler.	CU-5 RTI 2						
Practical component:	DIL-2						

Simp	le programs using embedded C								
TEXT	BOOKS								
1.	Jeyapoovan T. (2015). Fundamentals of Computing and Programming in C, Vikas Publishing house								
2.	Mark Siegesmund. (2014). Embedded C Programming, first edition, Elsevier publications.								
REFER	RENCE BOOKS								
1.	Ashok Kamthane. (2017). <i>Computer Programming</i> , Pearson Education, 7 th Edition, Inc 2017.								
2.	Yashavant Kanetkar. (2016). <i>Let us C</i> , 15th edition, BPP publication.								
3	S. Sathyalakshmi, S. Dinakar. (2013). Computer Programming Practical's – Computer Lab								
	Manual, Dhanam Publication, First Edition.								
E BO	OKS								
1.	https://en.wikibooks.org/wiki/C Programming								
MOO	C								
1.	https://onlinecourses.nptel.ac.in/noc18-cs10/preview								
2.	http://nptel.ac.in/courses/106105085/2								
3.	https://www.udemy.com/c-programming-for-beginners/								
4.	https://www.coursera.org/specializations/c-programming								

COURS	E TITLE			INTRO	DUC	TION T	O DIGI	TAL SY	STEM	S	C		S	3	
COURS	e cod	E	MH	B4102		COURSE CATEGORY				DE		L-T-P	9-S	2-0-2	2-1
Ver	sion		1	L.O		Approval Details			2 3(4 ACM O th May 2018	/	LEARNING LEVEL			-3
ASSESSMENT SCHEME															
First Pe Assess	riodica sment	ıl	Second Periodical Assessment Practical component										E	SE	
15	5%			15%	6				10%				50)%	
Cou Descri	irse iption	Ir di m	Introduction to digital system is concerned with the design, selection, analysis of digital circuits as well as the various electronics components to be used in a mechatronics system												
Course Objectiv	/e	1. 2. 3. 4. 5. 6.	The co Prac Desi Appl Desi conc Undo Syne	ourse s tice th gn of a y the u gn of a epts a erstand rgetic	shoul e diffe adders ander asynch nd its d the comb	d enabl erent n s, subtra lying pr nronous applica princip bination	e the s umber actors inciple s circuit ation. le of va of abo	studer syster and of and a ts and arious ove in	nt to, ms, Lo, ther co pplica the va electro the de	gic gat ombina tions c arious i onic de ssign o	es, Mi ational of vario issues evices f mech	nimizat circuit ous seq in it. Ro natronio	tion Te s. Juentia eal tim	chnique Il circuits le interfa ms.	s acing
Course Upon completion of this course, the students will be able to 0utcome 1. Simplify mathematical expressions using Boolean functions 2. Design combinational circuits 3. Design sequential circuits and Asynchronous circuits for simple problems 4. Select appropriate electronic devices for mechatronic systems Prerequisites: CO, PO AND PSO MAPPING															
со	PO 1	PO	PO 2	PO	PO E	PO	PO 7	PO °	PO	PO	PO	PO	PSO 1	PSO	PS

\sim	-	-	-	-	-	-	-	-	-	-	-	-			-
co	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2	O-3
CO-1	3	2	-	-	-	-	-	2	-	-	-	2	2	-	-
CO-2	3	2	2	2	2	-	-	2	-	-	-	2	2	-	-
CO-3	3	2	-	-	-	-	-	2	-	-	-	2	2	-	-
CO-4	3	2	-	-	-	-	-	2	-	-	-	2	2	-	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														
MODU	LE 1: IN	NTROD	DUCTIC	ON TO	DIGIT	AL SYS	TEMS				(6L	+6P=12	2)		

Introduction to Digital systems – Number systems - Binary, Hexadecimal – Boolean theorems – Basic Logic Gates, Minimization – Minterm, Maxterm, Karnaugh Map, Kmap up to 4 variables. Simplification of logic functions with K-map, tabular minimization procedures Practical component: (<i>To be done in Simulation environment</i>) 1. Implementation of Boolean Expressions using Basic Logic Gates Suggested Readings: Basics of number systems.	CO-1 BTL-2
MODULE 2: COMBINATIONAL CIRCUITS (6L+6P=12)	
Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, De-multiplexer, Magnitude Comparator, Decoder, Encoder. Practical component:	
 (To be done in Simulation environment) 1. Implementation of Boolean Relations using Digital Comparators 2. Implementation of Arithmetic Expressions using Adders / Subtractors 3. Implementation of BCD-TO-7-segment Decoder / Driver and Operation of 7-segment 	CO-2 BTL-2
Suggested Readings:	
Priority Encoder.	
MODULE 3: SEQUENTIAL CIRCUITS (6L+6P=12)	
 Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters-Ripple Counters, Ring Counters, Shift registers. Practical component: - (<i>To be done in Simulation environment</i>) 1. Implementation of Sequential Circuits using Basic Flip-Flops 2. Implementation of Multi-bit Sequential Circuits using Shift Registers Suggested Readings: Best practices for Cyber security standards 	CO-3 BTL-3
MODULE 4: ASYNCHRONOUS SEQUENTIAL CIRCUITS (6L+6P=12)	
Asynchronous sequential circuits- fundamental mode pulse mode sequential circuits. cycles and races, Race free assignments, hazards Practical component: - (<i>To be done in Simulation environment</i>) 1. Implementation of Logic Functions using Multiplexers 2. Implementation of Logic Functions using Decoders Suggested Readings: ASM chart	CO-3 BTL-2
MODULE 5: BASIC ELECTRONIC DEVICES (6L+6P=12)	
Voltage – Current – Ohms Law – introduction to electronic devices – PN Junction Diode, V-I characteristics, Transistors, Rectifiers. Practical component: V-I characteristics of PN junction diode, transistors Suggested Readings:	CO-4 BTL-2

Inverters, Conv	erters and Voltage regulators
TEXT BOOKS	
1.	Thomas I. Floyd. (2014). Digital Fundamentals, 11th edition, Pearson.
REFERENCE BOO	DKS
1	M. Morris Mano. (2016). Digital Logic and Computer Design, Prentice-Hall
2.	W.H.Gothmann. (1992). Digital Electronics-Introduction Theory and Practice, PH
3.	S. Salivahanan and S. Arivazhagan. (2006). <i>Digital Circuits and Design</i> , 3rd Edition., Vikas Publishing House Pvt. Ltd, New Delhi
E BOOKS	
1.	http://nptel.ac.in/courses/106108099/Digital%20Systems.pdf
2.	https://onlinecourses.nptel.ac.in/noc18_ee33/preview_
моос	
1	http://nptel.ac.in/courses/106108099/Digital%20System

COURSE TITLE	SUSTAI	NABLE ENGINEERING	G SYSTEMS	CREDITS	2
COURSE CODE	GEA4102	COURSE CATEGORY	PC	L-T-P-S	2-0-0-1
Version	1.0	Approval Details	24 th ACM, 30.5.2018	LEARNING LEVEL	BTL-3
ASSESSMENT S	СНЕМЕ				
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%
Course Description Course Objectives	This course will p 1. To explain th 2. To compare a 3. To apply the 4. To analyze th 5. To study wat	provide an insight ab e principles of sustai assessing technologie concepts of green en le need of waste, reu er cycle and role of h	out the principles of nability with case stu es for ensuring sustai ngineering. Ise and redistributior numan beings for ens	Sustainability. Idies. nability. n management. uring sustainabilit	-γ.
Course Outcomes Prerequisites: N	Upon comple 1. Explain the p 2. Compare ass 3. Apply the con 4. Analyze the r 5. Study water of il	etion of this course, t rinciples of sustainab essing technologies f ncepts of green engir need of waste, reuse cycle and role of hum	he students will be a bility with case studie for ensuring sustainane neering. and redistribution m nan beings for ensuri	ble to es. bility. anagement. ng sustainability.	

CO, P	O AND PS	Ο ΜΑΡ	PING											
0	РО	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	РО	PO-	PO-	PSO-	PSO-
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CO- 2	2	2	2	-	1	3	3	2	2	2	2	3	3	3
CO- 3	2	1	1	-	1	3	3	2	2	2	2	3	2	1
CO- 4	1	2	2	-	1	3	3	2	2	2	2	3	2	3

CURRICULUM AND SYLLABUS	CUF	RRIC	ULUM	AND	SYLL	ABUS
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MODUL	E 1 – PF	RINCIPL	ES OF S	SUSTAI	NABLE	SYSTEN	/IS	(6L)						
Sustaina Framewo	bility D orks for	efinitio Applyi	ns - Pri ng Sust	nciples ainabili	of Sust ty Prin	ainable ciples .	e Desigr Summa	n, Susta ary & Ad	inable ctivities	Enginee	ering -		CO BTI	-1 2
MODULE	2 – TE	CHNO	.OGY D	EVELO	PMENT		FECYC	LE ASSE	SSMEN	IT	(6L)			
Technolo technica (LCA) me	ogy as a I metrie thodol	a part o cs - Em ogy - Su	of anth Ierging, Immary	ropoge conve / & Act	nic env rging, o ivities.	vironme disrupti	ent - Te ve tech	chnolo nnologie	gy reac es - Lif	liness l e Cycle	evels (1 Assess	「RL) – sment	CO BT	1- 2 L-3
MODULE	3 - GR	EEN EN	GINEEF	RING(6	L)									
Principles Engineer Summary	s of G ing exa / & Acti	reen E amples ivities.	ngineer - Mult	ring - tifuncti	Framev onal N	vorks f 1aterial	or asso s and	essmen Their I	t of al mpact	ternati on Su	ves - (stainab	Green ility -	CC BT)-3 L-3
MODULE	4 - RE	SOURC	EMAN	AGEM	ENT TEO	CHNOLO	OGIES				(6L)			
Waste m thinking - waste str managen	nanage - Recycl ream m nent sy	ment p ling effi nanager stems -	ourpose ciency ment - Summ	e and s - Mana Reuse ary and	strateg gement and re I Activit	ies - R t of foo distribu ties.	ecyclin d waste ition pi	g: oper and co rograms	n-loop mposti s - LCA	versus ing tecł approa	closed nnologi ach to	l-loop es - E- waste	CO BTI	-4 3
MODULE	5 - SU	STAINA	BLE W	ATER A	ND WA	STEWA	TER SY	STEMS			(6L)			
Water of systems Activities Factor in	- cycle Metrics S.Collab Sustaii	Wate for oorative nability	r cons assessr Decisio Paradi	ervatio ment on Mak gm - Su	n and of wa ing - Ro mmary	proted Iter m Ie of Co & Acti	ction t lanager Immun vities.	echnolo nent ity and S	ogies - techno Social N	Wate logies-S letworl	r treat Summa king - Hi	tment ry & uman	CO BTI	-5 3
TEXT BO	OKS													
1.		Vanek F I <i>mplem</i>	M. an entatio	d L.D. A <i>n,</i> McG	lbright iraw Hi	. (2018 II.). Energ	yy Syste	ms Eng	ineerin	g. Eval	uation	and	
2	(C.U. Be	cker. (2	012). <i>S</i>	ustaina	ibility E	thics ar	nd Susta	ainabili	ty Rese	arch, Sj	oringer		
REFEREN	CES													
1.	-	J.B. Gui Techno	nee et a logy, pp	al. (201 p.90-96	5). <i>Life</i>	Cycle A	lssessm	nent: Pa	st, Pres	sent, ar	nd Futu	re, Envi	iron. Sci.	
2		Anastas Enginee	s P. T ar ering, S _l	nd Zimr oringer	nermar	n J. B. (2	2016). <i>I</i>	nnovati	ons in (Green (Chemist	ry and	Green	
3.	(Christei Sons.	nsen T.	(2016)	Solid	Waste	Techno	logy & l	Manag	ement,	Volum	e 1 & 2	, Wiley a	ind
4.	N P	Michael aradigr	P. Wei n, Sprir	nstein Iger Sci	R and E ence, B	ugene Susines	Turner. 6 Media	(2015) a.	. Sustai	inability	/ Scienc	e: The	Emergin	g
E BOOKS	1	-												

1.	https://www.oreilly.com/library/view/sustainable-engineering-concepts/9780132756563/
2.	https://www.abebooks.com/book-search/title/engineering-sustainability-practical-guide- sustainable/author/jonker-gerald-harmsen-jan/
моос	
1.	https://www.coursera.org/learn/sustainability
2	https://www.academiccourses.com/Certificate/Sustainability-Studies/India/
3.	https://onlinecourses.nptel.ac.in/noc18_ce08/preview
4.	https://www.coursera.org/learn/ecosystem-services

COUR	SE TITL	E		E	NGINEE		ND DES	SIGN			CREDITS	5		3	
COUR	SE COD	E	ATB4	101	COU	RSE CAT	FEGORY	,	DE		L-T-I	p-S	:	3-0-0)-0
Ve	ersion		1.0)	Арр	proval D	Details	2	24th AC 30.5.20	M, 18	LEARN LEV	IING EL		BTL	-4
ASSESS	MENT	SCHEM	E												
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Course Objecti	ves	1. 2. 3. 4. 5.	To an To exa To dis To exa To cla	alyze va amine a scrimina plain th ussify th	arious e and exp ate the le signif le paran	lement lain the process icance o neters i	in desig stages involve of quali n user o	gn of a in desig ed in pr ty and s centere	product gn of au ototype safety ir d desigi	tomob makin desigr conce	ile comp g. n of a pr epts.	oonents oduct.	5.		
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CO-2	2	2	2	1	2	3	3	1	2	2	3	3	3	2	-
CO-3	3	1	2	1	1	3	3	1	2	2	3	3	1	2	-
CO-4	3	1	2	1	1	3	3	1	2	2	3	3	3	2	-
CO-5	2	1	2	1	1	3	3	1	2	2	3	3	2	3	-
			1: Weał	kly relat	ted, 2: I	Modera	tely rel	ated a	nd 3: St	rongly	related				

MODULE 1 – INTRODUCTION TO AUTOMOBILE ENGINEERING DESIGN (7L + 2P = 9)	
Design and its objectives; Design constraints, Design functions, Design means and Design from; Role of Science, Engineering and Technology in design; Engineering as a business proposition; Functional and Strength Designs. Design form, function and strength; How to initiate creative designs? Initiating the thinking process for designing a product of daily use. Need identification; Problem Statement; Market survey-customer requirements; Design attributes and objectives; Ideation; Brainstorming approaches; arriving at solutions; Closing on to the Design needs. Project: An Exercise in the process of design initiation. A simple problem is to be taken up to examine different solutions- Vehicle, Group Presentation and discussion.	CO-1 BTL-4
MODULE 2: PROCESSES IN DESIGN FOR AUTOMOTIVE SYSTEM (7L+2P=9)	
Design process- Different stages in design and their significance; Defining the design space; Analogies and "thinking outside of the box"; Quality function deployment-meeting what the customer wants; Evaluation and choosing of a design. Design Communication; Realization of the concept into a configuration, drawing and model. Concept of "Complex is Simple". Design for function and strength. Design detailing- Material selection, Design visualization- Solid modelling; Detailed 2D pa drawings; Tolerance; Use of standard items in design; Research needs in design; Energy need of the design, both in its realization and in the applications	CO-2 BTL-4
Project. An exercise in the detailed design of any two automobile components	
MODULE 3: PROTOTYPING OF AUTOMOBILE COMPONENTS (7L+2P =9)	
Prototyping- rapid prototyping; testing and evaluation of design; Design modifications; Freezing the design; Cost analysis. Engineering the design – From prototype to product. Planning; Scheduling; Supply chains; inventory; handling; manufacturing/construction operations; storage; packaging; shipping; marketing; feed-back on design Project: List out the standards organizations. Prepare a list of standard items used in automobile original equipment manufacturers. Develop any design with over 50% standard items as parts.	CO-3 BTL-4
MODULE 4: QUALITY ASPECTS IN AUTOMOBILE ENGINEERING (7L+2P =9)	
Design for "X"; covering quality, reliability, safety, manufacturing/construction, assembly, maintenance, logistics, handling; disassembly; recycling; re-engineering etc. Project: List out the design requirements(x) for designing a car.	CO-4 BTL-4
Module 5: USER CENTRED DESIGNS IN AUTOMOBILE ENGINEERING (7L+2P =9)	
Product centered and user centered design. Product centered attributes and user centered attributes. Bringing the two closers. Example: Motorcycle and Car, Aesthetics and ergonomics. Value engineering, Concurrent engineering, Reverse engineering in design; Culture based design; Architectural designs; Motifs and cultural background; Tradition and design; Study the evolution of Wheels; Printed motifs; Role of colours in design. Make sharp corners and change them to smooth curves-check the acceptance. Design as a marketing tool; Intellectual Property rights – Trade secret; patent; copy-right; trademarks; product liability. Group presentation of	CO-5 BTL-4

Project: Exam	ine the possibility of value addition for an existing product.	
TEXT BOOKS		
1.	Balmer R. T, Keat W. D, Wise G and Kosky P. (2012). <i>Exploring Engineering: An Introductio to Engineering and Design,</i> Third Edition, Elsevier Publisher.	'n
2	Dym C L, Little P and Orwin E J. (2013). <i>Engineering Design - A Project based introduction</i> , Wiley.	
REFERENCES		
1.	Eastman, C. M. (Ed.). (1996). Design for X Concurrent engineering imperatives, Springer.	
2.	Haik, Y and Shahin M. T. (2011). Engineering Design Process, Cengage Learning.	
3.	Pahl G, Beitz W, Feldhusen J and Grote K H. (2007). <i>Engineering Design: A Systematic approach</i> , 3rd edition, Springer.	
4.	Voland, G. (1999). Engineering by Design, Pearson India	

	C	OURSE T	ITLE	II	NTROD	UCTION	I TO DI	GITAL SYS	STEMS	5	CREDIT	s	3	
	C	OURSE C	ODE	EEB	4101		COUF CATEG	RSE ORY		PC	L-T-P	-S	3-0)-0-1
	V	ersion			1.0	Ар	proval	Details	24t ACN 30.5	h //, 5.2018	LEARN LEVE	ING EL	ВТ	ſL-3
ASS	ESSMEN	NT SCHE	ME						•					
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		15%		1	15%		10%	6	Į.	5%	5%	6	51 %	0
	Course	Descript	ion	An introduction to digital system design, with an emphasis on practical design techniques and circuit implementation.										
Cou	rse Obj	ectives		1. 2. 3. 4. 5. U 1. 2. 3. 4. 5.	To ass To ch To ap To de logic o To exa device pon cor Assess Apply Descri contro Exami device	sess bas oose ap ply the scribe a controll amine t es. mpletio s basic o s basic o the cor ibe and oller and ne the es.	sic oper opropria concep and app ler and the con- n of thi operation opriate ncepts of apply of d PID co concep	ation in o ate senso ts of sign ly concep PID contro cepts of o s course, on in digi sensors a of signal p concepts ontroller ts of cons	digital ors and nal pro pts of roller consur the st tal sys and dis oroces of mic sumer	system l display cessing microco mer ele cudents tems a splay un srocont electro	is and ins y units. g and con ontrollers ctronics a will be a nd instru nits. d conver rollers, p onics and	trumen verting s, progra and com ble to ments. ting ele rograma	ts. element ammabl munica ments. mable lo unication	ts. e tion ogic
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CO -1	3	1	2	1	2	-	-	-	-	-	-	-	2	-
CO -2	2	3	1	2	3	-	-	-	-	-	-	-	1	1
CO -3	3	1	2	1	2	-	-	-	-	-	-	-	3	1

CO-4	1	3	2	1	2	-	-	-	-	-	-	-	2	1
CO-5	3	3	3	2	3	-	-	-	-	-	-	-	1	-
			1: Weal	dy rela	ted, 2: I	Modera	tely rel	ated ar	nd 3: St	ronglyı	elated	1		
MODU	JLE 1 – I	ntrodu	ction to	Digita	Systen	าร							(9)	L)
Analog Numbe Proper Practic Lab: - (1. Log 2. Boo 3. Dig Sugges electro	3& Digit sr syste ties) - D cal Com (To be d (To be d (ic gates blean Ide ital cont ted Rea nics.	al signa ms: - E gigital co ponent one in S simula entities troller c ding: B	als - Neo Binary, Dontrolle Cimulati tion and Pro lesign asics of	ed for o Hexade rs (ON- <i>on envi</i> operty v numbe	digital in cimal - OFF). <i>ironmer</i> verificat er syster	nstrume Logic (nt) tion ms, All c	ents — E gates - digital sy	Element Boolea ystems	is of dig n algeb	gital ins ora (Ide umer a	nd indus	trial	CO-1 BTL-3	3
MODU	LE 2 –Se	ensors a	and Dis	olays	· · · · · ·				D'		(12L)		
Sensor: Linear Thermo display Practic 1. 2. 3. 4. 5. Sugges	s and Tr Variab ocouple s. al Comp Simulat Simulat Simulat Simulat ted Rea	ansduc le Diff s, Tacti con of S tion of S tion of S tion of S tion of S	ers –Cla erentia ile tran - (To be Sensor o Sensor o Sensor o Sensor o Sensor o Sensor o	e done characte characte characte characte characte characte characte	in Simu eristics- eristics- eristics- eristics- eristics- eristics- eristics-	lation e potent Strain (LVDT RTD Thermo	ieter, Si stance Light I nvironr iometer Gauge bcouple	nent)	plays.	ezoelec detect e (inclu	tric Sens	sor, D), ED)	CO-2 BTL-	2 4
MODU	LE – 3 :	Signal (Conditio	oning C	ircuits						(9L))		
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MODU	LE – 4: I	ntrodu	ction to	Micro	control	lers					(9L)			
Introd Graph Analo and P Pract 1. PLC 2. Pro	Juction: nics Pro- gue Inp ID (Prop ical Con Ladder portion	Memo cessing ut/Outp oortiona nponen logic si al contr	ry types Unit (C out, Dis al + Inte at - (To imulatic coller sin	5, perip 5PU) - olay. In gral + D be done on. <u>mula</u> tio	heral de Applica troduct perivativ e in Sim n.	evices- 1 tions: - ion to F ve) Cont ulation	Microco Interfac Program croller. <i>environ</i>	ontrolle cing of nmable nment)	r (8 bit) Digital Logic C	, Archit Input/(ontrolle	ecture, Dutput, er (PLC)		CO-4 BTL-3	3

3. Proportional + In	itegral controller simulation.	
4. Proportional + D	erivative controller simulation.	
Suggested Reading	g: Hobby electronics with Microcontroller interface.	
MODULE 5 – Consur	mer Electronics and Communication System (6L)	
Consumer Electron	nics: Television, Mobile Phones, Air conditioners, Refrigerators, Washing	
Machine. (Block dia	agram approach only.)	CO 5
Communication Sy	stem: Satellite communication, Global Positioning Systems, Global	
System for Mobile.	(Block diagram approach only.)	BIL-2
Suggesten Neaning	S: Consumer Electronics Oser Manuals.	
TEXT BOOKS		
1.	Thomas I. Floyd. (2018). Digital Fundamentals, Pearson,11th edition.	
2.	Ramakant A. Gayakwad. (2017). <i>Op-amps and Linear Integrated Circuit</i> Hall,4 th edition.	s, Prentice
3.	David A. Bell. (2018). Electronic <i>Instrumentation and Measurements</i> , O. University Press.	xford
4.	SepehrNaimi, SarmadNaimi and Muhammad Ali Mazidi. (2017). The 80. Microcontroller And Embedded Systems Using Assembly and C, Pearson edition.	51 a,Second
5.	Frank D. Petruzella. (2016). Programmable Logic Controllers, McGraw-H	Hill Education.
	REFERENCE BOOKS	
1.	M. Morris Mano. (2016). Digital Logic and Computer Design, Prentice-H	lall.
2.	Roy Choudhury. (2018). <i>Linear Integrated Circuits,</i> New Age Internation 4th edition.	nal Publishers,
3.	Thomas W. Schultz. (2018), <i>C and 8051</i> , Schultz Publishers, 4 th edition.	
4.	S.P Bali. (2008). Consumer Electronics, Pearson Education Asia Pvt., Ltd	.,
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E BOOKS		,
Е ВООКЅ	http://www.ee.iitm.ac.in/~giri/pdfs/EE4140/textbook.pdf	,
Е ВООКЅ 1. 2.	http://www.ee.iitm.ac.in/~giri/pdfs/EE4140/textbook.pdf https://electronics.howstuffworks.com/home-audio-video-channel.htm	<u>n</u>
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COUR	SE TIT	LE		ENGINEERING IMMERSION LAB										DIT 0.5			
COUR	SE COI	DE	GEA	4131	СС	URSE	CATEG	ORY		BS	L-'	T-P-S		0-0-2-2			
VI	ERSIO	N		1.0	AP	APPROVAL DE			24 th 30.5	ACM - .2018	LE	ARNIN LEVEL	G	BTL-3			
ASSESSMENT SCHEME																	
CIA												ESE					
80%												20	%				
Co Desc	ourse criptio	n	To provide the students with hands on experience on various basic engineering practices														
Co Obj	ourse ective	2	 The course should enable the students to Relate theory and practice of basic Civil and Mechanical Engineering Learn basic concepts in Aeronautical and Automobile Engineering Learn basic concepts in Electrical, Electronics, mechatronics and Computer Science 														
Cc Out	ourse tcome	,	 Upon completion of this course, the students will be able to 1. Identify and use of tools, Types of joints used in welding, carpentry and plumbing operations. 2. Have hands on experience on basic fabrication techniques such as carpentry and plumbing practices. 3. Have hands on experience on basic fabrication techniques of different types of welding and basic machining practices. 														
Prerequisites: NIL																	
CO, PO		-50 N		G	DO			20	DO	DO	DO		DC	DC	DC O		
со	-1	-2	-3	РО- 4	РО- 5	РО- 6	PO-	90- 8	90- 9	РО- 10	РО- 11	РО- 12	PS 0-1	PS 0-2	PSO- 3		
CO-1	3	2	-	2	-	1	-	-	2	-		-	-	-	-		
CO-2	3	2	_	2	_	1	_	-	2	-	-	-	-	_	-		
CO-3	3	2	-	2	-	1	-	-	2	-	-	-	-	-	_		
	1				S	LOT X	-LIST O	F EXPE	RIMEN	NTS		1 1		1			
 I. MECHANICAL ENGINEERING WORKSHOP Welding: Arc welding: Butt joints Lap joints. Machining: Facing Turning II. AUTOMOBILE ENGINEERING Dismantling and studying of two stroke gasoline engines. Assembling of two stroke gasoline engines. Dismantling and studying of four stroke gasoline engines 																	
4. Assembling of four stroke gasoline engines. III. AERONAUTICAL ENGINEERING																	

- 1. Study of Flow Pattern around Various Objects.
- 2. Force measurement on Aircraft Model
- 3. Determination of Young's Modulus for Aluminum Cantilever Beam
- 4. Binary Addition & Subtraction using Microprocessor

IV. CIVIL ENGINEERING

- 1. Plumbing- Basic Pipe Connection using valves, couplings and elbows.
- 2. Carpentry Sowing, Planning and making common Joints.
- 3. Bar Bending
- 4. Construction of a 50 cm height brick wall without mortar using English Bond.

SLOT Y -LIST OF EXPERIMENTS

V. ELECTRICAL ENGINEERING

- 1. Study of tools and accessories.
- 2. Study of cables.
- 3. Staircase wiring, Tube light and Fan connection.
- 4. Measurement of energy using single phase energy meter.

VI. ELECTRONICS ENGINEERING

- 1. Study of Active and Passive Components.
- 2. Study of Logic Circuits.
- 3. Making simple circuit using Electronic Components.
- 4. Measuring of parameters for signal using CRO.

VII. COMPUTER SCIENCE

- 1. Troubleshooting different parts of the computer peripherals, Monitor, Keyboard & CPU.
- 2. Installation of various operating systems, their capabilities, Windows, Unix, Linux.
- 3. Installation of commonly used software like MS Office
- 4. Assembling digital computer.

VIII. MECHATRONICS ENGINEERING

- 1. Study of Key Elements of Mechatronics Systems
- 2. Sensors Load Cell, Thermocouple
- 3. Actuators Linear & Rotary Actuators
- 4. Interfacing & Measurements Virtual Instrumentation

REFERENCE 1 Jeyapoovan T and Saravanapandian M. (2015). Engineering practices lab manual, Vikas publishing House, New Delhi, 4th Edition. 2 Hajra Choudhury S.K, Hajra Choudhury A.K. and Nirjhar Roy S.K. (2008). Elements of Workshop Technology, Media promoters and publishers private limited, Mumbai. 3 Ibrahim Zeid. (2011). CAD/CAM Theory and Practice, Tata McGraw-Hill Publishing Company Ltd., New Delhi. 4 Robert Quesada, Jeyapoovan T. (2006). Computer Numerical Control Machining and Turning Centers, Pearson Education, New Delhi. METHOD OF ALLOCATION FOR ENGINEERING IMMERSION LAB SLOT X : MECH, AERO, AUTO, CIVIL EXPERIMENTS

SLOT Y : EEE, ELECTRONICS, CSE, MECHATRONICS EXPERIMENTS

- ➢ EVERY CLASS OF
 - GROUP A (AERO, AUTO, MECH, MCT, CHEM, BIO, CIVIL
 - GROUP B (CSE, IT, ECE, EEE, AEROSPACE)

GETS DIVIDED INTO 4 SUB - GROUPS NAMELY a, b, c, d -- EACH CONSISTING OF 15 TO 20 STUDENTS
 MAX.
 FOR EXAMPLE: GROUP A STUDENTS WILL OCCUPY SLOT X

- WEEK 1 : SLOT X ---
 - a MECH; b AUTO; c AERO ; d CIVIL
- WEEK 2 : SLOT X ---
 - b MECH; c AUTO; d AERO ; a CIVIL
- > THE ABOVE SCHEDULE WILL BE ON ROTATION EVERY MONTH (ONE CYLCE PER MONTH)
- **GROUP B STUDENTS WILL OCCUPY SLOT Y**
 - WEEK 1 : SLOT Y --
 - a EEE; b ECE; c CSE ; d MCT
 - WEEK 2 : SLOT Y ---
 - b EEE; c ECE; d CSE; a MCT
- > THE ABOVE SCHEDULE WILL BE ON ROTATION EVERY MONTH (ONE CYLCE PER MONTH)

COURS	E	(0	EN Commo	GINEE on to /		CRE	REDITS		1						
COURSE CODE		E	PHA4131			COURSE CATEGORY			BS			L-T-P-S		0-0)-2-0
Version			1.0			Approval Details			24 30	24 th ACM - 30.5.2018		LEARNING LEVEL		BT	TL-3
ASSESSMENT SCHEME															
Experi		Calculation			Result			Viva			Record		E	SE	
30		10%			10% 20%					1	0%	2	0%		
Co Desci	urse ription	Le de	Learn experimental methods to determine engineering properties of materials and demonstrate the use of modern tools in engineering												
Co Obje	Th 1. 2. 3. 4. 5.	 The course should enable the students to Train students to analyze elastic properties of materials Determine thermal conductivity of a bad conductor. Train students to measure viscosity of liquids. Study the V-I characteristics of diode Train students to apply light phenomena to analyze materials. 													
		U	Upon completion of this course, the students will be able to												
	1.	1. Determine elastic properties of materials													
Course		2.	 Determine thermal conductivity of bad conductor Determine viscosity of liquids 												
Out	3. 4	4. Plot V-I characteristics of a diode.													
	5.	5. Determine thickness of thin wire and refractive index of a material													
Prerequ	isites:	Physic	ysics practical at higher secondary level												
CO. PO AND PSO MAPPING															
СО	РО	РО	РО	РО	РО	РО	PO	РО	РО	РО	РО	РО	PSO	PSO	PSO
	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2	-3
CO-1	3	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO-2	3	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO-3	3	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO-4	3	3	-	-	3	-	-	-	3	-	-	3	-	-	-
CO-5	3	3	3 3 3								-				
		1	: Weal	dy rela	ated, 2	2: Mod	eratel	y relat	ed an	d 3: Str	ongly	relate	d		
MODU	LE 1: P	ROPE	RTIES	OF MA	TTER-	SOLID)								(9P)
1. 2.	Torsional Pendulum – Determination of rigidity modulus of the material of a wire. Non-Uniform Bending – Determination of Young's Modulus.	CO-1													
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3.	Uniform Bending – Determination of Young's Modulus.	BIL-3													
МС	DULE 2: PROPERTIES OF MATTER- LIQUID	(3P)													
4.	Viscosity – Determination of co-efficient of viscosity of a liquid by Poiseuille's flow.	CO-2													
		BTL-3													
MC	DULE 3: THERMAL CONDUCTIVITY	(3P)													
5.	Lee's Disc – Determination of thermal conductivity of a bad conductor. Preparation of	CO-3													
	urea-formaldehyde resin.	BTL-3													
MC	DDULE 4: OPTICS	(6P)													
6.	Air – Wedge – Determination of thickness of a thin wire	CO-4													
7.	Spectrometer – refractive index of a prism	BTL-3													
MC	DULE 5: ESTIMATION METAL ION CONTENTS IN THE SAMPLE	(6P)													
8.	Semiconductor laser – Determination of wavelength of laser using grating	CO-5													
9.	Semiconductor diode – VI characteristics	BTL-3													
TEX	кт воокѕ														
1.	P. Mani. (2005). Engineering Physics Practical, Dhanam Publications, Chennai														
REF	ERENCE BOOKS														
1.	Glenn V. Lo, Jesus Urrechaga Aituna. (2005). Introductory Physics Laboratory Manual, Po	art-I, Fall.													
2.	P. Kulkarni. (2015). Experiments in Engineering Physics Bachelor of Engineering and Tech	hnology.													
E B	оокѕ														
1	http://www.aurora.ac.in/images/pdf/departments/humanities-and-sciences/engg-phy-	-lab-													
т.	manual.pdf														
MC	DOC														
1.	https://www.coursetalk.com/providers/coursera/courses/introduction-to-chemistry-1														

cou	RSE TIT	LE		MATE (C	RIALS Comm	CHEMI on to A Engine	STRY LA LL bran eering)	BORAT	ORY		CREI	DITS		1	
COU	RSE CO	DE	CY	4131		COU	RSE		E	BS	L-	T-P-S		0-0-	2-0
v	ersion		:	1.0		Арј	proval [Details	24 th 30.5	ACM - .2018	LI	EARNIN LEVEL	G	BTI	3
ASSES	SSMEN	r schi	EME												
Ехре	eriment	al	Calc	ulation		Re	sult		v	iva	R	ecord		ES	E
	30%		10% 10% 20% 10% 20%												
C Des	Course scription	n	This course imparts practical exposure on basic techniques employed for the analyses of lubricants, refractories & other engineering materials and spectrophotometric analyses for metal ions.												
Cours Objec	se tives		 To train the students in characterization of lubricants by viscosity measurement. To give a practical exposure for the construction of phase diagram, for partially- miscible liquids (phenol-water system) To provide the students practical knowledge in preparation of polymers (urea- formaldehyde resin) To impart hands-on training in characterization of refractories. To equip the students with practical skill in estimation of metal ions by spectrophotometry. 												
Cours Outco	se omes		 Upon completion of this course, the students will be able to grade the lubricants based on viscosity analyze the phase diagram and interpret the critical solution temperature. apply the practical knowledge gained on the preparation of polymers, for the preparation of other similar macromolecules. analyze the strength of refractories. apply the spectrophotometric method for the determination of metal ions in 												
CO, P	O AND	PSO N	MAPPING	i											
со	PO- 1	РО- 2	- PO- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	РО- 10	РО- 11	РО- 12	PS 0-1	PS O-2	PS O 3
CO-1	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
CO-2	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
CO-3	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
CO-4	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
CO-5	3	2	1	_	-	-	2	-	-	-	-	2	-		-
	1: Weakly related, 2: Moderately related and 3: Strongly related														
MOD	ULE 1: F	PROPE	ERTIES O	F LUBRI	CANT	S (6 L	.)								

1.	Determination of viscosity of polymer using Ostwald Viscometer.	
2.	Determination of Viscosity Index of lubricants.	CO-1
3.	Determination of viscosity of oil using Red-Wood Viscometer.	BTL-3
мо	DULE 2: PHASE DIAGRAM IN LIQUID SYSTEM (6 L)	
4.	Construction of phenol-water phase diagram.	CO-2
5.	Determination of adsorption isotherm for acetic acid on activated charcoal.	BTL-3
МО	DULE 3: PREPARATION POLYMER RESIN. (6 L)	
6. P	reparation of urea-formaldehyde resin.	CO-3
		BTL-3
MO	DULE 4: BASIC PROPERTIES OF REFRACTORIES(6 L)	
7.	Determination of porosity of a refractory.	CO-4
8.	Determination of apparent density of porous solids.	BTL-3
		DIE-3
мо	DULE 5: ESTIMATION METAL ION CONTENTS IN THE SAMPLE (6 L)	
9.	Estimation of dye content in the effluent by UV-Visible spectrophotometry.	
10.	Determination of copper / iron content in the alloy by colorimetry.	CO-5
11.	Estimation of sodium and potassium ions by flame photometry.	BTL-3
12.	Verification of Beer-Lambert's law using gold nanoparticles.	
TEX	TBOOKS	
1.	P.S. Raghavan. (2018). Materials Chemicals Laboratory Manual, Dhanam Publications.	
REF	ERENCE BOOKS	
1.	J. Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas Vogel's. (2009). Textbook of Quar	ntitative
	Chemical Analysis, Pearson Education, 6 th Edition.	
E BC	DOKS	
1.	http://www.erforum.net/2016/01/engineering-chemistry-by-jain-and-jain-pdf-free-ebook	. <u>html</u>
MO	oc	
1.	https://www.coursetalk.com/providers/coursera/courses/introduction-to-chemistry-1	

SEMESTER II

COURS	E TITLE	E	ANALYTICAL MATHEMATICS								C	REDITS	5	4		
COURS	e cod	E	MA	4117		C/	COURS	E RY		BS		L-T-P	-S	3-0-2	2-1	
Ver	sion		-	1.0		Appr	oval Do	etails	24 30	th ACM .5.201	- 8	LEARN LEVE	ING EL	BTL	-3	
ASSESS	MENT	SCHE	ИE													
First	Period	lical	See	cond P	eriodi	cal	Pra	octical	comp	onent		ECE				
Ass	essme	nt		Assess	ment				comp	onent			LJ			
	15%			15% 20% 50%												
Course	Descri	ption	To imp	To make the student understand the basic analytical mathematical skills that is imperative for effective understanding of engineering subject using MATLAB.												
Course	Object	tive	The 1. 2. 3. 4. 5.	 The course should enable the students to 1. Demonstrate the fundamental understanding of integrals 2. Apply problem solving skills vectors 3. Understand the concepts of Laplace Transforms 4. Understand the concept of Fourier series 5. Understand the concepts of complex veriebles 												
Course	Course Outcome				 Upon completion of this course, the students will be able to 1. Competent to evaluate surface and volume integrals. 2. Perform vector operations and interpret the results geometrically 3. Solve the system of ordinary differential equations using Laplace Transform 4. Proficient to know that any periodic function satisfying Dirichlet's conditions can be expressed as a Fourier series 5. Understand complex variable theory, applications of analytic function and become included. 											
Prerequ	isites:	Nil														
CO, PC) AND	PSO	MAP	PING												
	РО	PO	PO	PO	РО	PO	PO	РО	РО	PO	РО	PO	PSO	PSO	PS	
CO	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2	O-3	
CO-1	1	2	-	-	-	-	2	-	-	-	-	-	-	-	-	
CO-2	2	1	1	2	-	-	-	-	-	-	-	-	-	-	-	
CO-3	2	1	1	1 2												
CO-4	2	1	-													
CO-5	CO-5 2 1 2															
		1	: Wea	kly rela	ated, 2	2: Mo	deratel	y relat	ed an	d 3: Stı	rongly	relate	d			

MODULE 1: MU	JLTIPLE INTEGRALS (10L+2P=12	2)								
Double integrat	ion – Cartesian and polar co-ordinates – Change of order of integration.									
Area as a doub	le integral – Triple integration in Cartesian coordinates – Volume as a	CO 1								
triple integral –	Change of variables between Cartesian and polar coordinates.	CO-1 DTI								
Suggested Read	ding: Line Integrals	DIL- 1 2 2 4								
Lab: Area and V	olume using double and triple integration.	1,2,3,4								
MODULE 2:VEC	TOR CALCULUS (10L+2P=1	2)								
Gradient, Diver	rgence and Curl – Unit normal vector, Directional derivative – angle									
between surfac	es–Solenoidal and Irrotational vector fields, Green's theorem - Gauss									
divergence the	prem and Stoke's theorem (without proof) – Verification and evaluation									
of the above the	eorems - Simple applications to regions such as square, rectangle, triangle,	CO-2								
cuboids and rec	tangular parallelopipeds.	BTL-3								
Suggested Reading: Basics of Vectors										
Lab: Area using Green's theorem and Volume using Gauss divergence theorem.										
MODULE 3: LAP	LACE TRANSFORMS (10L+2P=12	2)								
Laplace transfo	orm – Conditions of existence – Transform of elementary functions –	•								
properties- Tra	nsforms of derivatives– Initial and final value theorems – Transform of									
periodic function	ons. Inverse Laplace transforms using partial fraction and convolution									
theorem. Soluti	on of linear ODE of second order with constant coefficients.	CO-3								
Suggested Read	ling: Basics of Transform	BTL-3								
Lab:Finding La	place and Inverse Laplace Transform of Elementary Functions, Solutions									
of Ordinary diff	erential equations using Laplace transform									
MODULE 4: FOL	JRIER SERIES (10L+2P=12)								
Dirichlet's Cond	litions – General Fourier Series – Odd and even functions – Half range sine									
and cosine serie	es –Harmonic Analysis.									
Suggested Read	ling: Basics of series	CO-4								
Lab: Fourier ser	ries Expansion of simple functions, Harmonic Analysis	BTL-3								
MODULE 5: CO	MPLEX VARIABLES (10L+2P=12)									
Functions of a	complex variable – Analytic function – Cauchy - Riemann equations									
(Statement only	y) – Properties of analytic function (Statement only) – Construction of	CO-5								
Analytic functio	ns by Milne – Thomson method.									
Suggested Read	ling: Complex Numbers	BTL-3								
Lab: Complex N	lumbers									
TEXT BOOKS										
1.	Kreyszig Erwin. (2016). Advanced Engineering Mathematics, John Wiley a Edition.	and Sons, 10th								
2	A. P. Santhakumaran and P.Titus. (2012). Engineering Mathematics II, Ni Publications, Nagercoil.	Meric								
3.	Chandrasekaran A. (2014). Engineering Mathematics- II, Dhanam Publica	tion								
4.	Raj Kumar Bansal, Ashok Kumar Goel and Manoj Kumar Sharma. (2016). <i>MATLAB and its Applications in Engineering</i> , Pearson Publication, Second Edition									

REFERENCE BOO	DKS
1.	Sastry S. S. (2014). <i>Engineering Mathematics</i> , Vol. I & II, PHI Learning Pvt. Ltd, 4 th Edition.
2.	Wylie R.C. and Barrett L.C. (2012). <i>Advanced Engineering Mathematics</i> , Tata McGraw Hill Education Pvt. Ltd, 6th Edition.
3.	Dean G. Duffy. (2013). <i>Advanced Engineering Mathematics with MATLAB</i> , CRC Press, Third Edition.
E BOOKS	
1	https://nptel.ac.in/courses/122/104/122104017/
2	https://www.khanacademy.org//double-integrals/double-integral.
3	https://nptel.ac.in/courses/115101005/downloads/lectures-doc/Lecture- 1.pdf
4	https://nptel.ac.in/syllabus/122104017/
5	https://nptel.ac.in/courses/111105035/22%20nptel.ac.in/syllabus/1111030 70/
МООС	
1.	https://www.edx.org/course/introduction-engineering-mathematics- utarlingtonx-engr3-0x

COURS	E TITL	.E	(Comm	ENG on to	INEERI ALL B	NG M ranche	ATER es of I	IALS Enginee	ering)		CRE	DITS	3	3
COL CO	JRSE DE		CYA4	101		CO CATE	URSE EGORY	,		BS		L-	T-P-S	3-0	-0-1
Ver	sion		1.	0	Δ	pprov	al Det	ails	30 th	24 ACI ' May 2	И 2018	LEA	RNING EVEL	ВТ	L-3
ASSES	SMEN	т ѕсн	EME		•									•	
Firs Perioc Assess	st lical ment	Seco	ond Pe ssessn	riodica nent	I	Sem Assign Pro	inar/ ments, ject	/	Surpris	se Test	/ Quiz	Atte	ndance	E	SE
159	%		15%	6		10)%			5%			5%	50)%
Cour Descriț	rse otion	To make the students understand the basic concepts of Engineering Materials and their applications.													d their
Course Object	e ive ne	1. To 2. To in 3. To 4. To ex 1. To 2. St 3. Su gu 4. Id el 5. Di ex	 To make the students understand the basics of crystal structure and phase rule. To provide an exposure on the fundamentals of powder metallurgy and applications of inorganic materials and composites. To give a strong foundation on the basic concepts of nanomaterials, the general synthetic methods with emphasis on their applications. To illustrate the applications of conducting polymers and liquid- crystals, with a good exposure on their basic terminologies. To provide a knowledge on the theoretical basis of the chemical composition, properties and applications of lubricants, adhesives and explosives. Upon completion of this course, the students will be able to Propose and justify suitable metals/materials for alloying. State and select a suitable high-temperature material for industrial applications. Identify the materials which can be employed as organic conductors and liquid- crystals in electronic devices. Distinguish and select a suitable organic / inorganic material as lubricant / adhesive // 												
Prereq	uisite	s: Nil													
CO, PC) AND	PSO I	MAPPI	NG		1	I	I	T	T	1			I	
со	PO _1	PO -2	PO _2	PO _4	PO -5	PO -6	PO -7	PO ء_	PO _9	PO -10	PO -11	PO- 12	PSO -1	PSO- 2	PSO- 3
CO-1	3	1	1	-	-	-	1	-	-	-	-	1	1	-	-
CO-2	3	2	1	1	-	-	2	-	-	-	-	2	1	-	_
CO-3	3	1	1	-	-	-	2	-	-	-	-	2	1	-	-
CO-4	3	1	1	1	-	-	2	-	-	-	-	2	2	-	-
CO-5	3	2	1	-	-	-	2	-	-	-	-	2	2	-	-

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: CRYSTAL STRUCTURE AND PHASE RULE (9 L)							
Basic crystal systems – Types, characteristics, examples – Space lattice, Unit cell – types – X-ray diffraction and crystal structure. Basic terminology - Derivation of Gibbs Phase rule-Phase diagrams: One component system (water), Two component system— Reduced phase rule: Simple Eutectic system, examples, Phase diagram: Ag-Pb system, Pb-Sn system—Applications of phase rule.	CO-1 BTL-3						
MODULE 2: POWDER METALLURGY, INORGANIC MATERIALS AND COMPOSITES.	(9L)						
 Steel – Composition, types, heat-treatment, Abrasives – Classification, Properties, Uses Refractories – Classification, Properties, Applications. Glasses – Properties, Types, Specialty glasses. Composites - Introduction - Definition – Constituents – Classification -Fiber-reinforced Composites –Types and Applications. Powder Metallurgy – Preparation of metal/alloy– Advantages and limitations. 	CO-2 BTL-3						
MODULE 3: NANOMATERIALSAND MOLECULAR SIEVES	(9L)						
Introduction – Synthesis of Nanomaterials - Bottom-up and Top-down approaches – Methods of preparation – Sol-gel process, Gas-phase condensation, Chemical Vapour Deposition. Properties – Optical, Electrical, Magnetic, Chemical properties (introduction only).Characterization – FE-SEM, TEM (Principle and Applications only). Zeolite Molecular sieves – composition, structure, classification - applications – ion exchange, adsorption, separation, laundry, catalysis.	CO-3 BTL-3						
MODULE 4: MATERIALS FOR ELECTRONIC APPLICATONS (9L)							
Liquid Crystals- Introduction – Characteristics – Classification- Thermotropic crystals Polymorphism in Thermotropic Liquid Crystals – Molecular arrangement in various stsres of Liquid Crystals, Lyotropic Liquid Crystals- Applications. Conducting and Super conducting Organic electronic materials - Applications. Engineering plastics: Polycarbonate – Properties and uses- Conducting Polymers, Polymers: Classification, Intrinsic Conducting Polymers, Extrinsic Conducting Polymers,							
MODULE 5: LUBRICANTS, ADHESIVES AND EXPLOSIVES (9L)							
Lubricants – Mechanism of Lubrication, Classification and Properties, Semi Solid Lubricants, Solid Lubricants, MoS ₂ and Graphite - Adhesives – Development of Adhesive strength, Physical and Chemical factors influencing adhesive action, Classification of Adhesives – Epoxy Resin (Preparation, Properties and Applications). Explosives – Requisites, Classification, Precautions during storage – Rocket propellants – Requisites - Classification.	CO-5 BTL-2						
TEXT BOOKS							
1. P.S. Raghavan. (2018). <i>Engineering Materials</i> , Dhanam Publications							
2. P.C. Jain and Monicka Jain. (2012). <i>Engineering Chemistry</i> , Dhanpat Raj Publicatic Delhi	n (P) Ltd, New						
REFERENCE BOOKS							
1. Puri Sharma and Pathania. (2020). <i>Principles of Physical Chemistry</i> , Vishal Publish Jalandar.	ing Co.						
E BOOKS							
1. <u>http://www.erforum.net/2016/01/engineering-chemistry-by-jain-and-jain-pdf-free</u>	<u>e-ebook.html</u>						
MOOC							
1. https://www.edx.org/course/materials-science-engineering-misisx-mse1x							

COURS	SE TITL	.E	ENGINEERING PHYSICS CREDITS												3
CO CC	URSE DDE		PH	A4101		C	COUF ATEG	RSE ORY		BS	5	L-	T-P-S	3-	0-0-0
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ASSES	SMEN	T SCH	EME												
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1	5%		1	15%			10%	6		5%	6		5%	5	50%
Co Descr	urse riptio	n n n	This course deals with fundamental principles of physics, using mathematical derivations, for first year B. Tech students; the principles and applications of elasticity, acoustics, ultrasonics, quantum physics, crystal physics, lasers and fiber optics are dealt in this course. Intended for Aeronautical, Automobile, Bio tech., Chemical, Civil and Mechanical branches.												
Course Object	e tive		1. E 1. E 2. A 3. E 3. E 4. Id 5. D	xplain robler pply p nginee xplain pply it dentify nateria Discuss	stress ns rincipl ering to partic to infi crysta ils and the pr	a enac , strair es of a col le natu nite po al struc hyster inciple	acoust acoust ure of otenti ctures resis b es, wo	ics to stradiat radiat al well and cr based o rking a	solve ion, co rystal on cor	, uli and a basic pr ompute planes, ncept of oplicatio	opply t oblem Schro descri f ferro ons of	he cond as and u dinger' be diffe magnet lasers a	cepts to use ultra s wave erent m tic doma und fibe	o solve k asonics equatio agnetic ains. r optics	as an on and
Course Outcor Prereq	e me uisites	S: Kno	Jpon co 1. S 2. A 8 3. U 4. Io 9 5. F 0 wledge	mplet olve the mploy Jse ma dentify xplain amilia optics.	ion of the basi the kno ing ult thema the cr the fe rize w damer	this cc c prob wledg rasoni tical d ystal l rroma ith the ntals o	ourse, ourse, e of a c as a erivat attice gnetice gnetic e prin f Phys	the st in elas coustion ions to plane doma ciples, ics at	ticity cs in d neerir o solvo s, dist in. work	ts will b and exp designin ng tool. e quant inguish king and r second	g acou um pr differ d appl	e to ne prop istical b oblems ent may ications	erties c ouilding gnetic n s of las	of matte s and naterial ers and	er ls, and l fiber
CO, P	O AN	D PS	O MAI	PPINC	ч Т										
CO CO-1	PO -1 3	PO -2 2	PSO MAPPING 'O PO PO												PSO -3 -

CO-2 3 2 0 0 0 0 0 0 0 3 - - - CO-3 3 2 0 0 2 0 </th <th>CO-2</th> <th>-</th> <th>•</th> <th>•</th> <th>•</th> <th>-</th> <th>•</th> <th>•</th> <th>•</th> <th>•</th> <th>•</th> <th>•</th> <th>2</th> <th></th> <th></th> <th></th>	CO-2	-	•	•	•	-	•	•	•	•	•	•	2			
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CO-4 3 2 0 0 2 0 0 0 0 0 3 - - - CO-5 3 2 0 0 3 0 0 0 0 0 3 - - - I: Weakly related, 2: Moderately related and 3: Strongly related MODULE 1: PROPERTIES OF MATTER AND HEAT (SL+4P=9) Elasticity - Hooke's law- Elastic Moduli - Young's modulus of elasticity - Rigidity modulus - Bulk modulus of a wire - Depression of a cantilever - young's modulus by cantilever - uniform and non-uniform bending. Thermal conductivity - experimental determination of thermal conductivities of good and bad conductors. Forbe's method - theory and experiment - Lee's disc method for bad conductors. CO-1 MODULE 2: ACOUSTICS AND ULTRASONIC (SL+4L=9) Classification of sound - Characteristics of musical sound - intensity - loudness, focusing, echo, echolon effect, resonance and noise) and their remedies Weater Preveneration time, loudness, focusing, echo, echolon effect, resonance and noise) and their remedies Ultrasonics- Production - Magnetostriction and Piezoelectric methods - properties - Applications CO-2 MODULE 3: QUANTUM PHYSICS(SL+4L=9) Black body radiation - Planck's theory (derivation) - Deduction of Wien's displacement law and Rayleigh - lean's law from Planck's theory - Compton effect. Theory and experimen	CO-3	3	2	0	0	3	0	0	0	0	0	0	3	-	-	-
CO-5 3 2 0 0 3 0 0 0 0 0 3 - - - I: Weakly related, 2: Moderately related and 3: Strongly related MODULE 1: PROPERTIES OF MATTER AND HEAT (SL4P=9) Elasticity - Hooke's law- Elastic Moduli - Young's modulus of elasticity - Rigidity modulus- Bulk modulus - Twisting couple on a wire - Torsional pendulum - determination of thermal conductivities of good and bad conductors - Forbe's method - theory and experiment - Lee's disc method for bad conductors. CO-1 MODULE 2: ACOUSTICS AND ULTRASONIC (SL4L=9) Classification of sound - Characteristics of musical sound - intensity - loudness - Weber Fechner law - Decibel - Reverberation - Reverberation time, derivation of Sabine's formula for reverberation time (Jaeger's method) - absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies CO-2 Black body radiation- Planck's theory (derivation) - Deduction of Wien's displacement law and Rayleigh - Jean's law from Planck's theory - Compton effect - Theory and experimental verificationschrödinger's wave equation - Time independent and time dependent equations - Physical significance of wave function – Particle in a one dimensional box - Extension to 3 dimension (no derivation) CO-3 MODULE 2: CHYSTLE HYNECS AND MAGNETISM (SL+4L=9) CO-4 Grast	CO-4	3	2	0	0	2	0	0	0	0	0	0	3	-	-	-
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Elasticity - Hooke's law- Elastic Moduli - Young's modulus of elasticity - Rigidity modulus - Twisting couple on a wire - Torsional pendulum - determination of rigidity modulus of a wire - Depression of a cantilever - young's modulus by cantilever - uniform and non-uniform bending.Thermal conductivity - experimental determination of thermal conductors. CO-1 MODULE 2: ACOUSTICS AND ULTRASONIC (SL+4L=9) Classification of sound - Characteristics of musical sound - intensity - loudness - Weber Fechner law - Decibel - Reverberation - Reverberation time, derivation of Sabine's formula for reverberation time (Jaeger's method) - absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies CO-2 Black body radiation - Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jean's law from Planck's theory - Compton effect – Theory and experimental verifications Schrödinger's wave equation – Time independent and time dependent equations - Physical significance of wave function – Particle in a one dimensional box - Extension to 3 dimension (no derivation) CO-3 MODULE 3: QUANTUM PHYSICS (SL+4L=9) CO-1 Crystal Lattice - Unit cell - Bravais lattice - Lattice planes - Miller indices - G' spacing in cubic lattice - Calculation of num	MODI	JLE 1:	PROP	ERTIES	OF MA	TTER		IEAT					()	5L+4P=	9)	
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MODULE 5: PHOTONICS AND FIBER OPTICS(5L+4L=9)Principle of lasers - Stimulated absorption - Spontaneous emission, stimulated emission - population inversion - pumping action - active medium - laser characteristics - Nd-YAG laser - CO2 laser - Semiconductor laser - applications - Optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - types of optical fibers single and multimode, step index and graded index fibers - fiber optic communication system.CO-5 BTL-3TEXT BOOKSTEXT BOOKS	Crystal - Lattice - Unit cell - Bravais lattice - Lattice planes - Miller indices - 'd' spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - coordination number - Packing factor for SC, BCC, FCC and HCP structures.Magnetic dipole moment - atomic magnetic moments- magnetic permeability and susceptibility - Types of magnetism: diamagnetism - paramagnetism - ferromagnetism - antiferromagnetism- ferrimagnetism - domain structure - hysteresis - hard and soft magnetic materials - applications.													n n - C n: B	O-4 TL-3	
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	Principle of lasers - Stimulated absorption - Spontaneous emission, stimulated emission - population inversion - pumping action - active medium - laser characteristics – Nd-YAG laser - CO ₂ laser - Semiconductor laser – applications - Optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - types of optical fibers - single and multimode, step index and graded index fibers - fiber optic communication system.												r S B	O-5 TL-3		

B.TECH – CIVIL ENGINEERING

1.	P.Mani. (2011). Engineering Physics, Vol I & II, Dhanam Publications, Chennai.
REFERENCE	BOOKS
1.	Gaur R.K. and Gupta S.L. (2010). <i>Engineering Physics</i> , 8 th edition, DhanpatRai publications (P) Ltd., New Delhi.
2.	P.Charles, Poople and Frank J. Owens. (2007). Introduction to Nanotechnology, Wiley India.
3.	Arthur Beiser. (2007). Concepts of Modern Physics, Tata McGraw – Hill Publications.
4.	Rajendran V, Marikani A. (2003). <i>Applied Physics for engineers</i> , 3rd edition, Tata McGraw – Hill publishing company Ltd., New Delhi.
E BOOKS	
1.	https://books.google.co.in/books?id=w4crDAAAQBAJ&printsec=frontcover#v=onepage&q& f=false
2.	https://www.goodreads.com/book/show/789047.Physics for Scientists and Engineers
MOOC	
1.	https://www.coursera.org/learn/how-things-work
2.	https://www.coursera.org/learn/quantum-physics
3.	https://onlinecourses.nptel.ac.in/noc21_ph21
4.	https://onlinecourses.swayam2.ac.in/aic20_sp64

COURS	E TITLI	E	ENGI	NEERIN	NG GR	APHIC DE	S AND SIGN	COMP	UTER	AIDED		CRED	ITS	3	
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Ver	sion		:	1.0		Appr	oval D	etails	24 3(4 ACM D th May 2018	, /	LEARN LEV	IING EL	BTI	L-3
ASSESS	MENT	SCHE	ME												
First Pe	eriodica	l Asse	ssment		Sec	ond Pe Assessn	riodica nent	I		Practic	al Com	ponent	t	ES	E
	15	%	15% 20% 50%										%		
Cou Descr	irse iption	Tl tc bi ei as	tools and fundamentals of free hand sketching. It prepares the students to learn the basic concepts involved in technical drawing skills and computer graphics. It also emphasis on the principles and basic understanding of projections and visualizations aspects of component designing.												
Coı Objee	ırse ctives	1. 2. 3. 4. 5.	 Understand the basics of Engineering graphics and plane curvatures using AutoCAD tool Visualize the free hand sketch and orthographic projections and to solve simple problems Comprehend the various geometrical models and its developments Understand the transformation of 2D drafting to 3D models using CAD tools Generate associated views of 3D models and related geometric dimensioning and tolerancing. 												
Coı Outo	ırse come	1. 2. 3. 4. 5.	 Upon completion of this course, the students will be able to, Use the AutoCAD commands to generate simple drawings and understand drafting techniques. Apply the acquired knowledge to solve simple problems involving straight planes and solids. Visualize solid objects and apply AutoCAD commands to generate the models. Recognize and use 3D model commands in AutoCAD tool to generate solid objects. Generate the various views of the geometrical solid model manually and using AutoCAD as well. 									lanes ls. using			
Prerequ	isites:	Nil													
CO, PO	AND	PSO N	IAPPI	NG											
со	РО -1	PO -2	PO -3	РО -4	РО -5	PO -6	PO -7	PO -8	РО -9	PO -10	PO -11	PO -12	PSO -1	PS O-2	PS O-3
CO-1	2	1													

B.TECH – CIVIL ENGINEERING

1															
CO-2	-	-	2	-	3	-	-	-	-	-	-	-	-	-	-
CO-3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-
CO-5	-	-	3	-	-	-	-	-	-	-	-	1	-	-	-
		1	: Weal	kly rela	ated, 2	: Mod	eratel	y relat	ed and	d 3: Sti	ongly	relate	d		
MODU	LE 1: B	ASICS	OF EN	GINEE	RING	GRAPH		ND PLA	NE CL	JRVES			(6	L+6P=1	2)
Importa	nce of	f grap	hics -	BIS co	onvent	ions a	nd sp	ecifica	tions	- draw	/ing sł	neet si	zes -		-
Letterin	g – Dii	mensio	oning -	Scale	s. Dra	fting n	nethod	ds - int	troduct	tion to	Com	outer A	Aided		
Drafting	– Cor	mpute	r Hard	ware	– Wor	kstatio	on – P	rinter	and P	lotter	– Intro	oductio	on to		
software	e for C	omput	er Aid	ed Des	ign an	d Draf	ting – I	Exposu	ire to S	olid M	odellir	ng soft	ware	~~~	
– Geom	etrical	Const	ructior	n-Coor	dinate	Syste	ms/Ba	sic Ent	ities –	3D pri	nter.				-1
Practical component:												BIL	-2		
AutoCAD – Solid modelling tool - Basics.															
Suggested Readings:															
Basics of drafting and dimensioning															
MODULE 2: VISUALIZATION, ORTHOGRAPHIC PROJECTIONS AND FREE HAND SKETCHING(6L+6P=												=12)			
Visualization concepts and Free Hand sketching: Visualization principles —															
Representation of Three-Dimensional objects — Pictorial Projection methods - Layout of															
views- F	ree ha	and ske	etching	g of m	ultiple	views	from	pictori	al view	/s of o	bjects.	Drafti	ng of		
simple	Geom	etric	Object	s/Edit	ing G	eneral	princ	iples	of pre	esenta	tion o	of tech	nical		
drawing	gs as pe	er BIS -	- Intro	ductio	n to O	rthogra	aphic p	oroject	ions -	Namin	g view	vs as pe	er BIS		
- First a	ngle p	rojecti	ion me	ethod.	Conve	ersion	to ortl	hograp	hic vie	ews fro	om giv	en pic	torial	CO	-2
views o	f objec	cts, inc	luding	dimer	nsionir	ng – Dr	afting	of Ort	hograp	ohic vie	ews fro	om Pic	torial	BTI	2
views.															
Practica	l comp	onent	t:												
2D draf	ting, C	rthogr	raphic	projec	tions										
Suggest	ed Rea	adings	:												
AutoCA	D tool	– Com	nmand	s for s	ketchi	ng, Pro	jectio	ns							
MODUL	E 3: GI	EOME	FRICAL	. MOD	ELLING	g, Isol	METRI	C AND	DEVE	OPME	ENT OF	SURF	ACES(6	L+6P=1	.2)
Principle	es of is	ometr	ic proj	ection	and so	olid mo	odellin	g. Isor	netric (drawin	ıg — Isc	Planes	s and		
3D Mod	elling	comma	ands. F	Project	ions o	f Princ	ipal Vi	ews fr	om 3-D) Mod	els. So	lid Mo	deling		
– Types	of mo	delling	- Wire	e frame	e mod	el, Sur	face M	lodel a	nd Sol	id Moo	del – Ir	ntrodu	ction		
to graph	nic soft	ware f	or soli	d mod	elling.	Devel	opmer	nt of S	urfaces	5				CO	-3
Practica	l comp	onent	t:											BTI	3
3D mod	elling a	and su	rface c	levelo	oment										
Suggest	ed Rea	adings	:												
Surface modelling and solid modelling															
MODULE 4: COMPUTER AIDED DESIGN AND DRAFTING												(6L+6F) =12)		
Preparation of solid models of machine components like slide block, solid bearing block,										olock,					
bushed bearing, gland, wall bracket, guide bracket, shaft bracket, jig plate, shaft support										CO	-4				
(open ty	vpe), ve	ertical	shaft s	suppor	t etc u	ising a	ppropi	riate n	nodellii	ng soft	ware.	2D vie	ews	BTL	2
and sec	tional	view,	compu	uter ai	ded d	rafting	and o	dimens	sioning	. Gene	erate 2	2D dra	wing		

from the 3D mo	dels – generate and develop the lateral surfaces of the objects.						
Presentation Te	chniques of Engineering Drawings – Title Blocks – Printing/Plotting the						
2D/3D drawing	using printer and printing solid object using 3D printer.						
Practical compo	onent:						
2D to 3D transfo	ormation, plotting of drawings						
Suggested Read	ings:						
3D modelling – v	view generations and commands						
MODULE 5: SIMPLE DESIGN PROJECTS – COMPUTER AIDED DESIGN							
Creation of engineering models and their presentation in standard 2D form, 3D Wire- Frame and shaded solids, meshed topologies for engineering analysis, tool-path generation for component manufacture, geometric dimensioning and tolerencing. Use of solid-modelling software for creating associative models at the components and assembly levels in their respective branch of engineering like building floor plans that include: windows, doors, fixtures such as WC, Sink, shower, slide block, etc. Applying color coding according to drawing practice. Practical component: 3D solid meshed topology, geometrical dimensioning, simple components Suggested Readings: AutoCAD dimensioning, assembly of solid components							
TEXT BOOKS							
1.	Jeyapoovan, T. (2016). <i>Engineering Drawing and Graphics Using AutoCAL</i> Vikas Publishing House Pvt Ltd., New Delhi.	D, 7 th Edition,					
REFERENCE BOO	DKS						
1.	Warren J. Luzadder and Jon. M. Duff. (2016). <i>Fundamentals of Engineerin</i> Prentice Hall of India Pvt. Ltd., Eleventh Edition.	ng Drawing,					
2.	Jensen, J.D. Helsel, D.R. Short. (2012). <i>Engineering Drawing and Design</i> , N Sixth Edition.	AcGraw-Hill,					
E BOOKS							
1.	http://keralatechnologicaluniversity.blogspot.in/2015/06/engineering-g benjamin-pentex-freeebook-pdf-download.html	<u>raphics-j-</u>					
2.	http://keralatechnologicaluniversity.blogspot.in/2015/06/engineering-g varghese.html	<u>raphics-p-i-</u>					
MOOC							
1.	http://nptel.ac.in/courses/112103019/						
2.	http://nptel.ac.in/courses/105104148/						

COURSE TITLE	PROFESSIONAL ENG	GLISH AND SOFT	SKILLS	CREDITS	3							
COURSE CODE	ELA4101	COURSE CATEGORY	HS	L-T-P-S	2-0-2-1							
Version	1.0	Approval Details	24 ACM 30 th May 2018	LEARNING LEVEL	BTL-4							
ASSESSMENT SCHEM	E											
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE							
15%	15%	10%	5%	5%	50%							
Course Description	This course has been desin communication needs. It a skills and knowledge of gra to communicate accurately situations.	This course has been designed to meet students' current and future language and communication needs. It attempts to develop their proficiency in the four language kills and knowledge of grammar and vocabulary. This course teaches students how o communicate accurately, appropriately and fluently in professional and social situations.										
Course Objective	 To acquire self- informative list language. To provide an en- levels and use and debate. To equip the stu on literary, scient To enhance the recommendation report writing. To equip the leand participate and excel in employability 	 To acquire self-confidence by which the learner can improve upon their informative listening skills by an enhanced acquisition of the English language. To provide an environment to Speak in English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate. To equip the students to Read, comprehend and answer questions based on literary, scientific and technological texts. To enhance the writing skills of the students via training in instructions, recommendations, checklists, process-description, letter-writing and report writing. To equip the learners in analyzing and applying creative thinking skills and participate in brainstorming, mind-mapping, audiovisual activities 										
Course Outcome	Upon completion of this co 1. Demonstrate focus on syn 2. Enrich vocate Derive the o general and ideas. Learn 3. Analyse and essays, read profiles in th 4. Organize and comprehens speaking in f	burse, the students e the ability to co stax. bulary, use of phra contextual meanin academic situation to give instruction d transcode data, complex passages he form of a resume d articulate ideas, of sive manner in w formal and information	s will be able to onstruct sente ses, expression of through re- ns, Identify sp s and make su construct d s and summan e. concepts, and written busine al situations.	o ences with acco ons, idioms, and eading and liste pecific details a uggestions. ifferent types rize ideas, creat perceptions in ess correspond	uracy with I proverbs. ening from nd general of written e personal a ence, and							

B.TECH – CIVIL ENGINEERING

5. Apply critical thinking skills and participate in brainstorming sessions on general topics, and transact information with an audience. Prepare students for interview questions, presentation skills. Produce complex written documents such as reports, business/scientific documents, and project proposals.

Prerequisites: Plus, Two English-Intermediate Level

CO, PO AND PSO MAPPING

со	РО- 1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	PO -8	Р О- 9	Р О- 10	P O- 11	PO -12	PSO -1	PSO -2	PSO -3
CO-1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO-2	-	-	-	-	-	-	-	2	2	3	-	-	-	-	-
CO-3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO-4	-	-	-	-	-	-	2	-	-	3	2	-	-	-	-
CO-5	-	-	-	-	-	-	-	-	2	3	2	3	-	-	-
						-				_					

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: FUNCTIONAL GRAMMAR AND VOCABULARY (6L+6P=12)	
Introduction to communication skills –Self Introduction - Basic grammar (tenses, subject verb agreement) - Basic vocabulary (prefixes, suffixes, roots, phrasal verbs and idioms)- Topic sentences, paragraph writing	
Short conversations-Situational Communication-Dialogue Writing - Writing short paragraph based on environment protection, societal issues, health, cultural contexts etc., identifying topic sentences, linking pairs of sentences. Suggested Reading: 1. An Introduction to Professional English and Soft Skills with audio CD by Dr. Bikram K. Das et al.	CO-1 BTL-2
 Published by Cambridge University Press. 2009 2. Professional Speaking Skills by ArunaKoneru, Oxford Press, 2015 3. Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016. 4. English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition 	
MODULE 2 – LISTENING AND SPEAKING SKILLS (6L+6P=12)	
Academic listening (listening to lectures different topics, audio excerpts and answering question) - General listening (conversations, speeches: formal and informal) - Giving instructions and suggestions- Active and Passive Voice Suggested activities: Listen and repeat, listening to audio excerpts-Listening to native speakers - TED Talks, short prepared speeches, Table topics – Speaking in different situations- MCQ's - Cloze exercises- Complete the Dialogue Suggested sources: (Listening and Speaking Modules) – Language Lab Professional Speaking Skills by ArunaKonery, Oxford Press	CO-2 BTL-3
Professional Speaking Skills by Arunakoneru, Oxford Press	

English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications,								
2014 edition								
MODULE – 3: FUNCTIONAL READING AND WRITING (6L+	6P=12)							
charts, tables and graphs Report writing- accident, industrial, survey, general reports –Direct and Indirect speech Suggested Activities: Identify the errors in sentences, grammar exercise, reading passage for identifying the contextual meaning, interpreting charts, tables and graphs, choose the right meaning of the word given Assignment on suggested reading activity – Book review Suggested sources: Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016. (6L+6I MODULE – 4: BUSINESS CORRESPONDENCE								
MODULE – 4: BUSINESS CORRESPONDENCE (6L+6)								
Memo-Notice - Agenda – Minutes of the Meeting-Action Taken report- Report Writing- Connectives - Cause and effect Suggested activities: Drafting agenda, notice, memo, minutes of the meeting- ATR- Cause and effect exercises - Presentation in the language lab (Technical or Non-technical topic) Suggested sources: Cambridge Advanced English, Newspapers, library books, IELTS , IELTS Academic Writing 1, New Insights into IELTS, CUP								
MODULE 5 – PRESENTATION SKILLS AND INTERVIEW SKILLS (6L+6	P=12)							
MODULE 5 - PRESENTATION SKILLS AND INTERVIEW SKILLS(6L+6P=Presentation Skills - Reading and Interpreting Advertisements—Job Application- Covering Letter -Curriculum Vitae –E-mail - Project proposal –Interview skills (HR questions) – Group Discussion Suggested Activities: Presentation in the language lab (Technical or Non-technical topic) Group Discussion (Tutorial Classes) Suggested Sources: English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition Soft Skills and Employability Skills by Sabina Pillai and Agna Fernandez, Cambridge University Press, 2018. Education and personality development by K. Manoharan, APH Publishing Home, 2016								
TEXT BOOKS								
1.Dr. Bikram K. Das et al. (2009). An Introduction to Professional English and Soft S Cambridge University Press	kills,							
2 Dolly John . (2014). English for Life and the Workplace Through LSRW&T skills, Pear Publications								
REFERENCE BOOKS								
1. Sabina Pillai and Agna Fernandez. (2018). <i>Soft Skills & Employability Skills,</i> Camb University Press 2018.	idge							

2.	Steve Hart et al. (2016). English for Undergraduates, Cambridge University Press
3.	Collins. (2012). Skills for the TOEFL IBT Test, Collins publisher
4.	Jeff Butterfield. (2010). Soft Skills for Everyone, Cengage Learning.
5.	Aruna Koneru. (2015). Professional Speaking Skills, Oxford Publications.
E BOOKS	
1	https://www.britishcouncil.in/english/courses-business
2	http://www.bbc.co.uk/learningenglish/english/features/pronunciation
3	http://www.bbc.co.uk/learningenglish/english/
4	http://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/
5	https://oneshopenglish.com/
6	https://breakingnews.com/
моос	
1	https://www.mooc-list.com/tags/english
2	https://www.mooc-list.com/course/adventures-writing-stanford-online
3	http://www.cambridgeenglish.org/learning-english/free-resources/mooc/

COL TI	JRSE TLE			PROE	BLEM S	OLVIN	G USIN	G C		CI	REDITS			3		
	JRSE DDE		CSA4	101		COU CATEO	RSE GORY		РС		L-T-	P-S		2-0-2	-1	
Ver	sion		1.()	Ap	proval	l Details	5 3	24 ACN 80 th Ma 2018	I IY	LEAR LE\	NING /EL		BTL-4		
		·				ASS	ESSMEN	IT SCI	HEME							
Fi Peric Asses	rst odical sment		Seco Perioc Assessi	nd lical ment	Practical Component E						ESE	SE				
1	5%		159	%			20%	6					50%			
Coi Descr	urse iption	To con dev	To introduce computers and programming in C and also explore the power of computational techniques that are currently used by engineers and scientists and to develop programming skills with reasonable complexity.													
Cor Obje Cor Outo	urse ective urse come	U	1. To ar 2. Le 3. Ga 4. Ur 5. Ga 1. De 2. De co 3. De 4. De	o acquin ad Prob arn the ain kno adersta ain Kno omplet escribe escribe escribe escribe ade to s esign an esign an	re the lem-so e funda wledg ind the wledg ion of the ba crate p colve the nd Imp nd Imp	basic k blving t amenta e in Fu e on Er this co asics of roblem ne give blemen	ne stud nowled echniqu als of C p nctions, ers, Stru mbedde urse, th digital n solving n proble t C prog t C prog	ge in Jues. Drogra array Jucture d Pro e stu comp g tech em. gram u gram u	o, compu ammin vs and s es and s gramm dents v uter ar niques using C using P	ter han g. strings Union hing will be using ontrol ointers	in C proin C proin C proin C proin C proint C pr	, progr ogram ogramm D , ing lan art, alg nents a ile ope	ming. ming guages gorithm and Fur rations	ng lang s. n/pseud nctions	uages do	
Prere	auisite	s. Nil	5. IO	entity t	ne nee	ed for e	embead	ea C	in real-	time a	ррисат	ions.				
CO. P	0 ANI) PSO	ΜΔΡΡ	ING												
со, і	PO	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	РО	PO-	PO-	PS	PS	PS	
	-1	2	3	4	5	6	7	8	9	-10	11	12	0-1	0-2	0-3	
0-1	2	2	2	- ว	- ว	2	-	2	-	-	1	2	2	- 2	-	
CO-2	2	2	2	2	2	2		ے 1	2	5	- 2	1	2	2	_	
CO-4	3	3	3	2	-	-		-	-	-	1	-	- 1	2	-	
CO-5	1	1	1	-	1	2		1	-	-	-	2	1	-	-	
			1: We	akly re	lated,	2: Mo	derately	/ relat	ted and	d 3: Sti	rongly	related	ł			

MODULE 1: COMPUTER FUNDAMENTALS	(6L+6P=12)
Introduction – Fundamentals of digital computers - Programming languages -	
Programming Paradigms – Types of Programming Languages – Language Translators	
 Problem Solving Techniques: Algorithm – Flow Chart - Pseudo code. 	
Practical Component:	CO 1
 Drawing Flowcharts using E- Chart & Writing pseudo code for the following 	
problems	DIL-1
Greatest of three numbers	
Sum of N numbers	
Computation of nCr	
MODULE 2: PROBLEM SOLVING TECHNIQUES AND LANGUAGES (6L+6P=12)	1
Evolution of C -Why C language - Applications of C language - Data Types in C –	
Operators and Expressions – Input and Output statements in C – Decision Statements	
– Loop Control Statements.	
Practical Component:	
 Program to illustrate arithmetic and logical operators 	CO-2
 Program to read and print data of different types 	BTI-3
 Program to calculate area and volume of various geometrical shapes 	512 0
 Program to compute biggest of three numbers 	
 Program to print multiplication table 	
 Program to convert days to years, months and days 	
Program to find sum of the digits of an integer	
MODULE 3: FUNDAMENTALS OF C (6L+6P=12)	
Functions – Storage Class – Arrays – Strings and standard functions - Pre-processor	
Statements.	
Practical Component:	
 Program to compute Factorial, Fibonacci series and sum of n numbers using 	
recursion	
 Program to compute sum and average of N Numbers stored in an array 	CO-3
 Program to sort the given n numbers stored in an array 	BTL-4
 Program to search for the given element in an array 	
 Program to do word count 	
 Program to insert a substring in a string 	
 Program to concatenate and compare two strings 	
Program using pre-processor statements	
MODULE 4: FUNCTIONS, ARRAYS AND STRINGS (6L+6P=12)	I
Pointers – Dynamic Memory allocation – Structure and Union – Files.	
Practical Component:	
 Program to compute sum of integers stored in a 1-D array using pointers and 	
dynamic memory allocation	CO-4
 Program to read and print records of a student/payroll database using 	BTL-3
structures	
Program to simulate file copy	
Program to illustrate sequential access file	
Program to illustrate random access file	

MOD	ULE 5: POINTERS, STRUCTURES AND UNION (6L+6P=12)	
Struc	ture of embedded C program - Data Types - Operators - Statements - Functions	
- Keil	C Compiler.	CO-5
Pract	ical component:	BTL-2
Simp	le programs using embedded C	
TEXT	BOOKS	
1.	Jeyapoovan T. (2015). Fundamentals of Computing and Programming in C, Vikas	Publishing house.
2.	Mark Siegesmund. (2014). Embedded C Programming, first edition, Elsevier pu	ublications.
REFER	ENCE BOOKS	
1.	Ashok Kamthane. (2017). Computer Programming, Pearson Education, 7 th Edit	ion.
2.	YashavantKanetkar. (2016). Let us C, 15th edition, BPP publication.	
3.	S.Sathyalakshmi, S.Dinakar. (2013). Computer Programming Practicals – Comp	outer Lab Manual,
	Dhanam Publication, First Edition.	
E BO	OKS	
1.	https://en.wikibooks.org/wiki/C_Programming	
MOO	C	
1.	https://onlinecourses.nptel.ac.in/noc18-cs10/preview	
2.	http://nptel.ac.in/courses/106105085/2	
3.	https://www.udemy.com/c-programming-for-beginners/	
4.	https://www.coursera.org/specializations/c-programming	

I

COURSE TITLE	SUSTAI	NABLE ENGINEERING	G SYSTEMS	CREDITS	2							
COURSE CODE	GEA4102	COURSE CATEGORY	PC	L-T-P-S	2-0-0-1							
Version	1.0	Approval Details	24 th ACM, 30.5.2018	LEARNING LEVEL	BTL-3							
ASSESSMENT S	СНЕМЕ											
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE							
15%	15%	10%	5%	5%	50%							
Course Description	This course will provide an insight about the principles of Sustainability.											
Course Objectives	 To explain To compara To apply To analyz To study 	n the principles of su are assessing technol the concepts of gree the need of waste, water cycle and role	stainability with case ogies for ensuring su n engineering. reuse and redistribu of human beings for	e studies. Istainability. Ition managemen ensuring sustaina	t. bility.							
Course Outcomes	5. To study water cycle and role of human beings for ensuring sustainability. Upon completion of this course, the students will be able to 1. Explain the principles of sustainability with case studies. 2. Compare assessing technologies for ensuring sustainability. 3. Apply the concepts of green engineering. 4. Analyze the need of waste, reuse and redistribution management. 5. Study water cycle and role of human beings for ensuring sustainability.											

CO, P	CO, PO AND PSO MAPPING														
СО	РО	PO-	РО	PO-	PO-	PS	PS	PS							
	-1	2	3	4	5	6	7	8	9	-10	11	12	0-	0-	0-
													1	2	3
CO- 1	3	1	3	0	1	-	-	2	2	2	2	3	1	2	3
CO- 2	2	2	2	0	1	-	-	2	2	2	2	3	3	3	3
CO- 3	2	1	1	0	1	-	-	2	2	2	2	3	2	1	3
CO- 4	1	2	2	0	1	-	-	2	2	2	2	3	2	3	3

CURRICULUM AND SYLLA	BUS
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CO-5	3	2	2	0	1	-	-	2	2	2	2	3	3	3
		1:	: Weakl	y relat	ed, 2: I	Modera	tely re	ated a	nd 3: St	rongly	related	1		
MODULE	E 1 – PR	RINCIPL	ES OF S	USTAII	NABLE	SYSTEN	٨S	(6L)						
Sustainability Definitions - Principles of Sustainable Design, Sustainable Engineering - Frameworks for Applying Sustainability Principles . Summary & Activities.												CO BTI)-1 L-2	
MODULE	2 – TE	CHNOL	OGY D	EVELO	PMENT		IFECYC	E ASSE	SSMEN	IT	(6L)			
Technology as a part of anthropogenic environment - Technology readiness levels (TRL) – technical metrics - Emerging, converging, disruptive technologies - Life Cycle Assessment (LCA) methodology - Summary & Activities.										TRL) – sment	CC BT)-2 L-3		
MODULE	MODULE 3 - GREEN ENGINEERING(6L)													
Principles of Green Engineering - Frameworks for assessment of alternatives - Green Engineering examples - Multifunctional Materials and Their Impact on Sustainability - Summary & Activities.										CC BT)-3 L-3			
MODULE	MODULE 4 - RESOURCE MANAGEMENT TECHNOLOGIES (6L)													
Waste management purpose and strategies - Recycling: open-loop versus closed-loopthinking - Recycling efficiency - Management of food waste and composting technologies - E-waste stream management - Reuse and redistribution programs - LCA approach to wasteBTL-3management systems - Summary and Activities.)-4 L-3				
MODULE	5 - SUS	STAINA	BLE WA	ATER A	ND WA	STEWA	ATER SY	STEMS			(6L)			
Water of systemsM Activities Factor in	cycle - Metrics Collab Sustair	Water for orative nability	r conse assessr Decisic Paradig	ervation ment on Maki gm - Su	n and of wa ing - Ro mmary	proted Iter m le of Cc & Acti	ction t nanager ommun vities.	echnold ment ity and S	ogies - techno Social N	Wate logies-S letworl	er treat Summa king - Hi	tment ry & uman	CO BTI)-5 L-3
TEXT BOO	OKS													
1. 2	\ 	/anek, <u>mplem</u> C.U. Bee	F.M and <i>entatio</i> cker. (2	d L.D. A n, McG 012). S	lbright raw Hi ustaina	. (2018 . 1 <i>bility E</i>). Ener <u>o</u> thics ar	y Syste	ms Eng	ineerin ty Rese	ig - Eva arch, Sj	<i>luation</i>	and	
REFEREN	CES					-				-				
1.	J	.B. Gui Techno	nee et a l, pp.90	al. (201 -96.	5). <i>Life</i>	Cycle A	lssessm	ent: Pa	st, Pres	sent, ar	nd Futui	re, Envi	iron. Sci.	
2	l E	Anastas Enginee	, P.T., Z ering, Sp	immer oringer	man, J.	B. (201	6). Inno	ovations	s in Gre	en Che	mistry	and Gr	een	
3.		Christer Sons.	nsen T.,	Ed. (20	016). So	olid Wa	ste Tec	hnology	/ & Ma	nagem	ent, Vo	lume 1	& 2., Wi	iley and
4.	S E	Stermai Emergir	n, J.D, V ng Para	Veinste digm, S	ein, M.F Springe	P. and T r Scien	urner F ce, Busi	R.E. (Eds ness M	s.). (201 edia,	L5). <i>Sus</i>	stainabi	lity Sci	ence: Th	e
E BOOKS														

B.TECH – CIVIL ENGINEERING

1.	David T. Allen, David R. Shonnard. (2017). <i>Sustainable Engineering Concepts, Design and Case Studies,</i> Pearson Education.
2.	Gerald Jonker Jan Harmsen. (2014). <i>Engineering for Sustainability - A Practical Guide for</i> Sustainable Design, Elsevier, 1st Edition
MOOC	
1.	https://www.coursera.org/learn/sustainability
2	https://www.academiccourses.com/Certificate/Sustainability-Studies/India/
3.	https://onlinecourses.nptel.ac.in/noc18_ce08/preview
4.	https://www.coursera.org/learn/ecosystem-services

COURS	E TITLE	E	INTRODUCTION TO DIGITAL SYSTEMS									CREDITS			;	
COURS	e cod	E	MH	B4102		C CA	OURSI TEGOF	E RY		DE		L-T-P	P-S	2-0-	-2-1	
Ver	sion		1	1.0		Appro	oval De	etails	2 3(4 ACM 0 th May 2018	/	LEARN LEV	ING EL	BT	L-3	
ASSESSMENT SCHEME																
First Pe Asses	riodica sment	al	Second Periodical AssessmentPractical componentE										ES	SE		
15	5%			15%	6				10%				50	1%		
Coı Descr	ırse iption	l Ir di m	Introduction to digital system is concerned with the design, selection, analysis of digital circuits as well as the various electronics components to be used in a mechatronics system													
Course Objectiv	ve		 The course should enable the student to, 1. Practice the different number systems, Logic gates, Minimization Techniq 2. Design of adders, subtractors and other combinational circuits. 3. Apply the underlying principle and applications of various sequential circuit 4. Design of asynchronous circuits and the various issues in it. Real time interfacing concepts and its application. 5. Understand the principle of various electronic devices 6. Supergetic combination of above in the design of mechatronic systems. 											iques cuits		
Course OutcomeUpon completion of this course, the students will be able to 1. Simplify mathematical expressions using Boolean functions 2. Design combinational circuits 3. Design sequential circuits and Asynchronous circuits for simple problen 4. Select appropriate electronic devices for mechatronic systems											roblem	S				
Prerequ	isites:															
CO, PO) AND	PSO	MAP	PING												
со	РО -1	РО -2	PO -3	РО -4	РО -5	РО -6	РО -7	РО -8	РО -9	PO -10	PO -11	PO -12	PSO -1	PS O-2	PSO -3	
CO-1	3	3	-	-	-	-	-	2	2	-	-	2	2	-	-	
CO-2	3	3	3	3	3	-	-	2	2	-	-	2	2	-	-	
CO-3	3	3	-	-	-	-	-	2	2	-	-	2	2	-	-	

CO-4	3	3	-	-	-	-	-	2	2	-	-	2	2	-	
		1	: Wea	kly rel	ated, 2	2: Mod	eratel	y relat	ed an	d 3: St	rongly	relate	d		

MODULE 1: INTRODUCTION TO DIGITAL SYSTEMS

(6L+6P=12)

Introduction to Digital systems – Number systems - Binary, Hexadecimal - Boolean theorems – Basic Logic Gates, Minimization – Midterm, Maxterm, Karnaugh Map, Kmap up to 4 variables. Simplification of logic functions with K-map, tabular minimization procedures Practical component: (<i>To be done in Simulation environment</i>) 1. Implementation of Boolean Expressions using Basic Logic Gates Suggested Readings: Basics of number systems. MODULE 2: COMBINATIONAL CIRCUITS (6L+6P=12)	CO-1 BTL-2
Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry	
 look ahead Adder, BCD Adder, Multiplexer, De-multiplexer, Magnitude Comparator, Decoder, Encoder. Practical component: (<i>To be done in Simulation environment</i>) 1. Implementation of Boolean Relations using Digital Comparators 2. Implementation of Arithmetic Expressions using Adders / Subtractors 	CO-2 BTL-2
3. Implementation of BCD-TO-7-segment Decoder / Driver and Operation of 7-segment	
LED Display	
Suggested Readings:	
Priority Encoder.	
MODULE 3: SEQUENTIAL CIRCUITS (6L+6P=12)	
 Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters-Ripple Counters, Ring Counters, Shift registers. Practical component: - (<i>To be done in Simulation environment</i>) 1. Implementation of Sequential Circuits using Basic Flip-Flops 2. Implementation of Multi-bit Sequential Circuits using Shift Registers Suggested Readings: Best practices for Cyber security standards 	CO-3 BTL-3
MODULE 4: ASYNCHRONOUS SEQUENTIAL CIRCUITS (6L+6P=12)	
Asynchronous sequential circuits- fundamental mode pulse mode sequential circuits. cycles and races, Race free assignments, hazards Practical component: - (<i>To be done in Simulation environment</i>) 1. Implementation of Logic Functions using Multiplexers 2. Implementation of Logic Functions using Decoders Suggested Readings: ASM chart	CO-3 BTL-2
MODULE 5: BASIC ELECTRONIC DEVICES (6L+6P=12)	
Voltage – Current – Ohms Law – introduction to electronic devices – PN Junction Diode, V-I characteristics, Transistors, Rectifiers. Practical component: V-I characteristics of PN junction diode, transistors Suggested Readings:	CO-4 BTL-2

Inverters, Conv	erters and Voltage regulators									
TEXT BOOKS										
1.	Thomas I. Floyd. (2014). Digital Fundamentals, 11th edition, Pearson									
REFERENCE BOOKS										
1	M. Morris Mano. (2016). Digital Logic and Computer Design, Prentice-Ha	II								
2.	W.H.Gothmann. (1992). Digital Electronics-Introduction Theory and Prac	tice, PH								
3.	S. Salivahanan and S. Arivazhagan. (2006). <i>Digital Circuits and Design</i> , 3rd Publishing House Pvt. Ltd, New Delhi	l Edition., Vikas								
E BOOKS										
1.	http://nptel.ac.in/courses/106108099/Digital%20Systems.pdf									
2.	https://onlinecourses.nptel.ac.in/noc18 ee33/preview									
MOOC										
1	http://nptel.ac.in/courses/106108099/Digital%20System									

COURSE TITLE	ENGINEERING AND DESIGN CREDITS 3											
COURSE CODE	ATB4101	L-T-P-S	3-0-0-0									
Version	1.0	Approval Details	24th ACM, 30.5.2018	LEARNING LEVEL	BTL-4							
ASSESSMENT SCH												
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE							
15%	15%	15% 10% 5% 5% 50%										
Course Description	This course will p product as well as	This course will provide an insight about procedure and steps involved in design of a product as well as a process.										
Course Objectives	 To analyze To examin To discrim To explain To classify 	e various element in des le and explain the stage inate the process involv the significance of qua the parameters in user	sign of a product. s in design of aut ved in prototype i lity and safety in centered design	omobile compon making. design of a produ concepts.	ients. uct.							
Course Outcomes	 Upon completion of this course, the students will be able to 1. Analyze various elements in design of a product. 2. Examine and explain the stages in design of automobile components. 3. Discriminate the process involved in prototype making. 4. Explain the significance of quality and safety in design of a product. 5. Classify the parameters in user centered design concepts. 											
Prerequisites: Nil												
CO, PO AND PSO	MAPPING											

,															
СО	PO -	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO -	PO-	PO-	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	-1	-2	-3
CO-1	1	1	2	1	1	3	3	1	2	2	3	3	2	1	-
CO-2	2	2	2	1	2	3	3	1	2	2	3	3	3	2	-
CO-3	3	1	2	1	1	3	3	1	2	2	3	3	1	2	-
CO-4	3	1	2	1	1	3	3	1	2	2	3	3	3	2	-
CO-5	2	1	2	1	1	3	3	1	2	2	3	3	2	3	-
			1: We	akly re	elated,	2: Mod	erately	relate	d and 3	3: Stron	gly rela	ted			

MODULE 1 – INTRODUCTION TO AUTOMOBILE ENGINEERING DESIGN (7L + 2P = 9)	
Design and its objectives; Design constraints, Design functions, Design means and Design from; Role of Science, Engineering and Technology in design; Engineering as a business proposition; Functional and Strength Designs. Design form, function and strength; How to initiate creative designs? Initiating the thinking process for designing a product of daily use. Need identification; Problem Statement; Market survey-customer requirements; Design attributes and objectives; Ideation; Brainstorming approaches; arriving at solutions; Closing on to the Design needs. Project: An Exercise in the process of design initiation. A simple problem is to be taken up to examine different solutions- Vehicle, Group Presentation and discussion.	CO-1 BTL-4
MODULE 2: PROCESSES IN DESIGN FOR AUTOMOTIVE SYSTEM (7L+2P=9)	
 Design process- Different stages in design and their significance; Defining the design space; Analogies and "thinking outside of the box"; Quality function deployment-meeting what the customer wants; Evaluation and choosing of a design. Design Communication; Realization of the concept into a configuration, drawing and model. Concept of "Complex is Simple". Design for function and strength. Design detailing- Material selection, Design visualization- Solid modelling; Detailed 2D part drawings; Tolerance; Use of standard items in design; Research needs in design; Energy needs of the design, both in its realization and in the applications. Project: An exercise in the detailed design of any two automobile components 	CO-2 BTL-4
MODULE 3: PROTOTYPING OF AUTOMOBILE COMPONENTS (7L+2P =9)	
 Prototyping- rapid prototyping; testing and evaluation of design; Design modifications; Freezing the design; Cost analysis. Engineering the design – From prototype to product. Planning; Scheduling; Supply chains; inventory; handling; manufacturing/construction operations; storage; packaging; shipping; marketing; feed-back on design Project: List out the standards organizations. Prepare a list of standard items used in automobile original equipment manufacturers. Develop any design with over 50% standard items as parts. 	CO-3 BTL-4
MODULE 4: QUALITY ASPECTS IN AUTOMOBILE ENGINEERING (7L+2P =9)	
Design for "X"; covering quality, reliability, safety, manufacturing/construction, assembly, maintenance, logistics, handling; disassembly; recycling; re-engineering etc. Project: List out the design requirements(x) for designing a car.	CO-4 BTL-4
Module 5: USER CENTRED DESIGNS IN AUTOMOBILE ENGINEERING (7L+2P =9)	
Product centered and user centered design. Product centered attributes and user centered attributes. Bringing the two closers. Example: Motorcycle and Car, Aesthetics and ergonomics. Value engineering, Concurrent engineering, Reverse engineering in design; Culture based design; Architectural designs; Motifs and cultural background; Tradition and design; Study the evolution of Wheels; Printed motifs; Role of colours in design. Make sharp corners and change them to smooth curves-check the acceptance. Design as a marketing tool; Intellectual Property	CO-5 BTL-4

rights – Trade any such prode Project: Exam	secret; patent; copy-right; trademarks; product liability. Group presentation of ucts covering all aspects that could make or mar it. ine the possibility of value addition for an existing product.
TEXT BOOKS	
1.	Balmer, R. T, Keat, W. D and Wise, G, and Kosky P. (2012). <i>Exploring Engineering: An Introduction to Engineering and Design</i> . Elsevier, Third Edition.
2	Dym C. L., Little P. and Orwin E. J. (2014). <i>Engineering Design: A Project based introduction,</i> Wiley.
REFERENCES	
1.	Eastman C. M. (Ed.). (1996). Design for X Concurrent engineering imperatives, Springer
2.	Haik, Y. and Shahin, M. T. (2012). Engineering Design Process, Cengage Learning.
3.	Pahl, G., Beitz, W., Feldhusen, J and Grote, K. H. (2007). <i>Engineering Design: A Systematic approach</i> , Springer.
4.	Voland, G. (2012). Engineering by Design, Pearson India.

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COL	JRSE CC	DDE	CEI	B4117		COURS	SE CAT	EGOR	1	РС		L-	T-P-S		3-1-0-0
,	Version			1.0		Approval Details			24 3	1th ACI 0.5.20	VI - 18	LEARN	ING LEV	'EL	BTL-3
ASSES	SMENT	SCHEN	ЛЕ												
Firs As	t Period ssessmei	ical nt	Second Periodical Assessment			Seminar/ Assignments/ Project				Surpris est / Qu	e Jiz	Atte	ndance		ESE
	15%		15% 10% 5% 5% 50%										50%		
De	Course escriptic	on	This co	This course investigates the behavior of structures under mechanical loads											
Cours	se Obje	ctive	1. 2. 3. 4. 5.	 To determine a given system of forces using laws of mechanics To Interpret requirements of stable equilibrium and analyze the system of forces To illustrate the magnitude and nature of forces in truss members. To compare centroid and moment of inertia for various shapes To apply basic dynamic principles to analyze particles in motion. 											
Cour	se Outc	ome	Upon c 1. 2. 3. 4. 5.	comple Find c Check Analy Comp Apply	tion of out the the st ze the oute ce dynar	f this c forces tability forces entroid mic prin	ourse, s in dif and a in var and m nciples	the stu ferent nalyze ious pe noment s for pa	udents systen the fo erfect t t of ine articles	will be ns rces in trusses ertia fo in mot	e able syster r vario tion.	to ms. ous cro	ss sectio	ons.	
Prereq	uisites:	Physic	s, Math	ematic	S										
СО, РС	D AND F	SO MA	APPING												
со	PO - 1	РО- 2	PO-3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO -10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	3	2	1	1	1	-	-	-	-	1	-	2	3	2	-
CO-2	3	3	2	1	1	1	1	1	2	1	-	3	3	2	-
CO-3	3	3	1	1 - 1 2 2 - 2 3 1 -										-	
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CO-5	3	3	2	1	1	1	1	1	-	1	-	3	3	2	-
			1: Wea	kly rela	ated, 2	: Mod	erately	y relate	ed and	3: Stro	ongly	related	I		

MODUL	E 1: BASICS & STATICS OF PARTICLES (9L+3T)						
Introduc	tion - Units and Dimensions - Laws of Mechanics - Lame's theorem, Parallelogram and						
triangula	ngular Law of forces - Vectors - Vectorial representation of forces and moments - Coplanar						
Forces - Resolution and Composition of forces - Equilibrium of a particle - Equivalent systems of							
forces - Principle of transmissibility - Single equivalent force- Free body diagram - Types of							
supports and their reactions. Moment of a force about a point and about an axis - Moments and							
Couples- Varignon's theorem - Frictional force - Laws of Coulomb friction - Simple contact friction.							
MODULE	MODULE 2 :EQUILIBRIUM OF RIGID BODIES (9L+3T)						
Requirements of stable equilibrium Static determinacy - Vectorial representation of moments and							
couples -	- Scalar components of a moment - Equilibrium of Rigid bodies in two dimensions -	RTI_3					
Equilibriu	um of Rigid bodies in three dimensions - Examples.	DTL-J					
MODULE	3: ANALYSIS OF TRUSS (9L+3T)						
Stability	y and equilibrium of plane frames - types of trusses – Types of forces - tension,	CO-3					
compre	ssion	CO-S BTL_2					
analysis	s of forces in truss members method of joints – Method of sections.	DIE-3					
MODULE	4: PROPERTIES OF SURFACES AND SOLIDS (9L+3T)						
Determ	ination of Areas and Volumes - Determination of first moment of area Centroid of						
sections	s, Second and product moments of plane area - Rectangle, circle, triangle, T section, I	CO 4					
section,	Angle section, Hollow section- Parallel axis theorem and perpendicular axis theorem -	CU-4					
Polar m	oment of inertia -Product moment of inertia	BIL-3					
MODULE	5: DYNAMICS OF PARTICLES (9L+3T)						
MODULE Displace	E 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear						
MODULE Displace motion	5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear	CO-5					
MODULE Displace motion Newtor	5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of	CO-5 BTL-3					
MODULE Displace motion Newtor elastic b	5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of podies.	CO-5 BTL-3					
MODULE Displace motion Newtor elastic k	5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear h's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. by Topic: Impulse and Momentum	CO-5 BTL-3					
MODULE Displace motion Newtor elastic b Self-stud	5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear h's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. By Topic: Impulse and Momentum OKS	CO-5 BTL-3					
MODULE Displace motion Newtor elastic b Self-stud TEXT BO	E 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear h's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. by Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E	CO-5 BTL-3 rode.					
MODULE Displace motion Newtor elastic k Self-stud TEXT BO 1	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of podies. by Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGrav 	CO-5 BTL-3 rode.					
MODULE Displace motion Newtor elastic k Self-stud TEXT BO 1 2	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. by Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGravinternational, 10th Edition 	CO-5 BTL-3 rode.					
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MODULE Displace motion Newtor elastic b Self-stud 1 2 2 3	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. by Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGrav International, 10th Edition Rajasekaran S, Sankarasubramanian G. (2003). Fundamentals of Engineering Mechanics, Publishing House Pvt. Ltd. 	CO-5 BTL-3 rode. w-Hill Vikas					
MODULE Displace motion Newtor elastic b Self-stud 1 2 2 3 3	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. y Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGrav. International, 10th Edition Rajasekaran S, Sankarasubramanian G. (2003). Fundamentals of Engineering Mechanics, Publishing House Pvt. Ltd. Bedford and N. Fowler. (2007). Engineering Mechanics Statics & Dynamics, Pearson. 	CO-5 BTL-3 rode. w-Hill Vikas					
MODULE Displace motion Newtor elastic k Self-stud 1 2 1 2 3 3 4 REFEREN	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. y Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGrav International, 10th Edition Rajasekaran S, Sankarasubramanian G. (2003). Fundamentals of Engineering Mechanics, Publishing House Pvt. Ltd. Bedford and N. Fowler. (2007). Engineering Mechanics Statics & Dynamics, Pearson. 	CO-5 BTL-3 rode. w-Hill Vikas					
MODULE Displace motion Newtor elastic b Self-stud TEXT BO 1 2 3 3 4 REFEREN	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of podies. y Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGrav International, 10th Edition Rajasekaran S, Sankarasubramanian G. (2003). Fundamentals of Engineering Mechanics, Publishing House Pvt. Ltd. Bedford and N. Fowler. (2007). Engineering Mechanics Statics & Dynamics, Pearson. CE BOOKS Hibbeller R.C (2013). Engineering Mechanics, Pearson Education Asia Pvt. Ltd. 	CO-5 BTL-3 rode. w-Hill Vikas					
MODULE Displace motion Newtor elastic b Self-stud TEXT BOO 1 2 3 3 4 REFEREN 1 2	 5: DYNAMICS OF PARTICLES (9L+3T) ements, Velocity and acceleration, their relationship - Relative motion - Curvilinear n's law - Work Energy Equation of particles - Impulse and Momentum - Impact of bodies. by Topic: Impulse and Momentum OKS Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication E Beer, F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Dynamics, McGravinternational, 10th Edition Rajasekaran S, Sankarasubramanian G. (2003). Fundamentals of Engineering Mechanics, Publishing House Pvt. Ltd. Bedford and N. Fowler. (2007). Engineering Mechanics Statics & Dynamics, Pearson. CE BOOKS Hibbeller R.C (2013). Engineering Mechanics, Pearson Education Asia Pvt. Ltd. Ashok Gupta. (2002). Interactive Engineering Mechanics - Statics - A Virtual Tutor (CDRO) 	CO-5 BTL-3 rode. w-Hill Vikas					

E BOOKS	
1	http://www.engineeringbookspdf.com/engineering-mechanics-by-r-s-khurmi/
моос	
1	https://www.coursera.org/learn/engineering-mechanics-statics
2	https://www.edx.org/course/engineering-mechanics-urfux-engm1-1-x-0a
3	https://onlinecourses.nptel.ac.in/noc16_ph02/preview_
4	https://swayam.gov.in/courses/1364-engineering-mechanics-statics-and-dynamics

COUF	SURVEYING & GEOMATICS									EDITS		3	i		
COURSE CODE			CEB4118			COURSE CATEGORY			PC			L-T-P-S		3-0-0-0	
Version		1.0			4	opprov Detail	oval 24th ACM ails - 30.5.2018			I L B	EARN LEVE	NG L	BT	L-4	
ASSESSM	ENT SC	HEME													
First Periodical Assessment			Second Periodical Assessment			Seminar/ Assignments/ Project			Surprise Test / Quiz		. A	Attendance		ES	ĴΕ
15%				15%		10%			5%		5%		50	%	
Course Description			This course deals with the principles of surveying. To study about compass surveying, plane table surveying, tachometric surveying, traversing, concepts of leveling and measurement using electronic instruments.												
Course Objective			 To understand the principles of surveying To know about compass surveying, plane table surveying and Traversing. To understand the concepts of levelling and its applications. To understand the concepts of Tachometric surveying To get exposed to measurements using Electronic Instruments. 												
Course Outcome			 Upon completion of this course, the students will be able to 1. Illustrate the use of different surveying instruments. 2. Carryout levelling and contouring using theodolite 3. Use total station and GIS techniques for surveying 4. Carryout aerial Surveying 5. Interpret the data apply remote sensing techniques for surveying. 												
Prerequisi	tes: Nil		•												
CO, PO AND PSO MAPPING															
со	PO -	PO-	PO-	PO-	PO-	РО	РО	РО	РО	РО	РО	РО	PSO	PSO	PSO
	1	2	3	4	5	-6	-7	-8	-9	-10	-11	-12	-1	-2	-3
CO-1	2	1	-	1	2	3	1	3	2	1	2	2	3	2	-
CO-2	2	1	2	1	2	3	1	3	2	1	2	2	3	2	-
CO-3	2	1	1	1	2	3	1	3	2	1	2	2	3	2	-
CO-4	1	1	1	1	2	3	1	3	2	1	2	2	3	2	-
CO-5	1	1	1	1	2	3	1	3	2	1	2	2	3	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1	L: BASICS OF SURVEYING 9L						
Definition care and a Bearing - S of errors.	 Principles - Classification Scales - Conventional signs - Survey instruments, their adjustment - Ranging and chaining - Prismatic compass - Surveyor's compass - ystems and conversions - Local attraction - Magnetic declination – Dip – Correction 	CO-1 BTL-2					
MODULE 2	2: LEVELLING AND CONTOURING9L						
Theodolite – Fundamental and Desired lines – Uses – Adjustments – Angle Measurements. Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.							
MODULE 3	B: EDM, TOTAL STATION, GPS 9	L					
Electro-op Microwave Introductio survey tec	tical system, Measuring Principle, Working Principle, Sources of error, Total station, e system Measuring and working principle, Sources of error, GPS - Fundamentals - on space, Control segments User segment- GPS Survey Types-Kinematic and static hniques.	CO-3 BTL-3					
MODULE 4	I: PHOTOGRAMMETRY SURVEYING 9)L					
Aerial photographs - vertical and oblique photographs - height determination contouring - photographic interpretations - stereoscopy – parallax Flight Planning- Photo Interpretation, Applications of aerial Photos.							
MODULE 5	S: REMOTE SENSING)L					
Introduction – Historical Background - Electromagnetic Radiation (EMR) - Electromagnetic Spectrum Airborne Platforms – Platform, Sensors - Definition, Types- Parameter, optical Remote Sensing, Microwave remote sensing Scanners - Radiometer - Radar TEXT BOOKS							
1	Basak N N . (2017). Surveying and Levelling, McGraw-Hill Book Company.						
2	Dr. B. C. Punmia. (2016). Surveying, Laxmi Publications.						
3	3 S.C. Rangwala and P. S. Rangwala. (2014). <i>Surveying and leveling</i> , Charotar Publishing House Pvt. Ltd.						
REFERENC	E BOOKS						
1.	1. Clark D. (2004). Plane and Geodetic Surveying for Engineers, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition. Lames M Anderson and Edward M Mikbail. (2012). Surveying Theory and Practice. McGraw Hill						
2.	2. Book Company.						
E BOOKS							
1.	http://www.engineeringbookspdf.com/fundamentals-of-surveying-by-s-k-roy/						
моос							

1	https://swayam.gov.in/course/3613-digital-land-surveying-and-mapping
2	https://onlinecourses.nptel.ac.in/noc17_ce09/preview
B.TECH – CIVIL ENGINEERING

COUF	RSE TITI	E			S	URVEY	ING LA	В			CRI	DITS		1	
СС С	OURSE CODE		CEB4141 COURSE PC L-T-P-S 0-0-2-0												
V	ersion			1.0		Appro	oval Do	etails	24tł 30.	n ACM - 5.2018	LEA	RNING EVEL		BTL-3	
ASSE	SSMEN	T SCH	EME												
			C	CIA								ESE			
			8	0%								20%			
C Des	ourse criptior	n tł	urveyi ne elev	ng labo vation,	orato angle	ry deal es and t	with th o inter	ne pra pret r	ctical s esults	tudy to using so	prepa oftwar	are cont e.	our ma	ps by fin	ding
C Ob	ourse jective	1 2 3 4	. To a . To a . To a . To a	acquire acquire acquire acquire	knov knov knov knov	vledge vledge vledge vledge	on pre on usir on inte on use	paring ng tota erpret of mo	conto Il statio field d odern e	ur map on and ⁻ ata. equipme	s. theod ent's a	olite and softw	ware.		
C Ou	Upon completion of this course, the students will be able to1. Find the difference in elevation and prepare contour maps using dummy level.Course2. Find the angles using theodolite and total station.Outcome3. Prepare field data and interpret results.4. Create schematic maps using GIS software.5. Use modern survey equipment to measure angles and distances.														
CO. P	PO AND	PSO N		NG	5										
,-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
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CO-1	-	2	-	-	3	3	-	2	2	-	-	-	2	-	-
CO-2	1	-	2	-	3	3	-	2	2	-	-	-	2	-	-
CO-3	-	-	2	-	3	3	-	2	2	-	-	-	2	-	-
CO-4	-	2	-	-	3	3	-	2	2	-	-	-	2	-	-
CO-5	-	2	-	-	3	3	-	2	2	-	-	-	2	-	-
			1: W	eakly ı	relate	ed, 2: M	odera	tely re	lated	and 3: 9	Strong	ly relate	ed		
-						LIS	ST OF I	EXPER	IMENT	S					
1	Deter	minati	on of e	elevati	on be	etween	two po	oints.							
2	Plotti	ng the	profile	e of a c	anal,	/ road.									
3	Plotti	ng of c	ontou	r maps	5										
4	Meas	ureme	nt of h	neights	and	horizon	tal dist	tance	using t	heodol	ite.				

5	Determination of elevation using Total Station Determination of area of given plot using Total Station.
6	Setting of layouts using Total Station
7	Measurement of distance using GPS.
8	Creation of schematic map using GIS
	REFERENCE BOOKS
1	Basak N N. (2017). Surveying and Levelling, McGraw-Hill Book Company.
2	B.C. Punmia, Ashok K Jain, Arun K Jain. (2016). <i>Surveying,</i> Vol. I, Laxmi Publications.
3	S.C. Rangwala and P. S. Rangwala. (2014). <i>Surveying and leveling</i> , Charotar Publishing House Pvt. Ltd,

COUR	SE TITI	LE		E	NGIN	EERING		ERSION	I LAB		С	REDIT		0.5	5
COUR	SE COI	DE	GEA4131 COURSE CATEGORY BS L-T-P-S 0-0-2-2 24 th ACM - LEARNING												
VI	ERSIO	N		1.0	AP	PROV	AL DET	AILS	24 th 30.5	ACM - .2018	LI		3	BTL	-3
ASSESS	MENT	SCHI	EME												
					CI	4							ES	E	
					80	%							20	%	
Co Deso	ourse criptio	n	To pro Practic	vide th es	e stud	ents w	ith har	nds on	experie	ence or	n vario	ous basio	c engir	neering	5
Co Obj	ourse jective	2	 Fhe course should enable the students to Relate theory and practice of basic Civil and Mechanical Engineering Learn basic concepts in Aeronautical and Automobile Engineering Learn basic concepts in Electrical, Electronics, mechatronics and Computer Science 												
Course Upon completion of this course, the students will be able to 1. Identify and use of tools, Types of joints used in welding, carpentry and plumbing operations. 2. Have hands on experience on basic fabrication techniques such as carpent and plumbing practices. 3. Have hands on experience on basic fabrication techniques of different type											ntry pes of				
Prereq	uisites	: NIL													
СО, РО	AND	PSO N	ΛΑΡΡΙΝ	G											
со	PO 1	PO	PO	PO-	PO-	PO-	РО- 7	PO-	PO-	PO-	PO-	PO-	PS	PS	PSO-
CO-1	-1	-2	-5	4	-	1	-	-	-	- 10	-				-
CO-2	3	2	_	2	-	1	_	_	-	-	-	_	_	-	_
CO-3	3	2	_	2	-	1	_	-	-	-	_	-	-	-	-
					S	LOT X	-LIST C	F EXPE	RIMEN	NTS				<u> </u>	
I. MEC 1. 2. 3. 4. II. AUT 1. 2. 3. 4. II. AUT	 HECHANICAL ENGINEERING WORKSHOP Welding: Arc welding: Butt joints Lap joints. Machining: Facing Turning AUTOMOBILE ENGINEERING Dismantling and studying of two stroke gasoline engines. Assembling of two stroke gasoline engines. Dismantling and studying of four stroke gasoline engines Assembling of four stroke gasoline engines. 														

- 1. Study of Flow Pattern around Various Objects.
- 2. Force measurement on Aircraft Model
- 3. Determination of Young's Modulus for Aluminum Cantilever Beam
- 4. Binary Addition & Subtraction using Microprocessor

IV. CIVIL ENGINEERING

- 1. Plumbing- Basic Pipe Connection using valves, couplings and elbows.
- 2. Carpentry Sowing, Planning and making common Joints.
- 3. Bar Bending
- 4. Construction of a 50 cm height brick wall without mortar using English Bond.

SLOT Y -LIST OF EXPERIMENTS

V. ELECTRICAL ENGINEERING

- 1. Study of tools and accessories.
- 2. Study of cables.
- 3. Staircase wiring, Tube light and Fan connection.
- 4. Measurement of energy using single phase energy meter.

VI. ELECTRONICS ENGINEERING

- 1. Study of Active and Passive Components.
- 2. Study of Logic Circuits.
- 3. Making simple circuit using Electronic Components.
- 4. Measuring of parameters for signal using CRO.

VII. COMPUTER SCIENCE

- 1. Troubleshooting different parts of the computer peripherals, Monitor, Keyboard & CPU.
- 2. Installation of various operating systems, their capabilities, Windows, Unix, Linux.
- 3. Installation of commonly used software like MS Office
- 4. Assembling digital computer.

VIII. MECHATRONICS ENGINEERING

- 1. Study of Key Elements of Mechatronics Systems
- 2. Sensors Load Cell, Thermocouple
- 3. Actuators Linear & Rotary Actuators
- 4. Interfacing & Measurements Virtual Instrumentation

REFERENCE 1 Jeyapoovan T and Saravanapandian M. (2015). Engineering practices lab manual, 4th Edition, Vikas publishing House, New Delhi. 2 Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K. (2008). Elements of Workshop Technology. Media promoters and publishers private limited, Mumbai. 3 Ibrahim Zeid. (2011). CAD/CAM Theory and Practice, Tata McGraw-Hill Publishing Company Ltd., New Delhi 4 Robert Quesada, Jeyapoovan T. (2006). Computer Numerical Control Machining and Turning Centers, Pearson Education, New Delhi. METHOD OF ALLOCATION FOR ENGINEERING IMMERSION LAB SLOT X : MECH, AERO, AUTO, CIVIL EXPERIMENTS

SLOT Y : EEE, ELECTRONICS, CSE, MECHATRONICS EXPERIMENTS

- EVERY CLASS OF
 - GROUP A (AERO, AUTO, MECH, MCT, CHEM, BIO, CIVIL
 - GROUP B (CSE, IT, ECE, EEE, AEROSPACE)

GETS DIVIDED INTO 4 SUB - GROUPS NAMELY a, b, c, d -- EACH CONSISTING OF 15 TO 20 STUDENTS MAX.
 FOR EXAMPLE: GROUP A STUDENTS WILL OCCUPY SLOT X
 WEEK 1 : SLOT X ---

- a MECH; b AUTO; c AERO ; d CIVIL
- WEEK 2 : SLOT X ---
 - b MECH; c AUTO; d AERO ; a CIVIL
- > THE ABOVE SCHEDULE WILL BE ON ROTATION EVERY MONTH (ONE CYLCE PER MONTH)
- **GROUP B STUDENTS WILL OCCUPY SLOT Y**
 - WEEK 1 : SLOT Y --
 - a EEE; b ECE; c CSE ; d MCT
 - WEEK 2 : SLOT Y ---
 - b EEE; c ECE; d CSE; a MCT
- > THE ABOVE SCHEDULE WILL BE ON ROTATION EVERY MONTH (ONE CYLCE PER MONTH)

COURS	SE TITL	.E	ENGINEERING PHYSICS CREDITS 3												
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Co Desci	urse riptio	n Tl	This course deals with fundamental principles of physics, using mathematical derivations, for first year B. Tech students; the principles and applications of elasticity, acoustics, ultrasonics, quantum physics, crystal physics, lasers and fiber optics are dealt in this course. Intended for Aeronautical, Automobile, Bio tech., Chemical, Civil and Mechanical branches.												
Cours Object	e tive		1. E 1. E 2. A 3. E 3. E 4. Io 5. D	xplain robler pply p nginee xplain pply it dentify nateria Discuss	stress ns rincipl ering to partic to infi crysta als and the pr	a enar , strair es of a ool le natu inite po al struc hyster rinciple	acoust ure of otenti ctures resis b es, wo	ics to s radiati al well and cu pased o rking a	ion, con rystal	, uli and a basic pr ompute planes, ncept of oplicatio	apply t roblem Schrc descr f ferro ons of	he con is and u dinger' be diffe magnet lasers a	cepts to use ultra s wave erent m tic doma und fibe	o solve b asonics equatio agnetic ains. r optics	oasic as an on and
Course Outco Prereq	e me Juisites	s: Kno	 Discuss the principles, working and applications of lasers and fiber optics Upon completion of this course, the students will be able to Solve the basic problems in elasticity and explain the properties of matter Apply the knowledge of acoustics in designing acoustical buildings and employing ultrasonic as an engineering tool. Use mathematical derivations to solve quantum problems. Identify the crystal lattice planes, distinguish different magnetic materials, and explain the ferromagnetic domain. Familiarize with the principles, working and applications of lasers and fiber optics. 												
CO, P	PO AN	D PS	O MAI	PPINC	r J										
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CO-4	3	2	1	1	2	1	1	1	1	1	1	1	1	1	-
CO-5	3	2	1	1	3	1	1	1	1	1	1	1	1	1	-
			1: We	akly re	lated,	2: Mo	derat	ely rel	ated a	and 3: S	strong	ly relat	ed		
MODU	JLE 1:	PROP	ERTIES	OF M	ATTER	AND H	IEAT					(5L+4P=	9)	
Bulk modulus - Twisting couple on a wire - Torsional pendulum - determination of rigidity modulus - Bulk modulus - Twisting couple on a wire - Torsional pendulum - determination of rigidity modulus of a wire - Depression of a cantilever - Young's modulus by cantilever - uniform and non-uniform bending.													- :y n C B	CO-1 TL-3	
bad conductors -Forbe's method - theory and experiment - Lee's disc method for bad															
condu	ctors.														
MODULE 2: ACOUSTICS AND ULTRASONIC (5L+4L=9)															
Classification of sound - Characteristics of musical sound – intensity - loudness - Weber Fechner law - Decibel - Reverberation - Reverberation time, derivation of Sabine's formula for reverberation time (Jaeger's method) - absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies Ultrasonics- Production – Magnetostriction and Piezoelectric methods – properties –												er a g, (B	CO-2 STL-3		
MODU	LE 3: 0	QUAN	TUM P	HYSICS	6(5L+4I	L=9)									
Black b and Ra verifica equati Extens	oody ra ayleigh ation ons – ion to	adiatio – Jea - Schi Physio 3 dim	on- Plaı n's law rödinge cal sign iension	nck's tl from P er's wa ificanc (no de	neory (lanck's ive eq e of w erivatic	deriva theo uatior vave fi on)	ation) ry - Cc 1 – Ti unctio	– Ded ompto ime ir n – Pa	uctior n effeo ndepe article	n of Wie ct – The ndent a in a or	en's di eory ar and ti ne din	splacer nd expe ime de nensior	nent lav rimenta pender nal box	w al (nt B -	CO-3 STL-3
MODU	LE 4: 0	CRYST	AL PHY	SICS A	ND M/	AGNET	ΓISM					(5L+4	L=9)		
Crysta cubic l	l - Latt attice	ice - - Calc	Unit ce ulation	II - Bra of nu	mber c	ttice - of ator	· Lattions pe	ce pla r unit	nes - I cell - J	Miller in Atomic	ndices radiu	s - 'd' s s - coor	oacing i dinatio	n n	
atomic magnetic moments- magnetic permeability and susceptibility - Types of magnetism: diamagnetism - paramagnetism - ferromagnetism - antiferromagnetism- ferrimagnetism - domain structure - hysteresis - hard and soft magnetic materials - applications.											- C	20-4 TL-3			
MODU	LE 5: F	ното		AND FI	BER OI	PTICS						(5L+4I	.=9)		
Princip popula - CO ₂ la	ole of I ation ir aser - S	asers oversio Semico	- Stimu on - pur onducte	lated a nping a or lase	absorp action r – app	tion - active	Spont e med ons	aneou ium - l	s emis aser c	ssion, si haracte	timula eristics	ited em	ission - AG lase	r C B	CO-5 TL-3

B.TECH – CIVIL ENGINEERING

Optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - types of optical fibers - single and multimode, step index and graded index fibers - fiber optic communication system.

TEXT BOOK	<s< th=""></s<>
1.	P. Mani. (2011). Engineering Physics, Vol I & II, Dhanam Publications, Chennai.
REFERENCE	BOOKS
1.	Gaur R.K. and Gupta S.L. (2010). <i>Engineering Physics,</i> 8 th edition, DhanpatRai publications (P) Ltd, New Delhi.
2.	P. Charles, Poople and Frank J. Owens. (2007). <i>Introduction to Nanotechnology</i> , Wiley India.
3.	Arthur Beiser. (2007). Concepts of Modern Physics, Tata McGraw – Hill Publications.
4.	Rajendran V. and Marikani A. (2003). <i>Applied Physics for engineers</i> , 3rd edition, Tata McGraw –Hill publishing company Ltd., New Delhi.
E BOOKS	
1.	https://books.google.co.in/books?id=w4crDAAAQBAJ&printsec=frontcover#v=onepage&q& f=false
2.	https://www.goodreads.com/book/show/789047.Physics for Scientists and Engineers
MOOC	
1.	https://www.coursera.org/learn/how-things-work
2.	https://www.coursera.org/learn/quantum-physics
3.	https://onlinecourses.nptel.ac.in/noc21_ph21
4.	https://onlinecourses.swayam2.ac.in/aic20_sp64

COUR	SE TITLE	E	ا Co	MATER	IALS C	CRED	ITS			1					
COURSE CODE CYA4131 COURSE CATEGORY BS 24 th ACM														0-0	0-2-0
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ASSESS	SMENT S	SCHEM	E												
Expei	rimenta	I	Calcul	ation		R	esult		v	iva	Re	cord		E	SE
3	80%		10% 10% 20% 10% 20%												0%
Co Desc	ourse cription	Thi lub me	is cours pricants, etal ions	e impaı refract	rts pra ories a	actical e & other	exposure engine	e on bas ering m	sic tech aterials	niques and s	emplo pectrop	yed fo photom	or the netric	analy analys	rses of ses for
Course Objecti Course Outcon	e nes	2. 3. 4. 5. 1. 2. 3. 4. 5.	To give liquids (To prov resin) To impa To equip Upon cc grade th analyze apply th other sin analyze apply t	a pract phenol-v ide the rt hands o the stu ompletion the pha ne pract milar ma the stre he spec ment.	studer studer soon tra idents on of th ants b se diag ical kn acrome ctrophe	kposure system) hts prace aining in with pra- his cours ased on gram an- owledge olecules of refract otometr	for the tical kno actical sh e, the st viscosite d interpre gained tories. ic meth	constru owledge erization kill in est udents v / ret the c on the od for	in prep n of refr imation will be a ritical so prepara the de	f phas aration actorie of me ble to ble to blution termin	e diagr n of pol es. tal ions temper f polym ation o	am, fo ymers by spec ature. ers, fo f meta	r part (urea- ctroph r the p al ions	ially- forma otome orepar	miscible Idehyde etry. ation of
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CO-2	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
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CO-4	3	2	2 1 2 2												
CO-5	3	2	1	-	-	-	2	-	-	-	-	2	-	-	-
1: Weakly related, 2: Moderately related and 3: Strongly related															

MO	DULE 1: PROPERTIES OF LUBRICANTS (6 L)	
	 Determination of viscosity of polymer using Ostwald Viscometer. 	
	2. Determination of Viscosity Index of lubricants.	CO-1
	3. Determination of viscosity of oil using Red-Wood Viscometer.	BTL-3
MO	DULE 2: PHASE DIAGRAM IN LIQUID SYSTEM	(6 L)
	 Construction of phenol-water phase diagram. 	CO-2
	2. Determination of adsorption isotherm for acetic acid on activated charcoal.	BTL-3
MO	DULE 3: PREPARATION POLYMER RESIN. (6 L)	
	1. Preparation of urea-formaldehyde resin.	CO-3
		BTL-3
MO	DULE 4: BASIC PROPERTIES OF REFRACTORIES(6 L)	
	2. Determination of porosity of a refractory.	CO-4
	3. Determination of apparent density of porous solids.	BTI-3
		DIE-3
MO	DULE 5: ESTIMATION METAL ION CONTENTS IN THE SAMPLE (6 L)	1
-	L. Estimation of dye content in the effluent by UV-Visible spectrophotometry.	
	2. Determination of copper / iron content in the alloy by colorimetry.	CO-5
	3. Estimation of sodium and potassium ions by flame photometry.	BTL-3
4	 Verification of Beer-Lambert's law using gold nanoparticles. 	
TEY	T BOOKS	
1	P.S. Paghayan (2018) Materials Chemicals Laboratory Manual Dhanam Publi	ications
KEF		
1.	<i>Chemical Analysis,</i> Pearson Education, 6 th Edition.	book of Quantitative
E BC	OKS	
1.	http://www.erforum.net/2016/01/engineering-chemistry-by-jain-and-jain-pdf-free-e	ebook.html
MO		
1.	https://www.coursetalk.com/providers/coursera/courses/introduction-to-che	emistry-1

COUR	SE E	PAI	PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS CREDITS 4 COURSE COURSE COURSE COURSE													
COUR COD	SE E		MAA 4	4201		C CA	OURSE TEGOF	E RY		BS		L-T-P	-S	3-1-(0-1	
Versi	on		1.0)		Appro	oval De	etails	24 30	th ACM .5.201	- 8	LEARN LEVI	ING EL	BTL-3	3	
ASSESS	MENT	SCHEI	ME		<u>.</u>											
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Course Descrip	tion	To ma transf	ake the orms a	e stude and its	ent un applic	dersta ations	nd the	basic (conce	ots of p	partial	differe	ntial e	quations	and	
Course Objectiv	/e	The column 1. Pi 1. Pi 2. In 3. N 4. U 5. U	 The course should enable the students to Present the main results in the context of partial differential equations and to study numerical methods for the approximation of their solution Introduce the wave equation including time and position dependence Mathematically model the way thermal energy moves through the plate Understand the concept of Fourier transform Understand the concept of Z-transform and its properties 													
Course Outcom	ie	Upon 1. 2. 3. 4. 5.	compl Formu equati Classif Classif Solve techni Under	etion of late ar ons y and s oroble ques stand t	of this and solve solve t ms rel the dis	course ve som the Wa two-dir ated to screte	e, the s e of th we and mensio o engin transfo	studen e phys I Heat onal he neering orm ap	nts will sical pr equat eat equ g appli plied 1	l be ab roblem ions iations cations co engi	le to s invo s by us neerin	lving p ing Fou g prob	artial d urier Tr Iems	ifferenti ansform	n	
Prerequ	Isites															
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CO-1	2	1	1	1	1	-	-	-	-	-	-	1	-	-	-	
CO-2	2	1	1	1	1	-	_	-	-	_	-	1		_		
CO-3	2	1	1	1	1	-	_	_	-			1	_	_		
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MODU	LE 1: P	PARTIA	L DIFF	ERENT	IALEQ	UATIO	NS					(9L	+3T=12	2)		

SEMESTER II

For	mation of partial differential equations by elimination of arbitrary constants, arbitrary	
fun	ctions - Solution of standard types of first order partial differential equations -	CO 1
Lag	range's linear equation - Linear partial differential equations of second order with	
cor	nstant coefficients.	DIL-3
Su	ggested Reading: Partial Differentiation	
MO	DULE 2: ONE DIMENSIONAL WAVE AND HEAT FLOW EQUATION (9L+3T=1	L 2)
Cla	ssification of second order linear partial differential equations - Solutions of one-	
din	nensional wave equation (without proof) - One dimensional heat flow equation	CO-2
(wi	thout proof) and application in string and rod problems.	BTL-3
Sug	ggested Reading: Partial Differential Equations, Half range sine series.	
MO	DULE 3: TWO DIMENSIONAL HEAT FLOW EQUATION (9L+3T=12)
Ste	eady state solution of two-dimensional heat equations and applications in finite plates	
and	d infinite plates problems.	CO-3
Su	ggested Reading. Partial Differential Equations Half range sine series	BTL-3
MO	ODILIE 4. FOLIRIERTRANSFORM)
-)
Fou	urier Integral Theorem (without proof) - Fourier transform pair - Sine and Cosine	CO-3
Par	reval's identity Suggested Reading: Basic integration	BTL-3
INIC	DULE 5: 2-TRANSFORM AND DIFFERENCE EQUATIONS (9L+31=12)	
Z-T	ransform - Elementary Properties - Inverse Z-Transform - Convolution theorem -	CO-4
For	mation of Difference equations - Solution of difference equations using Z-Transform	BTL-3
Sug	ggested Reading: Basic calculus	_
TEX	KT BOOKS	
1	P. Sivarama Krishna Das and C. Vijayakumar L. (2009). Transforms and partial differer	ntial
Т	equations, Pearson Publication	
2	Grewal. B.S. (2012). Higher Engineering Mathematics, Khanna Publishers, 42nd Editio	on, Delhi
z	Chandrasekaran A. (2015). A Text Book of Transforms and Partial Differential Equatio	<i>ns,</i> Dhanam
5	Publication.	
REF	ERENCE BOOKS	
1	BalLN.P and Manish Goyal. (2007). A Textbook of Engineering Mathematics, Laxmi Pu	Iblications Pvt
ר	Ltd, /th Edition.	ing India Dut
2	Itd. Delhi	ing inula PVL
3	Veerarajan. T. (2012). Transforms and Partial Differential Equations. Tata McGraw Hi	ll Education
	Pvt. Ltd, New Delhi.	
E BO	DOKS	
1	https://nptel.ac.in/courses/122107037/	
2	https://nptel.ac.in/courses/122107037/22	
MO	000	
1	https://www.mooc-list.com/tags/laplace-transforms	
2	https://www.edx.org/course/introduction-differential-equations-hux-math226-1x-1	

COURSE TITLE	CON	NSTRUCTION MATER	IALS	CREDITS	3					
COURSE CODE	CEB4201	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0					
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3					
ASSESSMENT SCHEME										
First Periodical Assessment	First Periodical AssessmentSecond Periodical AssessmentSeminar/ Assignments/ ProjectSurprise Test / QuizAttendance15%15%10%5%5%									
15%	15%	10%	5%	5%	50%					
Course Description	The course pro construction n	ovides basic informat naterials to undergra	tion on the stru duate students	cture and prope	rties of					
Course Objectives	 To study the /li>	he properties of ston he properties of lime he properties and ap he properties and ap tand the basic prope tics and modern mat	es, Bricks, wood , cement, aggre plications of spe plications of po rties of glass, al cerials.	d and Steel. gate and concre ecial concrete in lymer-based ma uminum, ferroce	ete. construction. terials ement,					
Course Outcome	 Upon completion of this course, the students will be able to Identify the properties and uses of stones, bricks, timber and Steel used f construction. Illustrate the properties and application of lime, cement and concrete ingredients in building construction. Classify special concrete for building construction. Summarize the polymer-based building materials. Classify modern materials used for construction. 									

rerequisites: Nil

CO, PC) AND	PSO I	MAPPI	NG											
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CO-2	2	1	1	1	-	2	1	1	1	-	-	3	-	3	-
CO-3	1	1	1	1	-	2	1	1	2	-	2	3	1	3	-
CO-4	1	1	1	1	-	2	1	1	1	-	1	1	-	3	-
CO-5	1	1	1	1	-	2	-	1	1	-	1	2	-	3	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														

B.TECH – CIVIL ENGINEERING

MODULE 1: BASIC CO	INSTRUCTION MATERIALS	9L								
Stones – Types and p	properties of natural stone materials - Criteria for selection - Tests on									
Timber general chara	cteristics of wood – defects of wood – preservation of wood and its	CO-1								
application – Steel – ty	vnes and properties – advantages and uses	BTL-2								
MODULE 2: CEMENT	AND CONCRETE	9L								
Lime, Cement, Ingredients - Types and Grades - Properties of cement and Cement mortar –										
tests - Concrete - Ingredients - Aggregates – Types Grading - Manufacture - Batching plants CO-										
-1ests.										
MODULE 3: SPECIAL CONCRETES 9L										
Ready Mix Concrete	-Hollow concrete blocks- Lightweight concrete, High Performance									
concrete, High Streng	th concrete- Fibre reinforced concrete - Self Compacting concrete –	CO-3								
polymer modified concrete - pre stressed concrete - properties and application. BTL-3										
MODULE 4: POLYMER	BASED MATERIALS	9L								
Plastics – compositio	n – properties – Polymers – classification – uses. Paints, Varnishes -									
Composition – Typ	bes and its application in Construction – Polymer and Geopolymer	CO-4								
concrete – ingredients	concrete – ingredients – advantages – uses. BTL-2									
MODULE 5: MISCELLA	NEOUS MATERIALS	9L								
Glass and Aluminum -	-Glass Fibre reinforced plastics - steel concrete composite Materials -	CO-5								
Ferro cement - Geosyr	nthetics - types, use and application in construction industry.	BTL-2								
TEXT BOOKS										
1.	P. C Varghese. (2005). Building Materials, Prentice Hall of India.									
	M.S. Shetty. (2006). Concrete Technology (Theory and Practice). S. Cha	and &								
2.	Company Ltd.									
3.	S.K. Duggal. (2012). Building Materials, New age Publication, 4th edition	on.								
REFERENCE BOOKS										
1.	S Christian Johnson. (2017). Concrete Technology, Dipti Press.									
2.	G.C Sahu and Jayagopal Jena. (2017). <i>Building Materials and Construct</i> McGrawhill Publication.	tion,								
E BOOKS										
	http://www.mu.edu.et/iphc/images/liblary/Heritage/Construction Mages/liblary/Heritage/Construction Mages/liblary/Heritage/Constructige/Con	aterials/C								
1.	onstruction Materials 4th editionPeter Domone and John Illston.pdf									
2.	http://www.engineeringbookspdf.com/building-materials-by-s-k-dugg	<u>al/</u>								

MOOC	
1.	https://onlinecourses.nptel.ac.in/noc15_ce05/preview_
2.	https://swayam.gov.in/courses/1338-modern-construction-materials

COUR	SE TIT	LE	MECHANICS OF STRUCTURES II CREDITS												
CO CC	URSE ODE		CEI	B4202		CO CATE	URSE EGORY			РС		L-T-P	-S	3	8-1-0-1
Ver	rsion		1.0				Approval Details 24th ACM - 30.5.2018						ING LEVI	EL	BTL-3
ASSES	ASSESSMENT SCHEME														
First Pe Asses	eriodic sment	al	Second Asse	Periodi ssment	cal	S Assi I	eminar, ignmen Project	/ ts/	Surp	orise Tes Quiz	it /	Atte	ndance		ESE
1	5%		1	.5%			10%			5%			5%		50%
Co Descr	Course engineering structures.														
Course Object	e .ive	1. 2. 3. 4. 5.	 To gain knowledge in the analysis of simple and compound bars To be familiar with Determinate and Indeterminate beams To understand Euler's and Rankine's theory and its applications To be familiar with deflection of beams using classic analysis methods Be acquainted with analysis of shafts, springs and curved beams 												
Course Outco	e me	 Upon completion of this course, the students will be able to 1. Analyze simple and compound bars using direct application of Hooke's Law. 2. Analyze Determinate and Indeterminate beams. 3. Compare Euler's and Rankine's theory and apply the appropriate one for analysis of columns. 4. Determine deflection of beams using classic analysis methods. 5. Analyze shafts, springs and curved beams. 													
Prereq	uisite	s: Mec	hanics	of Stru	ctures										
СО, РС	D AND	PSO N	MAPPIN	IG											
со	РО -1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	РО - 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	1	2	3	3	3	3	-	3	-	1	2	3	2	3	-
CO-2	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-
CO-3	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-
CO-4	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-
CO-5	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-
			1: \	Weakly	relate	d, 2: M	oderat	ely rela	ated ar	nd 3: Sti	rongly	related			
MODU	JLE 1:	STRES	S STRA	IN AND	DEFO	RMATIO	ON OF	SOLIDS	,STATE	S OF ST	RESS	(9L+3	Т)		

B.TECH – CIVIL ENGINEERING

Rigid I	bodies and deformable solids – Normal and shear stresses - Elasticity, Hooke's law, Strain,								
Stress	-strain curve, lateral strain, Volumetric Strain - temperature stresses - deformation of simple	CO-1							
and co	mpound bars - shear modulus, bulk modulus, relationship between elastic constants - biaxial	BTI-3							
state o	of stress - stress at a point - stress on inclined plane - principal stresses and principal planes	2.20							
- Moh	r's circle of stresses, Three dimensional components of stresses, Theories of failure.								
MODU	LE 2 :DETERMINATE AND INDETERMINATE BEAMS	(9L+3T)							
Beam	s - types of supports - simple and fixed, types of load - concentrated, uniformly distributed,								
varyin	g distributed load, combination of above loading - relationship between bending moment								
and sh	near force - bending moment, shear force diagram for simply supported, cantilever and over	CO-2							
hangir	ng beams - Theory of simple bending - load carrying capacity of beams. Determinate and	BTL-3							
Indete	rminate beams - Propped cantilever and fixed beams-fixed end moments and reactions for								
differer	nt types of loads. Theorem of three moments - analysis of continuous beams.								
MODU	LE 3: COLUMNS, CYLINDERS AND SHELLS	(9L+3T)							
Colum	nns – Types - Eccentrically loaded short columns - middle third rule. Euler's theory of long								
colum	ns - critical loads for prismatic columns with different end conditions; Rankine-Gordon	CO-3							
formu	la for eccentrically loaded columns - thick cylinders – compound cylinders, thin cylinders	BTL-3							
and sh	nells								
MODU	LE 4: DEFLECTION OF BEAMS AND DETERMINATE STRUCTURES	(9L+3T)							
Deflec	ction of beams - double integration method - Macaulay's method -variation of shear stress								
-shear center. Strain energy and strain energy density - strain energy in traction, shear in flexure									
and torsion - Castigliano's theorems - principle of virtual work - application of energy theorems for									
compu	uting deflections in beams, trusses and pin-jointed frames - Maxwell's reciprocal	BTL-3							
theorer	ns-Williot diagram - Mohr's correction (concepts).								
MODU	LE 5: TORSION, SPRINGS AND ADVANCED TOPICS IN BENDING OF BEAMS	(9L+3T)							
Stress	es and deformation in circular (solid and hollow shafts) - stepped shafts - shafts fixed at both								
ends-	stresses in helical springs - deflection of springs. Unsymmetrical bending of beams of	CO-5							
symme	etrical and unsymmetrical sections - curved beams - Winkler Bach formula - stress	BTL-3							
conce	ntration								
Solf stu	idy Topic: MacAulay's method								
<i>Seij-stu</i>									
IEXI BO	UURS	-							
1	Kottiswaran. (2014). Engineering Mechanics Static and Dynamics, Sri Balaji Publication Erode	2.							
2		-							
	Beer F.P and Johnson Jr. E.R. (2017). Vector Mechanics for Engineers, Vol. 1 Statics and vol. 2								
Dynamics, McGraw-Hill International 10th Edition									
3	Dynamics, McGraw-Hill International 10th Edition Raiasekaran S. Sankar Subramanian G. (2003) <i>Fundamentals of Engineering Mechanics</i> , Vil	/25							
3	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Byte, Ltd	(as							
3	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Pvt., Ltd.	kas .							
3	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Pvt., Ltd. Bedford and N. Fowler. (2007). <i>Engineering Mechanics Statics & Dynamics</i> , Pearson.	kas							
3 4 REFERE	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Pvt., Ltd. Bedford and N. Fowler. (2007). <i>Engineering Mechanics Statics & Dynamics</i> , Pearson. INCE BOOKS	kas							
3 4 REFERE 1	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Pvt., Ltd. Bedford and N. Fowler. (2007). <i>Engineering Mechanics Statics & Dynamics</i> , Pearson. INCE BOOKS Hibbeller R.C. (2013). <i>Engineering Mechanics</i> , Vol. 1 Statics, Vol. 2 Dynamics, Pearson Educa	tion							
3 4 REFERE 1	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Pvt., Ltd. Bedford and N. Fowler. (2007). <i>Engineering Mechanics Statics & Dynamics</i> , Pearson. INCE BOOKS Hibbeller R.C. (2013). <i>Engineering Mechanics</i> , Vol. 1 Statics, Vol. 2 Dynamics, Pearson Educa AsiaPvt. Ltd.	tion							
3 4 REFERE 1 2	Dynamics, McGraw-Hill International 10th Edition Rajasekaran, S, Sankar Subramanian, G. (2003). <i>Fundamentals of Engineering Mechanics</i> , Vil Publishing House Pvt., Ltd. Bedford and N. Fowler. (2007). <i>Engineering Mechanics Statics & Dynamics</i> , Pearson. ENCE BOOKS Hibbeller R.C. (2013). <i>Engineering Mechanics</i> , Vol. 1 Statics, Vol. 2 Dynamics, Pearson Educa AsiaPvt. Ltd. Ashok Gupta. (2001). <i>Interactive Engineering Mechanics - Statics - A Virtual Tutor (CDROM)</i> ,	kas tion Pearson							

E BOOK	S
1	https://www.pdfdrive.net/strength-of-materials-i-e11311976.html
моос	
1	https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/
2	https://onlinecourses.nptel.ac.in/noc17_ce17
3	https://onlinecourses.nptel.ac.in/noc15_ce02

COURSE TITLE	М	ECHANICS OF FLUID	S	CREDITS	3					
COURSE CODE	CEB4203	COURSE CATEGORY	PC	L-T-P-S	3-0-0-1					
Version	1.0Approval Details24th A30.5.20		24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3					
ASSESSMENT SCHEME										
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE					
15%	15%	10%	5%	5%	50%					
Course Description	This course deals with the properties of fluids, flow parameters and properties. The study of fluid kinematics, dynamics and flow through pipes are also described. The concept of model analysis is also introduced.									
Course Objective	 To understand the properties of fluid. To understand the properties of flow. To understand the principles of Bernoulli's Theorem. To study the behavior of laminar and turbulent flow. To be acquainted with the principles of model analysis 									
Course Outcome	Upon completion of this course, the students will be able to 1. Elaborate the properties of fluids and apply it in relevant are Civil Engineering. 2. Identify the different types of flow and apply continuity equ for various conditions 3. Apply Bernoulli's theorem in pipe flow. 4. Determine the major and minor losses in pipes 5. Derive expressions using Dimensional Analysis.									
Prerequisites: Nil										
CO, PO AND PSO MAPPING										

0,10															
СО	PO-	PO-	PO-	PO-	РО	РО	PO-	PO-	PO	PO-	PO	PO-	PSO	PSO-	PSO-
	1	2	3	4	-5	- 6	7	8	-9	10	-11	12	-1	2	3
CO-1	2	2	2	3	-	3	1	1	1	1	-	1	3	2	-
CO-2	1	2	1	3	-	3	1	1	1	1	-	1	3	2	-
CO-3	1	2	1	3	1	3	1	1	1	1	-	1	3	2	-
CO-4	1	2	1	3	1	3	1	1	1	1	-	1	3	2	-
CO-5	1	2	1	3	1	3	1	1	1	1	-	3	3	2	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														

MODULE	1: DEFINITIONS AND FLUID PROPERTIES	(6L+3T=9)							
Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties. Detection of various cyber-attacks using Wireshark. Suggested Readings: Application of surface tension, capillarity									
MODULE 2: FLUID STATICS AND KINEMATICS (6L+3T=9)									
Hydrostatic equation – Forces on plane surfaces- Pressure measurement. Stream, streak and path lines – Classification of flows – Continuity equation Suggested Readings: Buoyancy									
MODULE 3	: FLUID DYNAMICS	(6L+3T=9)							
Euler and measurem Moody dia	d Bernoulli's equations – Application of Bernoulli's equation – Discharge ent – Laminar flows through pipes- turbulent flow – Darcy-Weisbach formula – gram. Suggested Readings: Forces on submerged bodies.	CO-3 BTL-3							
MODULE 4	: FLOW THROUGH PIPES	(6L+3T=9)							
Major and minor losses of flow in pipes – Pipes in series and in parallel Suggested Readings: Boundary layer theory									
MODULE 5: DIMENSIONAL AND MODEL ANALYSIS (6L+3T=9)									
Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models. CO-5 BTL-3									
TEXT BOOKS									
1.	Dr. R.K. Bansal. (2017). Fluid Mechanics and Hydraulic Machines, Laxmi Publication	, 9th edition							
2	Fox, Robert, W. and Macdonald, Alan, T. (2011). <i>Introduction to Fluid Mechanics</i> , J Sons	ohn Wiley &							
3	Rajput, R.K. (2016). A text book of Hydraulic Machines, S. Chand Publications, Sixth	edition.							
REFERENC	E BOOKS								
1	Streeter, Victor, L and Wylie, Benjamin. (2010). <i>Fluid Mechanics</i> , McGraw-Hill Ltd.								
2	E. John Finnemore. (2010). <i>Fluid Mechanics with Engineering Applications,</i> McGra International Edition.	w-Hill <i>,</i>							
3	Pernard Messay. (2005). Mechanics of Fluids, Nelson Thornes Ltd.								
E BOOKS									
1	https://drive.google.com/file/d/0B9_2yANiGJ12aWJrSGJZVjlxbHM/view								
2	http://www.engineeringbookspdf.com/fluid-mechanics-hydraulic-machines/								
моос									
1	https://onlinecourses.nptel.ac.in/noc17 me04/preview								

COUR	SE TITI	.E		CON	ISTRU	CTION	MATE	RIALS	LAB		CRE	DITS	1			
CO CO	URSE ODE		CEE	34231		C CA	OURSI TEGOF	E RY		РС	L-	T-P-S		0-0-2-0		
Ve	rsion		:	1.0		Appro	oval De	etails	24th 30.5	ACM 5.2018	- LEA	RNING EVEL		BTL-3		
ASSES	SMEN	т ѕсні	EME													
			C	CIA .								ESE				
			8	0%					20%							
Co Desc	ourse riptior	C n Ce	onstru ement,	iction i , coars	materi e aggr	ials lab egate a	orator and fin	y deal Ie aggr	with tl egate.	he prac	ctical s	tudy on	proper	ties of b	ricks,	
Co Obj	ourse ective	 To acquire knowledge on properties of bricks. To acquire knowledge on properties of cement. To acquire knowledge on properties of fine aggregate. To acquire knowledge on properties of coarse aggregate. 														
Co Out	ourse come	1 2 3 4 5	 Upon completion of this course, the students will be able to 1. Determine the properties of bricks according to IS Codes. 2. Determine the properties of cement according to IS Codes. 3. Determine the properties of fine aggregates according to IS Codes. 4. Determine the properties of coarse aggregates according to IS Codes. 5. Determine the properties of fresh concrete according to IS Codes. 													
Prereq	uisites	s: Cons	tructio	on Mat	erials											
СО, РС	O AND	PSO N	/IAPPII	NG												
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-	
<u> </u>	1	2	3	4	5 3	6	7	8	9	10	- 11	12	1 2	2	3	
CO-2	- 1	2	2	3	3	2	3	2	-	-	-	_	-	-	-	
CO-3	1	2	2	3	3	-	3	2		-	-	-	2	-		
CO-4	1	2	2	3	3	2	3	2	-	-	-	-	2	-	-	
CO-5	1	2	2	3	3	2	-	-	-	-	-	-	2	-	_	
			1: W	eakly r	elated	d, 2: M	oderat	l tely re	lated a	and 3: 9	Strong	ly relate	ed			
				•		LIS	ST OF E	XPER	MENT	S	5	-				
1	Compr	essive	Stren	gth and	d Wat	er Abso	orptior	n of bri	ick							
2	Tests o	on Cen	nent, S	pecific	gravi	ty,										
3	Consis	tency	test or	n Ceme	ent											

4	Setting Time of cement
5	Soundness test on cement
6	Tests on Fine Aggregate: Specific Gravity
7	Fineness Modulus of fine aggregate
8	Coarse Aggregate: Specific Gravity
9	Fineness Modulus of coarse aggregate
10	Crushing Strength
11	Flakiness and Elongation Index
12	Abrasion Test
REFE	RENCE BOOK
1	IS:383-2016 specifications for coarse and fine aggregates from natural sources for concrete.

B.TECH – CIVIL ENGINEERING

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COURS	ETITL	E	Mechanics of Fluids Lab										CREDITS 1					
COURS	E COD	E	CEB4232			COURSE PC CATEGORY				L-T-P	?-S	0-0-	2-0					
Ver	sion		1.0			Approval Details			24t 30	th ACN .5.201	1 - 8	LEARN LEVI	ING EL	BTI	L- 3			
ASSESS	MENT	SCHEI	ME															
CIA					8)%		ESE				20%						
Cou Descr	urse iption	Th us pij	The experiments in Fluid mechanics Laboratory deal with the flow measuring devices used to find rate of flow in pipes and open channels. The major and minor losses in pipes can also be found.															
Cou Obje	urse ective	1. 2. 3. 4.	 To study the flow measuring devices in pipes and measure the flow. To study the flow measuring devices in open channels and measure the flow To understand the principles of Bernoulli's Theorem. To be acquainted with the losses of flow in pipes. 															
CourseUpon completion of this course, the students will be able to1. Calibrate the given venturimeter2. Calibrate the orificemeter to find the discharge through pipes3. Calibrate the notches and orifice used to find discharge through open channed4. Determine the major and minor losses in pipes5. Verify Bernoulli's theorem									els.									
Prerequ	isites:	CEB42	203- M	lechan	ics of	Fluids												
CO, PO	AND P	SO M	APPIN	G														
со	PO- 1	PO -2	PO -3	РО- 4	РО -5	РО- 6	РО- 7	PO -8	PO -9	PO- 10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3			
CO-1	1	2	3	3	-	3	1	2	3	2	-	1	2	2	-			

LIST OF EXPERIMENTS

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1. Determination of coefficient of discharge of venturimeter

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- 2. Determination of coefficient of discharge of Orifice meter.
- 3. Determination of coefficient of discharge of Orifice.
- 4. Determination of coefficient of discharge of Notches.
- 5. Determination of frictional losses in pipes.

CO-2

CO-3

CO-4

CO-5

- 6. Determination of Minor losses in pipes
- 7. Study of the impact of jet on vanes.
- 8. Verification of Bernoulli's theorem

REFERENCE BO	REFERENCE BOOKS									
1	Ven Te Chow. (2009). Open-Channel Hydraulics, The Blackburn Press.									
2	Ramamirtham S. (2006). <i>Fluid Mechanics, Hydraulics and Fluid Machines</i> , Dhanpat Rai & Sons, Delhi.									
3	John A.Roberson. (2013). Hydraulic Engineering, John Wiley & Sons.									
4	Streeter, Victor, L. and Wylie, Benjamin E. (2010). Fluid Mechanics, McGraw-Hill Ltd.									
5	Ven Te Chow. (2009). Open-Channel Hydraulics, The Blackburn Press.									

COUR	SE TITI	LE	C	OMPU	TER A	IDED B	UILDII	NG DR	RAWING CREDITS					1		
СС С	OURSE ODE		CEE	34233		C CA	OURSI TEGOF	E RY		РС	L-	T-P-S		0-0-2-0)	
Ve	ersion			1.0		Appro	oval De	etails	24th 30.!	n ACM - 5.2018	LEA	RNING EVEL		BTL-6		
ASSE	SSMEN	т ѕсн	EME													
			C	CIA								ESE				
			8	0%					20%							
Co Deso	ourse criptior	n fu	his cou uilding Inctior	urse w s in ao nal req	ill ena ccorda uiremo	ble the nce wi ents as	e stude ith dev per N	ents to velopn ationa	draft nent a I Build	the pla nd con ing Coc	in, ele trol ru le	vation, a	and sec sfying c	tional vi prientatio	ews of on and	
Cours Objec	se tive		To d Cod	levelor e	o plan,	elevat	ion an	d sect	ional v	iews of	buildi	ings as p	oer Nati	onal Bui	lding	
Cours Outco	se ome	1. 2. 3. 4. 5.	Upo Devo Crea Sum Sum Desi Nati	n com elop be imarize imarize gn anc onal B	pletion uilding specti e requ e the g d devel uilding	n of thi layou iremer uidelir op bui g code	s cour ts, Plar vs of b its of a nes for Iding p and lo	se, the n, Sect uilding n app a build permit cal bui	e stude ion an gs. roval d ding as drawir Iding r	ents will d Eleva Irawing s per Na ngs for p rules	l be ab tion for a ationa given o	ole to new bui l Buildin custome	lding pr g Code er requi	oject Provisio rements	ns as per	
Preree	quisite	s: Engi	neerin	g Grap	blics &	a CAD										
СО, Р	O AND	PSO N	ΜΑΡΡΙ	NG												
со	PO-	РО- 2	РО- З	РО- 4	PO- 5	PO- 6	РО- 7	РО- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3	
CO-1	1	1	2	3	3	2	1	3	2	2		3	3	2	3	
CO-2	1	1	2	3	3	2	1	3	2	2	2	2	3	1	3	
CO-3	1	1	1	3	3	2	1	3	-	-	1	2	3	2	3	
CO-4	1	1	1	3	3	2	1	3	-	-	1	2	3	2	3	
CO-5	2	1	2	3	3	2	1	3	-	2	1	2	3	3	3	
		1	1: W	eakly ı	related	d, 2: M	odera	tely re	lated	and 3: 9	Strong	ly relate	ed			
	LIST OF EXPERIMENTS															
1	Introd	ductior	n to Bu	ilding	Drawii	ng										
2	2 Conventional Signs, Doors, Windows, Footings															
3	Devel	op Sec	tion ar	nd Froi	nt Elev	ation f	or Sin	gle Roo	om Bui	ilding						

4	Develop Section and Front Elevation For 2BHK Plan
5	Develop Section and Front Elevation for Given Cottage
6	Study on General Building Requirements as Per NBC 2016
7	Develop Plan, Section and Front Elevation for Given line sketch
8	Develop Plan, Section and Front Elevation for Residential Building as per Given Customer
	Requirement
9	Develop Plan, Section and Front Elevation for Commercial Building as per Given Customer
	Requirement
10	Develop Plan, Section and Front Elevation for Educational Building as per Given Customer
	Requirement
	LIST OF EQUIPMENTS (For a batch of 30 students)
1.	AutoCAD Software (30 License)
2	30 Systems
TEXT	BOOKS
1	B.P. Verma. (2012). Civil Engg. Drawing & House Planning, Khanna publishers, Delhi.
2	V.B.Sikka. (2014). Civil engineering drawing, S.K.Kataria & sons.
REFE	RENCE BOOKS
1	M. G. Shah. (2012). Building Drawing, Tata McGraw Hill.
2	National Building Code of India 2016.

COURS	E TITLI	Ξ			DE	SIGN	PROJE	СТІ			C	REDITS	5	1	
COL CO	JRSE DE		CEB4234					E RY		РС		L-T-P	P-S	0-0-	-2-0
Ver	sion		:	1.0		Appr	oval Details 24th ACM - 30.5.2018			-	LEARN LEV	ling El	BT	L-5	
ASSES	MENT	PATTER	RN												
	First R (CI	eview A)		Seco	nd Rev (CIA)	view	-	Third R	eview	(CIA)		Pro	ject Rej Viva	oort & (CIA)	
	20		20 30 30												
Cou Descr	To provide sufficient hands-on learning experience related to the design, development and analysis of suitable product / process so as to enhance the technical skill sets in the chosen field.														
Cou Obje	urse ctive		1. T 2. T a 3. T	o enal o enal repor o impi	ole the ole the t on th rove th	stude m to p e wor e leve	ents to plan an k el of co	apply t d orga nfidenc	he the nize a ce in pi	eoretica small C resenti	al knov Civil En ng the	wledge Igineer e civil e	e in prac ing pro ngineer	ctice ject and ring con	l write cepts.
Cou Outo	urse come	Up	on co 1. F 2. P 3. C tl 4. S 5. [mpleti ormula erforn conduc he resu he resu ynthes Docum	on of t ate spe n litera t expe ults. size the ent th	his co ecific p ture s rimen e resul e resul e resu	urse, th problem earch i ts / De ts and Its in th	he stuc n state n the a sign an arrive ne forn	ents v ments rea of d Anal at scie n of teo	vill be a for rea interes lysis / s ntific c chnical	able to al life p st. olutio onclus repor	o probler n itera sions / t / pre	ms tions ar produc sentatio	nd docu ts / solu on	ment
Prerequ	uisites:	Knowl	edge	on Bas	sic Cor	e Cour	ses								
CO, PO	AND	PSO M	APPIN	IG											
0	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	РО	PO-	PO-	PO-	PSO-	PSO-	PSO-
	1	2	3	4	5	6	7	8	-9	10	11	12	1	2	3
CO-1	1	3	2	2	2	2	2	2	-	2	1	3	2	2	2
CO-2	-	2	-	-	-	2	2	-	-	2	1	1	1	2	2
CO-3	2	3	3	3	3	3	3	3	3	3	2	3	2	3	3
CO-4	2	3	3	3	3	3	3	2	3	2	1	3	2	3	2
CO-5	-	-	-	-	-	-	-	-	3	3	-	2	-	-	-
		1	: Wea	akly re	lated,	2: Mo	derate	ly rela	ted an	d 3: St	rongly	relate	ed		
						<u>LIS</u> T	OF EX	PERIM	<u>ENTS</u>						

B.TECH – CIVIL ENGINEERING

In this project each group consisting of four/five members is expected to design and develop practical solutions to real life problems related to Industry and Civil Engineering research. Software usage should be followed during the development. The theoretical knowledge gained from the subject should be applied to develop effective solutions to various computing problems. At the end of the course the group should submit a complete report of the project work carried out.

COU	RSE TIT	LE		PR	OBABII		ND STA	TISTICS	5		CRE	DITS		4	
cou	RSE CO	DE	MAA4216 COURSE BS L-T-P-S 3-1-0-0											0	
v	ersion		1	0	A	pprov	val Deta	ils	24th 30.5.	ACM, 2018	LE	ARNIN LEVEL	3	BTL-4	1
ASSES	SSMEN	r schi	EME												
First Ass	Periodi essmen	cal It	SecondSeminar/PeriodicalAssignments/AssessmentProject											ESE	
	15%		15% 10% 5% 5% 50%												
C Des	Course scription	n	To make mostly u	To make the student understand the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science.											
Cours Objec	se tives		1. T 2. T 3. T 4. T 5. T	 To familiarize the concept of probability and random variable To identify the standard distribution variables. To perform the discrete and continuous random variables To explore the types of hypothesis testing To establish optimal process performance 											
Cours Outco	se omes		Upor 1. Fami 2. Impr distri 3. Explo 4. Perfo para 5. Profi	n compl liarize t ove the ibutions ore the orm tes meter cient to	letion o the con ability s random t of hyp o obtain	f this o cept o to uno n expe pothes	course, f Probal derstand riments is as we dedge o	the stu bility and d the ir s specif ell as ca n desig	idents nd one mporta ied by Iculate gn of e:	will be e-dime ance o two d e confi xperin	e able t nsional f discre imensio dence i nents	o l randor te and o onal ran interval	n varial continu idom va for the	ble ious ariables popula	tion
Prerec	quisites														
CO, P		PSU			56	00	DC	56			-	20	D (2)	DCO	
со	РО- 1	2 PO	2 3 4 5 6 7 8 9 10 11 12 -1 -2								-2	PSO			
CO-1	2	1	3	-	-	-	-	-	-	-	-	-	2	2	-5
CO-2	3	2	1	-	-	-	-	-	-	-	-	-	1	1	
CO-3	2	1	2	-	-	-	-	-	-	-	-	-	2	2	
CO-4	3 2 3 3 1														
CO-5 2 1 1			-	-	-	-	-	-	-	-	-	1	2		

SEMESTER – IV

	1: Weakly related, 2: Moderately related and 3: Strongly related	
MODULE	1: PROBABILITY AND RANDOM VARIABLES (9L+3T=12)	
Axioms of functions. Suggested	⁻ Probability- Bayes' Theorem -Random variables – Moments – Moment generating d Reading: Basic Probability	CO-1 BTL-3
MODULE	2: STANDARD DISTRIBUTIONS (9L+3T=12)	
Binomial, Suggested	Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions d Reading: Discrete and Continuous Functions	CO-2 BTL-3
MODULE	3: TWO-DIMENSIONAL RANDOM VARIABLES (9L+3T=12)	
Joint distr Regressior Suggestec	ibution – Marginal and conditional distribution – Co-variance – Correlation and າ ຢ Reading: Random Variables	CO-3 BTL-3
MODULE	4: TESTING OF HYPOTHESIS (9L+3T=12)	
Sampling Test – Larg in proport Suggestec	distributions – Testing of Hypothesis –Small samples– t Test, F Test and Chi-square ge samples– Single mean– Difference in means– single proportion and difference ions. I Reading: Sampling Problems	CO-3 BTL-4
MODULE	5:DESIGN OF EXPERIMENTS (9L+3T=12)	
Analysis o Way Class Suggestec	f variance– One Way Classification–Completely Randomized block design– Two ification – Randomized block design – Latin Square design I Reading: Analysis of variance	CO-4 BTL-4
TEXT BOO	KS	
1.	Milton. J. S. and Arnold. J.C. (2017). <i>Introduction to Probability and Statistics</i> , Tata Hill, 4th Edition.	McGraw
2.	Johnson. R.A, Gupta. C.B, Miller and Freund's. (2017). <i>Probability and Statistics fo</i> Pearson Education.	r Engineers,
3.	A. Chandrasekaran, G. Kavitha. (2014). <i>Probability, Statistics, Random Processes a QueuingTheory</i> , Dhanam Publications	nd
4.	Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma. (2016). MATLAB and Applications in Engineering, Pearson Publication, Second Edition.	its
REFERENC	E BOOKS	
1.	Spiegel. M.R., Schiller. J. and Srinivasan. R.A. (2014). Schaum's Outline of Theory a Probability and Statistics, Tata McGraw Hill Edition.	nd Problems of
2.	Devore. J.L. (2012). <i>Probability and Statistics for Engineering and the Sciences</i> , Cer New Delhi, 8th Edition.	ngage Learning,
3.	Dean G. Duffy. (2013). Advanced Engineering Mathematics with MATLAB, CRC Pre Edition	ess, Third
E BOOKS		
1.	http://nptel.ac.in/courses/IIT-MADRAS/Principles of Communication1/Pdfs/1 5.	. <u>pdf</u>
MOOC		
1.	https://www.edx.org/course/introduction-probability-science-mitx-6-041x-2	

COURSE	TITLE				STRU	CTURA	AL ANA	LYSIS-	I		С	REDITS	5	4	
COURSE	CODE		CEB4216 COURSE PC L-T-P-S											3-1-	0-1
Versi	on			1.0		Appro	oval D	etails	24t 30	h ACN .5.201	l - B	LEARN LEVE	ING EL	BTI	-3
ASSESSME	NT SC	HEME													
First Peri Assessr	iodical nent		Second Periodical Assessment			Se Assi	eminar ignmer Project	/ nts/	Surj	Surprise Test / Quiz		Attenda	ance	ES	Ε
15%	6		1	.5%			10%			5%		5%		50	%
Cour Descrip	se otion	T a	This course introduces the students to basic theory and concept and the classical methods of analysis, which are required for the									ncepts or the a	of Stru analysis	uctural a s of build	nalysis dings.
Course Ob	jective	25	 To impart knowledge in the analysis of the structural elements using the classical methods of analysis. To understand the basic principles of different types of arches used in construction industry. To study the concept of influence lines for the analysis of beams and trusses for moving loads. To differentiate determinate and indeterminate structures. 												
Course Ou	tcome	U	pon cc 1. / 2. / 3. / 4. [5. / c	ompleti analyze analyze analyze Determ analyze liagran	ion of e indet e conti e multi ine th e struct n.	this co ermina nuous storiec e force tural m	ourse, t ate stru beams d build es in ar nembe	the stu uctures and fr ing usi rches u rs for n	dents s using rames ng mo sed in noving	will be g force using s ment c constr gloads	able t metho slope c distribu uction and als	o deflecti ution indust so to dr	on :ry :aw the	einfluen	ce line
Prerequisit	es: CE	B4202	- Mecł	nanics	of Stru	ctures	; —II								
CO, PO AN	ID PSO	MAP	PING												
со	PO- 1	РО- 2	PO- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO -1	PSO- 2	PSO- 3
CO-1	2	2	3	3	3	1	-	1	1	1	-	2	3	3	-
CO-2	2	2	3	3	3	1	-	1	1	1	-	2	3	3	-
CO-3	2	2	3	3	-	1	-	1	1	1	_	2	3	3	_
CO-4	2	2	3	3	-	1	-	1	1	1	-	2	3	3	-
CO-5	2	2	3	3	-	1	-	1	-	1	-	-	3	3	-
		1:	Weak	ly rela	ted, 2:	Mode	erately	relate	d and	3: Stro	ongly r	elated			

MODULE 1	: ANALYSIS OF INDETERMINATE STRUCTURES: FORCE METHOD (9L+3T)	
Determinat method of theorem of	e and Indeterminate structures - Statically indeterminate structures - Force analysis of indeterminate structures - Method of consistent deformation - least work.	CO-1 BTL-3
MODULE 2	SLOPE DEFLECTION METHOD (9L+3T)	
Continuous	beams and rigid frames (with and without sway) - Simplification for hinged end	CO-2
-Support dis	splacements.	BTL-3
MODULE 3	: MOMENT DISTRIBUTION METHOD (9L+3T)	
Distributior	and carry over of moments - Stiffness and carry over factors - Analysis of	CO-3
continuous	beam Plane rigid frames with and without sway.	BTI-3
Self-Study:	Analysis of a multi storied building	DIE 3
MODULE 4	ARCHES (9L+3T)	
Arches as st	ructural forms - Examples of arch structures - Types of arches - Analysis of three	
hinged, two	o hinged and fixed arches, parabolic and circular arches - Settlement and	CO-4
temperatur	e effects.	BTL-3
Self-Study:	Application of arches in the construction industry	
MODULE 5	: MOVING LOADS AND INFLUENCE LINES (9L+3T)	
Influence l	ines for reactions in statically determinate structures - influence lines for	
member for	ces in pin-jointed frames - Influence lines for shear force and bending moment	CO-5
in beam se	ctions. Muller Breslau's principle - Influence lines for continuous beams and	BTI-3
single store	y rigid frames.	DIE-3
Self-Study:	Arches – Types of Arches – Arch Structures case studies. 97	
TEXT BOOKS		
1	Vaidyanthan, R. and Perumal, P. (2016). Comprehensive structural Analysis, Vo	ol.I & II" <i>,</i> Laxmi
1.	Publications, New Delhi.	
2	S.S. Bhavikatti. (2011). Structural Analysis, Vol I & II, Vikas Publishing House, D	elhi, Pvt.Ltd.
3	L.S. Negi & R.S. Jangid. (2003). Structural Analysis, Tata McGraw-Hill Publicatic	ons, New Delhi.
REFERENCE	BOOKS	
1	Ghali.A, Nebille, A.M. and Brown,T.G. (2009). <i>Structural Analysis</i> , A unified cla Matrix approach, CRC Press, 6 editions.	ssical and
2	Vazirani V.N, &Ratwani, M.M. (2008). Analysis of Structures, Khanna Publisher	s, Delhi.
3	G.S. Pandit & S.P. Gupta. (2008). Structural Analysis - A Matrix Approach, Tata	McGraw Hill.
4	Devdas Menon. (2016). Structural Analysis, Narosa, Publishing house, Delhi.	
E BOOKS		
1	http://www.engineeringbookspdf.com/advanced-methods-of-structural-analy	<u>/sis/</u>

B.TECH – CIVIL ENGINEERING

2	https://www.kopykitab.com/Structural-Analysis-II-by-S-S-Bhavikatti
3	http://bookslock.org/structural-analysis-2-textbook-download-in-pdf/
MOOC	
1.	http://freevideolectures.com/Course/3015/Advanced-Structural-Analysis
2.	https://pe.gatech.edu/user/login?destination=node/7781
3.	https://swayam.gov.in/course/3740-structural-analysis-i
4.	http://nptel.ac.in/courses/105106050/

COURSE TITLE	CONSTRUCTION	I TECHNIQUES, EQUI PRACTICES	PMENT AND	CREDITS	3		
COURSE CODE	CEB4217	COURSE CATEGORY	PC	L-T-P-S	3-0-0-1		
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3		
ASSESSMENT SC	CHEME						
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE		
15%	15%	10%	5%	5%	50%		
Course Description Course Objective	This course aims to equipment, and pro- 1. Be acquainte construction 2. Understand 3. Understand 4. Understand 5. Familiarize windustry.	o impart knowledge o ocedures needed for ed with different con n. the various practices the various practices the techniques adop with the various cons	on various construction practice struction practice in sub structure in super structure ted in special structure truction equipme	uction technique tion activities res used in build e construction. are construction ructures. ent used in the	ues, practices, ding n. construction		
Course Outcome	 Upon completion of this course, the students will be able to Summarize the sequence of building construction Identify and enumerate the various techniques adopted for substructure construction. Identify and enumerate the various techniques adopted for superstructure construction. Identify and enumerate the various techniques adopted for superstructure construction. Adopt the techniques used for the construction of special structures. Illustrate the various equipment needed for construction. 						
Prerequisites: NI	L						

CO, PO		20 IVI	APPIN	G											
0	РО	РО	PO-	PO-	РО	PO-	PO-	PO-	РО	РО	РО	PO-	PSO-	PSO-	PSO-
	-1	-2	3	4	-5	6	7	8	-9	-10	-11	12	1	2	3
CO-1	-	2	2	-	-	1	2	1	-	-	-	2	2	1	-
CO-2	2	2	1	1	-	-	-	3	-	-	-	2	1	2	-
CO-3	-	1	1	-	-	1	-	-	-	-	2	3	2	2	-
CO-4	-	2	2	-	-	1	2	2	-	-	3	3	2	2	-
CO-5	1	1	3	-	-	2	2	2	-	-	-	3	1	2	-

	1: Weakly related, 2: Moderately related and 3: Strongly related	
MODULE	1 : CONSTRUCTION PRACTICES (9)	
Specificat Clearance masonry finishes - Building f temporar	tions, details and sequence of activities and construction co-ordination - Site - Marking - Earthwork - masonry - stone masonry - concrete hollow block - flooring - damp proof courses- laying brick weather and water proof - roof construction joints - movement and expansion joints - pre cast pavements - oundations - basements - ry shed - centering and shuttering- Scaffoldings - slip forms	CO-1 BTL-2
MODULE	2: SUB STRUCTURE CONSTRUCTION	(9)
Techniqu and base Dewaterii diaphragr	es of Box jacking - Pipe Jacking -under water construction of diaphragm walls ment-Tunneling techniques - Piling techniques- driving well and caisson - ng well points- sinking cofferdam - cable anchoring and grouting-driving n walls, sheet piles - shoring for deep cutting	CO-2 BTL-2
MODULE	3: SUPERSTRUCTURE CONSTRUCTION (9)	
Launchin for heavy handling Self study	g girders, bridge decks, off shore platforms - special forms for shells - techniques decks -Introduction to pre-stressing and Post tensioning, aerial transporting - erection of transmission towers. / :Ready mix concrete production	CO-3 BTL-3
MODULE	4 : CONSTRUCTION PRACTICES – SPECIAL STRUCTURES	(9)
Fabrication silos, chin for heavy and space	on and erection of steel trusses - Construction sequences in cooling towers, nney, sky scrapers, bow string bridges, cable stayed bridges -Support structure Equipment and conveyors -Erection of articulated structures, braced domes e decks.	CO-4 BTL-3
MODULES	5: CONSTRUCTION EQUIPMENT	(9)
Selection equipmer and pile Equipmer trenching Transport Self-study	of equipment for earth work - earth moving operations - types of earthwork ht - tractors, motor graders, scrapers, earth movers - Equipment for foundation driving. Equipment for compaction, batching and mixing and concreting - ht for material handling and erection of structures - Equipment for dredging, , tunneling, drilling, blasting dewatering and pumping equipment - terers. y: Form-work - Material and latest techniques Next-generation digital forensics	CO-5 BTL-3
TEXT BO	DKS	
1	Varghese, P.C. (2016). <i>Building construction</i> , Prentice Hall of India Pvt. Ltd, Ne revised edition.	w Delhi, 2nd
2	M.S Shetty. (2012). Concrete Technology Theory and Practice, S. Chand & Com	ipany Ltd.
3	Arora S.P. and Bindra S.P. (2010). Building Construction, Dhanpat Rai and Sons	
4	P.Purushothama Raja. (2012). <i>Construction Techniques Equipment and practic</i> Publishers, Chennai.	e, Sri Krishna

REFERENC	E BOOKS										
1	Gambhir, M.L. (2013). Concrete Technology, Mc Graw Hill India.										
2	J Jha. (2004). Construction and Foundation Engineering, Khanna Publishers.										
3	Sharma S.C. (2008). Construction Equipment and Management, Khanna Publishers New Delhi.										
4	Deodhar, S.V. (2012), Construction Equipment and Job Planning, Khanna Publishers, New Delhi.										
E BOOKS											
1	https://www.pdfdrive.net/rapid-pavement-construction-tools-materials-and-methods-										
	<u>e6088890.ntmi</u>										
MOOC											
1	https://onlinecourses.nptel.ac.in/noc17 ce18/										
2	http://nptel.ac.in/courses/105104161/21										
3	http://nptel.ac.in/courses/105103093/11										
4	https://onlinecourses.nptel.ac.in/noc16_ce02/										
COURSE TITLE	ENVIRO	NMENTAL ENGINEE	RING	CREDITS	3						
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COURSE CODE	CEB4218	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0						
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3						
ASSESSMENT SCHEME											
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE						
15%	15% 10% 5% 5% 50%										
Course Description	To make the stu of water treatm	idents understand al ent including disinfe	bout the water ction of water	r borne diseas	es, important						
Course Objective	The course shou 1. Learn all source ic Also to s 2. Know ab 3. Study ab sewage. 4. Understa methods 5. Study ab	uld enable the stude bout the population lentifications, transp tudy water treatmer out the various wate out sewerage syster and the design princi s. out the safe disposa	nts to: n forecasting portation and t nt units and dis er treatment p n for collection ples of sludge a l of sewage.	methods, wat reatment of su stribution netw rocesses. n and transmis and wastewate	ter demand, urface water. vorks. sion of er treatment						
Course Outcome	 Upon completion of this course, the students will be able to 1. Design the various water treatment units in the water supply system. 2. Illustrate the various water treatment processes. 3. Design sewers for transmission of sanitary sewage and the pumping units. 4. Design sedimentation tanks, aeration tank, trickling filter and septic tank. 5. Apply the suitable technique for the disposal of sewage. 										

Prerequisites:

СО, РО	CO, PO AND PSO MAPPING														
со	PO - 1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО -9	PO - 10	PO -11	PO- 12	PS O- 1	PS O- 2	PS O- 3
CO-1	3	2	2	1	1	1	1	1	3	1	1	1	3	3	-
CO-2	1	0	1	0	0	1	3	1	2	3	1	1	1	0	-
CO-3	3	2	2	1	1	1	1	1	3	1	1	1	3	3	-

CO-4	3	2	2	1	1	1	1	1	3	1	1	1	3	3	-	
CO-5	2	1	1	1	0	1	1	1	2	1	3	2	0	1	-	
			1: Weal	kly rela	ted, 2:	Modera	ately re	lated a	nd 3: 9	Strongly	, relat	ed			•	
MODU	LE 1: W	ATER S	SUPPLY	SYSTEN	/IS – SO	URCE 8	k CONV	EYANCI	E (4L+	5L=9)						
Objecti	ves – Po	opulatio	on forec	asting -	- Desigr	n perioc	l – Wate	er dema	and– S	ources	of wat	er and	its			
charact	eristics	– Sour	ce sele	ction –	Water	quality	param	eters 8	k signi	ficance	– Sta	ndards	of	CO	-1	
drinkin	g water	– Intal	ke struc	tures –	- Conve	yance–	Laying,	jointin	ig & te	esting o	of pipe	s – Pur	np	BTL	-3	
selectio	on.															
MODU	MODULE 2: DESIGN PRINCIPLES OF WATER TREATMENT (4L+5L=9) Objectives - Selection of unit operations and processos - Principles of flocculation															
Objectives – Selection of unit operations and processes – Principles of flocculation, sedimentation, filtration, disinfection – Design principles of flash mixer, flocculator, clarifiers, filters – Disinfection devices – Softening – Demineralization – Desalination – Iron removal – De- fluoridation. Distribution - Requirements – Components –Layout of distribution networks- Service reservoir -computer application in water distribution – Leak detection.													on, rs, De- ks-	CO-2 BTL-2		
MODU	DULE 3: SEWERAGE SYSTEM: COLLECTION & TRANSMISSION(4L+5L=9)															
Object	ODULE 3: SEWERAGE SYSTEM: COLLECTION & TRANSMISSION(4L+5L=9) bjectives – Sources of wastewater – Quantity of sewage – Storm water run-off estimation –															
Objectives – Sources of wastewater – Quantity of sewage – Storm water run-off estimation – Wastewater characteristics and significance – Effluent disposal stand over – Design of sewers														CO	-3	
- Computer applications - Laying, jointing and testing of sewers - Sewer appurtenances -													-	BTI	3	
Pump s				45NIT 0	DECIC			41.51-	12)							
NODU	LE 4: SE	WAGE	IKEAIN	/IEINI &	DESIG		LIPLES (4L+5L=	12)							
Objecti	ves – S	Selectio	n of ur	nit ope	ration	and pr	ocess –	- Desigi	n prin	ciples	of prii	mary a	nd			
second	ary trea	itment,	screen	chamb	er, grit	chamb	er, prin	nary se	dimen	tation	tanks,	activat	ed	CO	-4	
sludge	process	- Aerat	ion tanl	k & oxi	dation (ditch –	Trickling	g filter ·	- Stab	lization	pond	s – Sep	tic	BTL	-3	
tanks w	nth soal	k pit <u>s</u> .														
MODU	LE 5: DI	SPOSAI	L OF SE\	NAGE (4L+5L=	9)										
Standa	rds of D	Disposal	l-Dispos	al on la	ind – Di	sposal i	nto wa	ter bod	ies – C	Dxygen	sag cu	rve –		CO	-5	
Streete	r help's	s model	– Wast	ewater	reclam	ation te	echniqu	es. Sluc	lge: tr	eatmer	it and	disposa	al	BTL	-2	
– Bioga	s recov	ery – Se	ewage f	arming	•											
IEXIB	JUKS	<u>c k (20</u>	10) 5							- 1: - la - va	Nam	Delle:				
1	Garg,	S.K. (20	(10). En	vironme	ental Er	igineeri	ng, i & i	II, Khan	na Pu	blishers	, New	Deini.				
2		P.N. (2	$\frac{013}{2010}$		iental E	ngineer	ing, 1 &	II, Stan			buse, L			alh:		
3	Dugga	II K.N. (<i>.</i>	2010). E	iement	s of En	/ironme	ental En	gineerii	ng, S.C	.nand a	na Co.	Lta., N	iew D	eini.		
REFERE	NCE BC	OKS														
1	Manu	al on W	/ater Su	pply an	d Treat	ment, C	PHEEO	, Gover	nmen	t of Ind	ia, Nev	v Delhi	, 2015	5		
2	Manu	al on Se	ewerage	e and Se	ewage T	Freatme	ent, CPF	IEEO, G	overn	ment o	f India	, New [Delhi,	2013		
3	Metc Editic	alf and on India	Eddy, N	1.C. (20	05). Wa	astewat	er Engil	neering	– Tre	atment	& Reu	<i>se,</i> Mc	Graw	Hill, 4	Ļ th	

4	Gray N.F. (2006). Water Technology, Elsevier India Pvt. Ltd., New Delhi.
5	Birdie, G.S. and Birdie. (2010). Water Supply and Sanitary Engineering, Dhanpat Rai & Sons.
E BOOK	S
1	https://www.pdfdrive.net/environmental-engineering-fourth-edition-e13522425.html
2	http://www.tnu.edu.vn/sites/quynhntt/references/8064517-Environmental-Engineering.pdf
моос	
1	https://www.shortcoursesportal.com/studies/75474/making-environmental-decisions.html
2	https://ocw.mit.edu/courses/civil-and-environmental-engineering/
3	https://ep.jhu.edu/programs-and-courses/programs/environmental-engineering

COURS		E	STRENGTH OF MATERIALS LAB CREDITS 1												
COURS	SE COD	E	CEE	34241		C CA	OURS TEGOI	E RY		PC	Ŀ	T-P-S		0-0-2-	0
Ver	rsion			1.0		Appro	oval D	etails	24t - 30.	h ACM 5.2018	LEA	RNING EVEL		BTL-5	
ASSESS	MENT	SCHE	ME												
			C	IA								ESE			
			80)%								20%			
Course Descrip	tion	S m d cl	trengtl naterial ifferen haracte	h of ma ls used t mate eristics	aterial for co rials u exper	s labor onstruc nder tl imenta	atory ction a he acti ally.	deals wind ma	vith as nufact /arious	sessing uring. ٦ s forces	mech This co and t	nanical p ourse ex o detern	properti poses t mine th	ies of va he test e	arious ing of
Course Objecti	ve	 Understand different methods available for testing materials under the action of various forces like axial compression axial tension, torsion, flexure, shear. Assess the strength of existing structure using Non-destructive testing 													
Course Outcon	CourseUpon completion of this course, the students will be able to1. Classify various materials based on their mechanical properties2. Carry out durability tests on various materials3. Evaluate the strength parameters of new materials4. Evaluate existing structural elements using Non-destructive testing5. Develop suitable mix design for concrete as per the given requirement														
Prerequ	isites:	Engin	eering	Chem	istry										
CO, PO		PSO IV	IAPPIN	G											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
<u> </u>	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO-1	2	1	2	1	-	2	2	1	3 2	2	-	1	2	3 	-
CO-2	2	1	2	1	-	2	5	1	3	2	-	1	2	3	-
CO-3	2	1	2	1	-	2	1	1	3	2	-	1	2	3	-
CO-4	2	1	1 2 1 - 2 2 1 3 2 - 1 2 3 -												
CO-5	2	1	2	1	-	2	-	1	3	2	-	1	2	3	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														
	LIST OF EXPERIMENTS														
1	1 Tension Test on Mild Steel bars and bolts.														
2	Comp	oressio	on Test	on Co	ncrete	cubes	and c	ylinde	rs with	stress	strain	curve.			
3	Torsic	on tes	t on M	ild stee	el bars										

4	Tests on springs
5	Hardness tests.
6	Shear test.
7	Test for impact resistance of steel and concrete.
8	Verification of Maxwell's Reciprocal Theorem
9	Determination of Modulus of Elasticity of Concrete using Strain gauges.
10	Durability test on concrete – RCPT, Sulphate attack, carbonation test.
11	Non-Destructive tests on beams and columns.
	LIST OF EQUIPMENTS (For a batch of 30 students)
1.	Universal Testing Machine
2	Computerized Universal Testing Machine
3	Torsion Testing Machine
4	Pendulum Impact Tester
5	Deflection Test Bench Apparatus
6	UPV Testing Equipment
7	Spring Testing Machine
8	Motorized Digital Rockwell Hardness Tester
9	Optical Brinell Hardness Tester
10	Rebound Hammer
MOOC	
1	https://www.coursera.org/learn/mechanics-1

COUF	RSE TITI	.E		ENVIR	ONN	IENTAL	ENGIN	IEERIN	IG LAB	6	CRE	DITS		1	
сс С	OURSE ODE		CEI	34242		C CA	OURSE	E XY		РС	L	T-P-S		0-0-2-0	D
Ve	ersion			1.0		Appro	oval De	etails	24th 30.!	n ACM - 5.2018	LEA	RNING EVEL		BTL-3	
ASSE	SSMEN	T SCH	EME												
			C	CIA								ESE			
			8	0%								20%			
Ca Dese	ourse criptior	,	o get e	exposu	ire ab	out wa	ter and	sewa	ge ana	lysis.					
Cours Objec	se tive	 To acquire knowledge water quality and wastewater analysis To acquire knowledge on working principal of AAS to determine various heavy metals To acquire knowledge on water and wastewater quality standards To understand the impacts of various water and wastewater pollutants 													
Cours	se ome		Upo 1. An 2. Reo 3. Reo 4. Eva	n com alyze v call the comme aluate	pletic vater e stan end tl the ir	on of th and wa idards fi he appli npacts (is cours istewat or wate ication (or) tox	se, the er quater and of san kicity o	e stude ality pa waste nple ba f varic	ents will aramete water ased on ous wast	be at ers the q cewat	ole to uality a er pollu	nd stan tants	dards	
Prere	quisites	5:													
СО, Р	O AND	PSO N	ΜΑΡΡΙ	NG											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
CO-1	1	2	3	4	5	6 2	2	8	y z	10 2	-	12	1	2	3
CO-2	2	1	- 2	1	_	2	- 2	1	3	2	-	-	2	3	
CO-3	2	1	2	1	_	2	2	1	3	2	_	1	2	3	_
CO-4	2	1	2	1	-	2	2	1	3	2	-	1	2	3	_
			1: W	eakly r	elate	ed. 2: M	oderat	elv re	lated a	and 3: S	trong	lv relate	ed		
				,-			ST OF F	XPFRI	MFNT	S					
1	Sampl	ing and	l prese	rvation	meth	ods and	signific	ance o	f chara	cterizati	on of	water ar	d waste	water.	
2	2 Determination of i) PH and Turbidity; ii) Hardness														
3	Deteri	minatio	on of ire	on & flu	uoride	2									
4	Detern	ninatio	n of re	sidual c	hlorir	ne									
5	Detern	ninatio	n of Ch	lorides											

6	Determination of Ammonia Nitrogen
7	Determination of Nitrate in waste water
8	Determination of Sulphate
9	Determination of Optimum Coagulant Dosage
10	Determination of available Chlorine in Bleaching powder
11	Determination of dissolved oxygen
12	Determination of suspended, volatile and fixed solids
13	B.O.D. test
14	C.O.D. test
15	Introduction to Bacteriological Analysis (Demonstration only)
16	Heavy metals determination - Chromium, Lead and Zinc. (Demonstration only)
	LIST OF EQUIPMENTS (For a batch of 30 students)
1.	Muffle Furnace
2	BOD Inhibitor
3	COD Digester
4	Weighing Balance
5	PH meter; Turbidity meter
6	Atomic Absorbance Spectroscopy (AAS)
7	Hot air Oven

COU TIT	JRSE FLE				DE	С	REDITS	5	1	L							
COL CO	JRSE DDE		CEB	84243		(CA	COURS	E RY		РС		L-T-F	⊳_S	0-0	-2-0		
Ver	sion		1	0		Appr	oval D	etails	24t 30.	h ACM .5.2018	-	LEARN LEV	ling El	ВТ	L-5		
ASSES	MENT	PATTE	RN														
	First R	leview	,	Seco	nd Rev	view		Secor	nd Rev	view		F	Project	Report	&		
	(C	IA)			(CIA)				(CIA)			Viva (CIA)					
	20				20			3	0				30				
Cou Descr	urse iption	To de te	o pro evelop chnica	vide ment 11 skill	suffici and a sets ii	ent h nalysi 1 the c	ands-o is of s chosen	on lea uitable field.	rning e proc	exper luct /	rience proce	e relat ess so	ed to as to	the de enhanc	esign, e the		
Coi Obje	urse ective		 To enable the students to apply the theoretical knowledge in practice To enable them to plan and organize a small Civil Engineering project and write a report on the work To improve the level of confidence in presenting the civil engineering concepts. 														
Cor Outo	urse come	Up	on cor 1. Fc 2. Pe 3. Cc th 4. Sy 5. D	npletic ormula erform onduct ne resu vnthesi occume	on of t te spe litera exper lts. ize the ent the	his cou cific p ture se iment riment e result	urse, th roblem earch in ts / Des ts and i ts in th	ne stud n staten n the a sign an arrive a ne form	ents w ments rea of d Anal at scie n of teo	vill be a for rea interes ysis / s ntific c chnical	ible to I life p st. olutio onclus repor	orobler n itera sions / t / pre	ns tions ai produc sentatio	nd docu ts / solu on	ment tion		
Prereq	uisites	: Knov	vledge	on Ba	sic Co	re Cou	irses										
СО, РС	O AND	PSO N	ΛΑΡΡΙΙ	NG													
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	РО	PO-	PO-	PO-	PSO-	PSO-	PSO-		
	1	2	3	4	5	6	7	8	-9	10	11	12	1	2	3		
CO-1	1	3	2	2	2	2	2	2	-	2	1	3	2	2	2		
CO-2	-	2	2 2 2 2 1 1 2 2														
CO-3	2	3	3	3	3	3	3	3	3	3	2	3	2	2	3		
CO-4	2	3	3	3	3	3	3	2	3	2	1	3	2	3	2		
CO-5	-	-	_	_	-	-	-	_	3	3	-	2	_	_	-		
			1: We	akly re	lated,	2: Mc	derate	ely rela	ted ar	nd 3: Si	rongl	y relat	ed				

LIST OF EXPERIMENTS

In this project each group consisting of four/five members is expected to design and develop practical solutions to real life problems related to Industry and Civil Engineering research. Software usage should be followed during the development. The theoretical knowledge gained from the subject should be applied to develop effective solutions to various computing problems. At the end of the course the group should submit a complete report of the project work carried out.

	SEMESTER – V												
COURSE TITLE DESIGN OF CONCRETE STRUCTURES CREDITS 4 COURSE CODE CEB4301 PC L-T-P-S 3-1-0-1													
COURSE CODE	CEB4301	COURSE CATEGORY	РС	L-T-P-S	3-1-0-1								
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3								
ASSESSMENT SCHEME													
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE								
15%	15% 10% 5% 5% 5 %												
Course Description	This course dea reinforced conce column and foot 1. To know practices	Is with the differen rete structures and ting which form part the concepts of limit	t types of philoso design of basic ele of any structural t state method an	ophies related to ements such as sl system. d international co	design of ab, beam, des of								
Course Objective	 To Know To throw To be fan To introd 	the behavior of RC b light on the design niliar with the desigr uce yield line theory	beams in shear and concept of Limit st n of prestressed bo r for the design of	d torsion. tate design of colu eams slabs.	imns.								
Course Outcome	 Upon completion of this course, the students will be able to Apply the concepts of limit state method and international codes of practices in the design of concrete structures Design beams for flexure, shear and torsion using limit state method. Design reinforced concrete columns Compute the losses in prestressing and analyze the prestressed beams Apply yield line theory to analyze and design slabs. 												

Prerequisites: NIL

CO, PO AND PSO MAPPING															
~~~~	PO-	РО	PO	<b>DO</b> 4	PO	PO	РО	РО	РО	PO	PO	PO	PSO	PSO	PSO
	1	-2	-3	PU-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2	-3
CO-1	3	3	3	2	1	2	1	2	2	2	1	3	2	3	-
CO-2	3	3	3	2	2	2	1	2	1	1	1	2	2	3	-
CO-3	3	3	3	2	2	2	1	2	1	1	1	2	2	3	-
CO-4	3	3	3	2	2	2	1	2	1	1	1	3	2	3	-

CURRICULUM AND SYLLABUS B.TECH – CIVIL ENGINEER													ERING		
CO-5	3	3	3	2	3	2	1	2	1	2	1		1	3	-
			1: V	Veakly relate	ed, 2: I	Mode	rately	related	d and 3	3: Stro	ongly r	elated			
MOD	JLE 1:	METH	ODS C	F DESIGN O	FCON	CRETE	STRU	CTURE	S			(9L+3	Т)		
Concer metho metho Euro co	ot of el d over d-IS 45 odes, a	astic r r othe 56 - lim and An	nethoo er met nit stato nericar	d ultimate loa hods-design e philosophy n standards f	ad met codes as det or des	thod a and ailed i sign of	nd limi specif n curre concre	it state icatior ent IS c ete str	metho I -Intro ode. Ir ucture	od- ad oducti ntrodu s.	vanta on to iction	ges of I worki to Briti	imit sta ng stre sh Code	te ss es,	CO-1 BTL-2
MODU	ILE 2: L	IMIT S	STATE	DESIGN FOR	FLEX	JRE, S	HEAR	AND T	ORSIO	N		(12L+3	т)		
Analysis and design of one way and two-way slabs - rectangular slab subjected to uniformly distributed - boundary conditions and corner effects - singly and doubly reinforced rectangular and flanged beams - design aids for flexure-deflection and crack width control. Behavior of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of RC members for combined bending shear and torsion- use of design aids.													nly Ilar RC for	CO-2 BTL-3	
MODU	MODULE 3:LIMIT STATE DESIGN OF COLUMNS (9L+3T)														
MODULE 3:LIMIT STATE DESIGN OF COLUMNS(9L+3T)Types of columns-analysis and design of short columns for uniaxial and biaxial and bi axial bending- design of long columns- use of design aids. Design of staircases (ordinary and doglegged)													CO-3 BTL-3		
MODU	ILE 4: F	PRINC	IPLES (	OF PRESTRES	SING							(9L+3T	)		
Materi stressi Analys	als for ng anc is of si	r pre-: 1 post mply s	stresse tensic suppor	ed concrete oning- Unifo ted beams w	- Diffe rm and vith str	erent d non aight a	methc unifor and pa	ods an rm pre raboli	d syst -stress c tendo	ems - sing - ons.	intro Losse:	duction s in pr	n to pr e-stress	e- 5 -	CO-4 BTL-3
MODU	ILE 5: \	IELD	LINE T	HEORY AND	SPECI	AL STR	UCTU	RAL M	EMBE	RS		(6L+3T	.)		
Applica Design	ation o of flat	of virtu slabs	ial wor	k method to	Squar	e, Rec	tangul	ar and	Trian	gular s	slabs.				CO-5 BTL-3
SELF S	TUDY:	Comp	arison	of various co	odes o	f prac	tices ir	n the d	esign o	of con	crete s	structu	res		
TEXT B	OOKS														
1	N. Kr	ishnar	aju, ar	nd R. N.Prane	esh. (2	009). I	Reinfo	rced Co	oncret	e Desi	gn, Ne	ew Age	Interna	ational	Pvt.Ltd.
2	Vargl Limit	hese P ed, Ne	C. (20 w Del	10). <i>Limit St</i> i hi.	ate De	sign oj	f Reinf	orced	Concre	<i>ete,</i> Pr	entice	Hall of	India,	Private	Э,
3	Gam Limit	bhir. N ed <i>,</i> Ne	/I.L. (20 ew Del	011). <i>Fundan</i> hi.	nental	s of Re	einforc	ed Con	crete I	Desigr	ı. Prer	ntice Ha	all of In	dia Pri	vate
REFER	ENCE E	BOOKS	5												
1.	Subra Delhi	amani i,	an,N. (	2013). Desig	n of R	einford	ced Co	ncrete	Struct	ures, (	Oxford	l Unive	rsity Pr	ess, N	ew
2.	IS 45 New	6:2000 Delhi.	D, Code	e of practice	for Pla	ain and	l Reinf	orced	Concre	ete, Bu	ureau	of India	an Stan	dards,	
3	SP16	5, IS 45	56:200	0, Design Aic	ls for F	Reinfo	rced C	oncret	e to Bi	ureau	of Ind	ian Sta	ndards		

4	Sinha, S.N. (2014). Reinforced Concrete Design, Third Edition, Tata McGraw Hill Publishing										
t	Company Ltd., New Delhi.										
5	Punmia B.C, Ashok Kumar Jain, ArunK. Jain. (2012). R.C.C. Designs Reinforced Concrete Structures,										
	Laxmi Publications Pvt. Ltd., New Delhi, 2012										
E BOOK	S										
1	https://www.pdfdrive.net/design-of-concrete-structures-nilson-14th-edition-										
	<u>e19804731.ht%20ml</u>										
MOOC											
1	https://onlinecourses.pptel.ac.in/noc17_ce23/preview										
2	http://nptel.ac.in/courses/105105105/										

COURS		Ξ			STRU	CTURA	C		S	4					
COURS	SE COD	E	CEE	34302		C CA	OURS TEGOI	E RY		РС		L-T-P	9-S	3-1-	0-1
Ver	rsion		-	1.0		Appro	oval D	etails	241 30	th ACN	l - B	LEARN LEVI	ING EL	BTI	3
ASSESS	MENT	SCHE	ME												
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1	5%		1	.5%			10%			5%		5%		50	%
Co Descr	urse ription	To introduce the students to basic theory and concepts of structural analysis and, the modern methods of analysis of buildings.													
Course Objecti	<ol> <li>To understand the constraints in beams, frames and truss elements thus select suitable analysis method for analysis.</li> <li>To study the matrix approach for analysis of complex engineering problems which incorporates solution for unknown forces and moments</li> <li>To understand the concepts involved in Finite Element Analysis</li> <li>To study the plastic behavior of structural elements.</li> <li>To understand and infer the nature of forces in arches, cables and suspensior bridges</li> </ol>												ns		
Course Outcon	ne	U	pon co 1. Co 2. A 3. So 4. El so 5. Fo	ompleti ompar or struc nalyze olve fo aborat oftware ormula	ion of e shap ctural and c rces ir ce the e. ite stif	this co be facto elemer ompare o space concep fness r	urse, t ors for hts e matr frame ots of f natrix	he stu variou ix metl es and Finite E using I	dents s confi hods fo susper Elemer MATLA	will be guratic or anal nsion b nt Anal AB.	able t ons an ysis of ridges ysis fo	o d comp variou or applie	oute pla s struct cations	astic mol cural ele in adva	ments ments nced
Prerequ	isites:	CEB4	216- St	ructur	al Ana	alysis-I									
CO, PO	AND F	SO N	IAPPIN	G											
со	PO- 1	PO -2	PO- 3	РО- 4	PO -5	РО- 6	РО- 7	РО- 8	PO -9	PO- 10	РО -11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	1	2	3	3	-	3	-	1	-	1	-	2	3	3	-
CO-2	1	2	3	3	3	3	-	1		1	-	2	3	3	-
CO-3	1	2	3	3	3	3	-	1	-	1	-	2	3	3	-
CO-4	1	2	3	3	-	3	-	1	-	1	-	3	3	3	-

-

3

3

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3

2

1

CO-5

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1

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1

3

3

3

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1: Weakly related, 2: Moderately related and 3: Strongly related									
MODU	JLE 1: PLASTIC ANALYSIS OF STRUCTURES (9L+3T)								
Statica resista - Plasti theore <i>Self-St</i>	Illy indeterminate axial problems - Beams in pure bending - Plastic moment of nce - Plastic modulus - Shape factor - Load factor - Plastic hinge and mechanism c analysis of indeterminate beams and frames - Upper and lower bound ms udy: Shape factor for different sections of a beam	CO-1 BTL-3							
MODU	JLE 2 : FLEXIBILITY METHOD FOR INDETERMINATE FRAMES       (9L+3T)								
Equilit Indete pin-joi redunc	prium and compatibility - Determinate Vs Indeterminate structures - rminacy - Primary structure - Compatibility conditions - Analysis of indeterminate nted plane frames, continuous beams, rigid jointed plane frames (with lancy restricted to two).	CO-2 BTL-3							
MODU	ILE 3: MATRIX STIFFNESS METHOD (9L+3T)								
Eleme transfo vectors frames	Element and global stiffness matrices - Analysis of continuous beams - Co-ordinate transformations - Rotation matrix - Transformations of stiffness matrices, load vectors and displacements vectors - Analysis of pin-jointed plane frames and rigid frames. Formulation of stiffness matrix for Beams and Trusses using MAT LAB.								
MODU	ILE 4: SPACE AND CABLE STRUCTURES(9L+3T)								
Analys cables <i>Self-St</i>	is of Space trusses using method of tension coefficients – Suspension bridges- with two and three hinged stiffening girders udy: Application of cable structures and space frames in the construction industry	CO-3 BTL-3							
MODU	ILE 5: FINITE ELEMENT METHOD (9L+3T)								
Finite procec functic	element method: Introduction to FEM-Historical development – General lure of FEA-Discretisation of a structure -Displacement approach – shape ons- Beam element.	CO-4 BTL-3							
TEXT BO	DOKS								
1.	Vaidyanthan, R. and Perumal, P. (2016). <i>Comprehensive structural Analysis</i> , Vol. Publications, New Delhi.	.I& II, Laxmi							
2	S.S. Bhavikatti. (2011). <i>Structural Analysis</i> , Vol I & II, Vikas Publishing House, De	lhi,Pvt.Ltd							
3	L.S. Negi & R.S. Jangid. (2003). <i>Structural Analysis</i> , Tata McGraw-Hill Publication	s, New Delhi.							
REFER	ENCE BOOKS								
1	Ghali.A, Nebille, A.M. and Brown,T.G. (2009). <i>Structural Analysis: A unified class Approach</i> , CRC Press, 6 editions.	ical and Matrix							
2	Vazirani V.N, & Ratwani, M.M. (2008). Analysis of Structures, Khanna Publishers	, Delhi.							
3	G.S. Pandit & S.P. Gupta. (2008). Structural Analysis - A Matrix Approach, Tata N	AcGraw Hill.							

4	Devdas Menon. (2016). Structural Analysis, Narosa Publishing house, Delhi.
E BOO	KS
1	http://www.engineeringbookspdf.com/advanced-methods-of-structural-analysis/
2	http://bookslock.org/structural-analysis-2-textbook-download-in-pdf
3	https://www.kopykitab.com/Structural-Analysis-II-by-S-S-Bhavikatti
моос	
1.	http://freevideolectures.com/Course/3015/Advanced-Structural-Analysis
2.	https://pe.gatech.edu/user/login?destination=node/7781
3.	https://swayam.gov.in/course/3740-structural-analysis-i
4.	http://nptel.ac.in/courses/105106050/

	••••	CHINICAL ENGINEERII	NG	CREDITS	3							
COURSE CODE	CEB4303	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0							
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3							
ASSESSMENT S	CHEME											
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE							
15%	15%	10%	5%	5%	50%							
Course Description	This course describes the Engineering Properties of soil.											
Course Objective	<ol> <li>The course should enable the students to:         <ol> <li>Develop an understanding of the index properties of soils and the various methods of soil classification.</li> <li>Be acquainted with permeability, effective stress concepts and seepage through porous media and flow nets.</li> <li>Understand the stress distribution and types of settlement in soil.</li> <li>Gain knowledge about the compaction and consolidation theory</li> <li>Gain knowledge about the different tests carried to find out the shear strength of</li> </ol> </li> </ol>											
Course Outcome	soil.Upon completion of this course, the students will be able to1. Summarize the various types and classification of soil.2. Analyze various water flow properties.3. Explain the stresses in soil through various methods4. Describe compaction and consolidation and determine the factors affecting them5. Apply the Shear strength parameters for the different types of soil under various conditions.											

CO, PO AND PSO MAPPING															
0	РО	PO-	РО	PO-	PO-	PSO-	PSO-	PSO-							
co	-1	2	3	4	5	6	7	8	9	-10	11	12	1	2	3
CO-1	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-
CO-2	2	1	1	2	-	1	1	1	1	1	-	1	2	1	-
CO-3	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-
CO-4	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-
CO-5	2	1	1	2	-	1	1	1	1	1	-	1	2	1	-

1: Weakly related, 2: Moderately related and 3: Strongly related										
MODULE 1: IN	IDEX PROPERTIES AND CLASSIFICATION OF SOIL	9L								
Nature of Soil limits - classifi	<ul> <li>Soil - phase relation - sieve analysis - sedimentation analysis - Atterberg</li> <li>cation for engineering purposes - BIS Classification system</li> </ul>	CO-1 BTL-3								
MODULE 2: SC	DIL WATER AND WATER FLOW	9L								
Soil water - Va and effective measurement Introduction to	Soil water - Various forms - Capillary rise - Effective stress concepts in soil - Total, neutral and effective stress distribution in soil - Permeability - Darcy's Law-PermeabilityCO-2measurement in the laboratory - quick sand condition - Seepage - Laplace Equation - Introduction to flow nets-properties and uses - Simple problems.BTL-3									
MODULE 3: ST	RESS DISTRIBUTION	9L								
Stress distribution and rectangula	tion in soil media - Boussinesque formula - stress due to line load and circular ar loaded area -Use of influence charts - Westergaurd equation for point load.	CO-3 BTL-3 91								
Soil compaction - factors affecting compaction - field compaction methods and monitoring. Components of settlement - Immediate and consolidation settlement - laboratory consolidation test Normal Consolidated and Over Consolidated clavs – problems.										
MODULE 5: SH	IEAR STRENGTH	9L								
Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests - Drained and undrained behavior of clay and sand.CO-5 BTL-3										
TEXT BOOKS										
1	Punmia B.C. (2017). <i>Soil Mechanics and Foundations,</i> Laxmi Publications Pvt Delhi, 16 th Edition	. Ltd., New								
2	Gopal Ranjan and Rao A.S.R. (2006). <i>Basic and applied soil mechanics</i> , New International Publishers, New Delhi.	Age								
3	Venkatramaiah C. (2010). <i>Geotechnical Engineering</i> , New Age International New Delhi.	Publishers,								
REFERENCE BC	DOKS									
1	Coduto, D.P. (2002). Geotechnical Engineering Principles and Practices, Prer India Private Limited, New Delhi.	ntice Hall of								
2	McCarthy D.F. (2002). Essentials of Soil Mechanics and Foundations Basic Ge Prentice-Hall, New Jersey, Sixth Edition.	eotechniques,								
3	Das, B.M. (2002). Principles of Geotechnical Engineering, Thomas Books/ co	le, fifth edition.								
4	Muni Budhu. (2015). Soil Mechanics and Foundations, Wiley- Blackwell, Inc,	New York.								
E BOOKS										
1	https://www.pdfdrive.net/soil-mechanics-e15995601.html									
2	https://www.pdfdrive.net/elements-of-soil-mechanics-7th-edition-e19806	<u>140.html</u>								

моос	
1	https://onlinecourses.nptel.ac.in/noc18 ce05/preview
2	https://swayam.gov.in/course/1376-geology-and-soil-mechanics
3	https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil- %20mecha%20nics-fall-2004/

COURSE T	ITLE		TRA	NSPC	RTAT	ION E	G - I		CI	REDIT	S	3			
COURSE C	ODE	C	EB43	04		C CA	OURS TEGO	E RY		РС		L-T-P	-S	3-0-	0-0
Versio	n		1.0			Appro	proval Details			th ACN - .5.201	И 8	EARN LEVE	ING :L	BTL	3
ASSESSMENT	SCHEME														
First Period Assessme	dical ent	Second Periodical Assessment				Seminar/ Assignments/ Project			Su Tes	urprise t / Qui	a A	ttenda	ance	ES	E
15%			15%				10%			5%		5% 50			%
Course Desc	ription	This course deals with fundamental principles of highway engineering. It has three key areas covered: geometric design of highways, materials used in highway construction and traffic engineering.													
Course Obj	<ol> <li>To introduce students with the basics of highway engineering.</li> <li>To teach students how to carry out geometric design for different types of roads.</li> <li>To demonstrate to students on how to design flexible and rigid pavements.</li> <li>To make students familiar with highway materials and construction practice.</li> <li>To teach the importance of traffic characteristics.</li> </ol>														
Course Out	come	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Explain the various elements of a highway.</li> <li>2. Develop Geometric Design for highways.</li> <li>3. Design flexible and rigid pavements.</li> <li>4. Explain highway materials and construction practice.</li> <li>5. Explain traffic characteristics and signal systems</li> </ul>													
Prerequisites:	A course	on Surve	eying.												
CO, PO AND F	SO MAP	PING	Γ			T				[]		I			
со	PO-1	PO- 2	РО -3	РО -4	РО -5	РО -6	РО -7	РО -8	РО -9	РО -10	РО -11	PO -12	PSO -1	PS O-2	PS O-3
CO-1	3	2	2	1	2	2	1	2	2	2	1	1	3	3	-
CO-2	3	3	3	1	2	2	1	2	2	2	1	1	3	3	-
CO-3	3	3	3	1	2	2	1	2	2	2	1	1	3	3	-
CO-4	3	3	3	1	2	2	1	2	2	2	1	2	3	3	-
CO-5	3	3	2	1	2	2	1	2	2	2	1	1	3	3	-
	1:	Weakly	relate	ed, 2:	Mode	rately	relat	ed an	d 3: St	rongl	y rela	ted			

MODULE 1: HIGHWAY ALIGNMENT (9L)										
Classifi Highwa Metho of Way of diffe	cation of Urban and Rural roads Requirements of Ideal Alignment, Factors Controlling ay Alignment, Engineering Surveys for Alignment - Conventional Methods and Modern ds (Remote Sensing, GIS and GPS techniques), Highway Cross Sectional Elements - Right , Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards], Cross sections erent Class of Roads.	CO-1 BTL-3								
MODULE 2: GEOMETRIC DESIGN OF HIGHWAYS (9L)										
Design of Horizontal Alignments –Sight Distances – Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD], Super elevation, Design Speed, Radius of horizontal curve, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves, Geometric Design of Hill Roads [IRC Standards Only]										
MODU	LE 3: DESIGN OF FLEXIBLE AND RIGID PAVEMENTS AND MATERIALS (9L)									
Types of pavements-pavement components and their roles, Design factors, Design practice for flexible and rigid pavements (IRC methods only). Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil - California Bearing Ratio Test, Field Density Test. Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening Point Tests. Aggregate test – Impact test, abrasion test, Crushing test, Flakiness and elongation test. Practical: Penetration test, Ductility test, Viscosity test, softening point, Flakiness and elongation test, Crushing test, CBR test.										
MODU	LE 4: HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE (9L)									
Desiral Highwa Aggreg indices conten Bitumi Draina	ble Properties and Testing of Highway Materials: - (Tests have to be demonstrated in ay Engineering Laboratory) Soil - California Bearing Ratio Test, Field Density Test; gate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation and Stone polishing value test Bitumen - Penetration, Ductility, Viscosity, Binder and Softening point Tests. Construction Practice - Water Bound Macadam Road, nous Road and Cement Concrete Road [as per IRC and MORTH specifications] Highway ge [IRC Recommendations]	CO-4 BTL-3								
MODU	LE 5: TRAFFIC ENGINEERING (9L)									
Traffic delay- relation Grade,	Characteristics, Traffic Studies – Volume study, Speed studies-spot speed, speed and OD studies, Traffic flow characteristics on flow, Capacity studies-PCU, Fundamental nships Control devices- Traffic Signs and signals (Webster's method), Intersection, At Channelized, Rotary, Grade Separator.	CO-5 BTL-3								
TEXT B	OOKS									
1	Khanna K, Justo C E G Justo and Veeraraghavan, A. (2014). <i>Highway Engineering</i> , Khan Publishers, Roorkee.	na								
2	Alok Kumar Goel. (2016). Highway Engineering, S.K Kataria& Sons.									
3	Kadiyali L R. (2011). Traffic Engineering and Transport Planning, Khanna publishers.									
4	Dr. Purushothama Raj. (2013). <i>Railways, Airports and Harbour Engineering</i> , Sri Krishna Publishing Company Pvt. Ltd.	Hitech								

5	Saxena Subhash C and Satyapal Arora. (2011). <i>A Course in Railway Engineering</i> , Dhanpat Rai and Sons, Delhi.
REFERE	
1.	Kadiyali L R & N.B. Lal. (2011). Principles and Practice of Highway Engineering, Khanna Publishers.
2.	Rangwala, (2009). Airport Engineering, Charotar Publishing House.
3.	Oza and Oza. (2012). A course in Docks & Harbour Engineering, Charotar Publishing House.
4.	Bureau of Indian Standards (BIS) Publications on Highway Materials.
E BOOK	S
1	https://www.pdfdrive.net/ism-for-transportation-engineering-an-introduction-e19463916.html
моос	
1	https://cee.illinois.edu/academics/graduate-programs/cee-online-program/cee-online-
1	<u>%20transportation-engineering</u>
2	https://www.mastersportal.com/studies/161540/transportation.html
2	

	COUR	SE TITL	E	(	CONSTRUCTION MANAGEMENT									3		
	COUF	RSE COE	DE	CEB43	05	CA	COURS	SE RY		DE		L-T-P-	s	3-0-0	)-1	
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ASSES	SSMEN ⁻	T SCHE	ME													
First	t Period	ical Asse	essment	Secon Periodi Assessi nt	Second Periodical Assessme ntSeminar/ Assignments/ ProjectSurprise Test / Quiz				z At	Attendance		ESI	E			
	:	15%		15%	5		10%			5%		5%		50%	%	
	Course	Descrip	tion	Learn t system to mate industr	Learn the functions of management, network planning techniques, contract system & accounting procedures in government, organization& groom them to match to the requirements of employer expectation in construction industry.											
	Course	Object	The col 1. 2. 3. 4. 5.	<ul> <li>The course should enable the students to <ol> <li>Understand the functions of management and various organizational structures.</li> <li>Understand the construction planning, resource planning and various labour legislations</li> <li>Understand the concept of network planning methods and principles of cost control</li> <li>Study the concept of tender and contracts and impart idea about quality control and safety requirements</li> <li>Know various accounting procedures adopted in government</li> </ol> </li> </ul>												
	Course	e Outco	me	Upon c 1. 2. 3. 4. 5.	<ul> <li>Upon completion of this course, the students will be able to <ol> <li>Explain the functions, importance of management and classify various organizational structures.</li> <li>Plan for the resources and labor requirement</li> <li>Prepare construction schedules by network analysis and gain a wide knowledge of cost control.</li> <li>Organize the contract documents and execute construction project works with the practice of quality control.</li> <li>Control of work measurement, payment of bills</li> </ol> </li> </ul>											
Prerec	quisites	: Nil														
CO, P	O AND	PSO M	APPING													
CO	PO- 1	РО- 2	PO-3	РО- 4	РО- 5	PO -6	PO -7	PO -8	PO -9	PO- 10	PO- 11	PO -12	PSO- 1	PSO -2	PSO -3	
CO-1	-	-	-	-	-	2	-	2	2	-	3	3	-	3	3	

CO-2	1	-	2	1	1	2	1	2	2	-	3	3	2	3	3
CO-3	2	2	1	2	2	2	-	1	3	-	2	3	2	1	3
CO-4	1	2	1	2	2	2	1	2	3	2	3	3	2	3	3
CO-5	1	1	1	1	1	2	-	2	2	2	3	3	-	3	3
			1: Wea	akly relate	d, 2: M	odera	tely r	elatec	l and 3	: Stron	gly rel	ated			
MOD	ULE 1: I	PRINCIP	LES OF	MANAGE	MENT				(9)						
Defini	tion –	Science	or art	-principles	of scie	entific	mana	ageme	nt- im	portan	ce – fi	unctio	n of		
mana	gement	: – ma	nageme	ent levels-	- planr	ning,	nature	e and	purp	ose- ty	vpes a	nd st	eps-	CO-	1
organ	isation,	definiti	ion and	need-char	acteris	tics- t	ypes, j	princip	oles an	id chart	s-orga	nisatio	onal	BTL-	2
struct	ure of o	construc	ction de	partments	•										
MODU	JLE 2:	CIVIL	ENGIN	EERING M	ANAGE	MEN	Г					(9	9)		
Cons	tructio	n Plann	ing: Co	llection of	field (	data -	- preli	iminar	y esti	mates ·	– appr 	oval a	and		
sanct	ion of	estimat	es – bu	idget prov	ision –	cons	tructio	on sta	ges –	schedu	ling m	ethod	s –	~~~	-
progr	ess re	oorts ai	nd char	ts Resour	ce Plar	ining:	Plann	ning to	or mai	terials,	machi	nes, a	and	CO-	2
organ	isation	- reso	Jurce a	nroblon		and	Lapo	ur vve		Relatio	nsnip Mag		en	BIL	-3
settle	ment o	nf disnu	tes – ind	– problen dustrial nsv		ω υ	Legisi		5 - 101	mmun	i vvag	es Au	. –		
MODL	JLE 3: S			ND COST C		). )L						(9	ə)		
Scheduling definition-preparation classification construction schedule methods															
devel	opmen	it of n	etwork	analysis,	advant	ages-	Cond	cept a	and pr	rocedur	e CPN	Л/PER	T –	CO-	3
princ	iples of	cost co	ntrol –	control by	graphi	cal rep	oreser	ntatior	n, by b	ill of qu	antitie	s and	by	BTL	-3
netw	ork ana	lysis											(0)		
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b) Co	ontract	s: Contr	act syst	em – type	s of coi	ntract	s – spe	ecifica	tions.	docum	ents.				
proce	edures,	conditio	on, taxe	es, law of c	ontract	ors ar	nd lega	al imp	licatio	ns are p	enalti	es.		CO-	4
c) Te	nder ai	nd Tend	er Doci	uments:		Defin	ition –	- callir	ig for t	enders	– tend	ler		BTL-	3
docu	ments -	- submi	ssion	of tende	rs	— р	roces	sing	of ter	nders	_				
nego	tiations	contra	cts-agre	ement be	tween	the ov	vner a	nd th	e conti	ractor					
d) Qu	ality Co	ontrol: (	Quality	of materia	ls – role	e of sit	te eng	ineer-	work	manshi	р				
MODU	JLE 5: A	CCOUN	ITS AND	STORES								(9)			
Meas	uremer	nts of w	ork – re	ecording –	checkiı	ng — ty	/pes o	of bills	– moc	de of pa	yment	t – bu	dget		
estima	ate – r	evised e	estimat	es – comp	letion	of rep	orts a	and ce	ertifica	ites – c	laims	– ban	king		_
settlement – types of accounts – drawls and transfer classifications of transactions – ledger								dger	CO-	5					
accounts – interest account – cash book. Suspense classification – storing – maintenance								ance	BTL	3					
inspec	tion – i	nvento	ries – tr	anster of s	urplus a	and ac	count	ing of	shorta	age stor	es – pi	ocedu	ures		
adopt		wv.D. ar		V.U.	in D:L-	linger	nd D-	ad	arke						
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2.	Saurabh K Son	aurabh K Soni. (2016). Construction Management and Equipment, S.K. Kataria& Sons.								
3.	Sengupta. (200	02). Construction Management, Tata McGraw Hill.								
4.	J.L. Sharma. (2	002). Construction Management and accounts, Satya Publications.								
5.	D. Lal. (2017).	Construction Management and P.W.D. Accounts, S.K. Kataria& Sons								
REFERENCE B	BOOKS									
1.	1. Kumar NeerajJha. (2016). <i>Construction Project Management -Theory and Practice</i> , Pearson publications, 2nd edition.									
2.	2. Jimmie Hinze. (2013). <i>Construction Contracts</i> , McGraw hill education, 2013									
3.	3. Joseph T. Bockreth. (2013). <i>Contracts and Legal environment</i> , McGraw hill education, 2013									
4.	C.P.W.D Manuals									
5.	Public Works	Accounts Code, PWD, Tamilnadu								
E BOOKS										
	1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20man agement								
	2.	https://www.scribd.com/search?content_type=tops&page=1&query=constr% 20uction%20%20management								
моос										
]	1.	http://www.nptel.ac.in/courses/10510309								
	2.	https://onlinecourses.nptel.ac.in/noc18_ce15/preview_								

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ASSES	SSMEN	T SCHI	EME												
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Ca Desa	ourse cription	T C	his cou onstru	urse pr ction n	ovide nateri	s pract als. It ii	ical ex nclude	perien s testii	ce for ng of b	studen itumer	ts in ta 1, aggr	esting tl egates	ne quali and soil	ty of hig	;hway
Course1. To conduct tests to check suitability of given particularCourse2. To know and identify tests suitable for any a particularObjective3. To get familiar with field or in-situ tests4. To demonstrate how to conduct laboratory-bar										pavem pavem pased t	ient ma ient :ests.	terial			
Cours Outco	se ome		<ol> <li>Upon completion of this course, the students will be able to</li> <li>Assess the quality of various pavement materials and their suitability in highway construction</li> <li>Identify suitable tests for any given pavement construction material.</li> <li>Conduct field or in-situ tests on highway materials.</li> <li>Conduct laboratory-based tests on highway materials.</li> </ol>												
Prerec	quisites	: Tran	sporta	tion Er	iginee	ering –									
СО, Р	O AND	PSO N	ΛΑΡΡΙΙ	NG						I					
со	PO-	PO- 2	PO-	PO-	РО- Б	PO-	PO-	PO-	PO-	PO- 10	PO- 11	PO-	PSO-	PSO-	PSO-
CO-1	2	2	1	1	3	3	1	2	1	10	1	2	2	3	-
CO-2	2	2	1	1	3	3	1	2	1	1	1	2	2	3	
CO-3	2	2	1	1	3	3	1	2	1	1	1	2	2	3	_
CO-4	CO-4         2         2         1         1         3         3         1         2         1         1         1         2         2         3									-					
	1: Weakly related, 2: Moderately related and 3: Strongly related														
	LIST OF EXPERIMENTS														
1	1 Aggregate crushing value														
2	2 Aggregate impact value														
3	Los Ar	ngeles	abrasi	on valı	le										
4	Shape	tests-	Flakin	ess ind	ex an	d Elong	gation i	index							
5	Angularity of coarse aggregates and fine aggregates														

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6	Specific gravity and water absorption of coarse aggregate								
7	California Bearing Ratio test (Soaked and Un-soaked CBR)								
8	Dynamic cone penetration test (ASTM D6951 (2015) procedure)								
9	Penetration value of bitumen								
10	Softening point of bitumen								
11	Ductility of bitumen								
12	Flash and Fire point of bitumen								
13	Determination of theoretical specific gravity of loose mix and bulk specific gravity of compacted mix								
	(ASTM D2041, ASTM D1188)								
	LIST OF EQUIPMENTS (For a batch of 30 students)								
1	Aggregate crushing machine								
2	Los Angeles abrasion								
3	Penetration value of bitumen								
4	Softening point of bitumen								
5	Ductility of bitumen								
6	California bearing ratio test								
7	Specific gravity test								
8	Heating equipment								
9	Measuring equipment (pycnometer etc)								

COUF	RSE TIT	LE		GEO	TECHN	NICAL E	NGINE	ERING	LAB		CRE	DITS		1		
CC C	DURSE CODE		CE	B4332		C CA	OURSE	E RY		PC	Ŀ	T-P-S		0-0-2-0	)	
V	ersion			1.0		Appro	oval De	etails	24th 30.5	ACM - 5.2018	LEA	RNING EVEL		BTL-3		
ASSE	SSMEN	IT SCH	IEME													
				CIA								ESE				
			5	80%					20%							
C Des	ourse criptio	n (	Geotec haract	hnical l eristics	aborat experi	ory de imenta	al with lly.	testin	g of dif	ferent	types (	of soils a	and to d	etermin	ie its	
<ol> <li>To acquire knowledge on Grain size distribution of soils</li> <li>To acquire knowledge on determine the characteristics of various soils.</li> <li>To acquire knowledge on conducting tests on shear strength parameters of</li> <li>To acquire knowledge on preparing the Soil Investigation report</li> <li>To acquire knowledge on to Prepare the Field test report on Geotechnical in studies</li> </ol>											s of the s	Soil gation				
C Ou	ourse tcome		Upo L. Dete 2. Dese 3. Find 4. Expl 5. Prep	on comp ermine cribe and l the sh lain and pare th	pletion the gr nd det lear str d prepa e Field	of this ain size ermine ength are the test re	course e distrik the ch parame Soil In port o	e, the soution. aracte eters o vestigan	ristics f the S ation re	ts will b of varic oil eport al inves	e able ous soi stigatic	to ls. on studi	es			
Prere	quisite	s: Geo	Techn	ical En	gineeri	ng										
CO, P	O AND	PSO	MAPPI	NG												
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO-1	2	1	-	-	-	-	-	-	-	-	-	-	1	2	-	
CO-2	2	1	-	-	-	-	-	-	-	-	-	-	1	2	-	
CO-3	2	1	-	-	-	-	-	-	-	-	-	-	1	2	-	
CO-4	2												-			
CO-5	2	Т	-	-	-					-	-	-		2	-	
1: Weakly related, 2: Moderately related and 3: Strongly related																
1	LIST OF EXPERIIVIENTS															
2	2 Specific gravity of soil															

3	Relative density of sands									
4	Determination of Atterberg limits									
5	Moisture – density relationship using standard Proctor test.									
6	Permeability of soil									
7	Direct shear test on cohesion less soil									
8	Unconfined compression test on cohesive soil									
9	Triaxial compression test									
10	Determination of co-efficient of consolidation									
11	Field density test									
	LIST OF EQUIPMENTS (For a batch of 30 students)									
1.	Sieve shaker									
2	Pycnometer									
3	Core cutter									
4	Liquid limit apparatus									
5	Electrical oven									
6	Constant head Permeameter									
7	Falling head permeameter									
8	Direct shear test									
9	UCC testing machine									
10	Triaxial shear apparatus									
REFE	RENCE BOOKS									
1	IS: 4198 -1970, Classification and Identification of soils for general Engineering purposes.									
2	IS:2720 –Methods of test for soils									

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Vei	rsion		1	.0		Appr	oval D	etails	24t 30.	h ACM 5.2018	- 3	LEARN LEVI	ING El	BT	L-5		
ASSES	MENT	PATTE	RN														
	First R	eview		Seco	nd Rev	view		Thir	d Revi	ew		Project Report &					
	(CI	A)			(CIA)				(CIA)				Viva (Cl	A)			
	20				20			3	0				30				
Co Desci	urse ription	To de te	o pro evelop chnica	vide ment al skill	suffici and a sets in	ent h inalys n the c	ands-o is of s chosen	on lea uitable field.	rning e proc	expe luct /	rience proc	e relat ess so	ed to as to	the de	esign, e the		
Co Obje	<ol> <li>To enable the students to apply the theoretical knowledge in practice</li> <li>To enable them to plan and organize a small Civil Engineering project and write a report on the work</li> <li>To improve the level of confidence in presenting the civil engineering concepts.</li> </ol>																
Co Outo	urse come	Up	on cor 1. Fe 2. P 3. C th 4. Sv 5. E	mpletio ormula erform onduc ne resu ynthes Docum	on of t ate spe h litera t exper ilts. ize the ent the	his con ecific p ture so riment e resul e resul	urse, th roblem earch in ts / Des ts and lts in th	ne stud n state n the a sign an arrive a ne form	ents w ments rea of d Anal at sciel n of teo	vill be a for rea intere ysis / s ntific c chnical	able to al life p st. olutio onclus repoi	o problen on itera sions / rt / pres	ns tions ar produc sentatio	nd docu ts / solu on	ment tion		
Prereq	quisites	: Knov	vledge	e on Ba	asic Co	re Cou	irses										
СО, Р	O AND	PSO N	ΙΑΡΡΙ	NG													
	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-		
CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO-1	-	3	2	2	-	1	1	-	3	3	1	3	2	3	3		
CO-2	2	3	2	3	3	2	3	2	3	2	1	3	2	3	3		
CO-3	2	3	2	3	3	2	3	2	3	2	1	3	2	3	3		
CO-4	2	3	3	3	3	2	3	2	3	2	1	3	2	3	3		
CO-5       2       3       3       2       2       2       2       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3																	
			1: We	akly re	elated,	2: Mo	oderate	ely rela	ited ar	nd 3: St	rongl	y relate	ed				

LIST OF EXPERIMENTS

#### **B.TECH – CIVIL ENGINEERING**

In this project each group consisting of four/five members is expected to design and develop practical solutions to real life problems related to Industry and Civil Engineering research. Software usage should be followed during the development. The theoretical knowledge gained from the subject should be applied to develop effective solutions to various computing problems. At the end of the course the group should submit a complete report of the project work carried out.

COURSE TITLE	OPTI	MIZATION TECHNIQU	ES	CREDITS	4						
COURSE CODE	MAA 4301	COURSE CATEGORY	BS	L-T-P-S	3-1-0-0						
Version	1.0	Approval Details	24 th ACM, 30.5.2018	LEARNING LEVEL	BTL-4						
ASSESSMENT SCH	HEME										
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE						
15%	15%	10%	5%	5%	50%						
Course Description	To make the student develop a knowledge in the field of optimization techniques ,basic concepts, principles of linear and integer programming, assignment and transportation problems										
Course Objectives	<ol> <li>To understand</li> <li>To formulate lind</li> <li>To understand</li> <li>To understand</li> <li>To understand</li> <li>To understand</li> </ol>	the concept of optimit near programming mo the concept of integer the assignment and tr the concept of networ	zation del programming ansportation pro rk analysis	oblem							
Course Outcomes	<ul> <li>5. To understand the concept of network analysis</li> <li>Upon completion of this course, the students will be able to</li> <li>1. Formulate mathematical model</li> <li>2. Cast engineering maxima/minima problems into optimization framework.</li> <li>3. Solve the integer programming problems</li> <li>4. Solve the assignment and transportation problems</li> <li>5. Analyze the designs of networks</li> </ul>										
Prerequisites:											
CO. PO AND PSO	MAPPING										

/	-		_												
60	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO	PSO	PSO
CO	1	2	3	4	5	6	7	8	9	10	11	12	-1	-2	-3
CO-1	1	-	1	-	1	1	-	-	-	-	-	I	2	1	-
CO-2	3	-	1	-	-	1	-	-	-	-	-	I	1	1	-
CO-3	2	-	-	-	1	1	-	-	-	-	-	-	2	2	-
CO-4	3	-	1	-	1	1	-	-	-	-	-	-	1	1	-
CO-5	2	-	3	-	-	1	-	-	-	-	-	-	2	1	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														

MODULE 1: I	NTRODUCTION TO OPTIMIZATION (9L+3T=12)	-					
Introduction Introduction a Suggested Rea	to operations research – objective – scope of OR – Limitations of OR – and formulation of linear programming – Solving LPP using Graphical method. ading: Basics of inequalities	CO-1 BTL-2					
MODULE 2: L	INEAR PROGRAMMMING PROBLEM (9L+3T=12)						
Solving LPP us to dual. Suggested Rea	ing simple method – Big-M method – Two phase method – conversion of primal ading: System of equations	CO-2 BTL-3					
MODULE 3: I	NTEGER PROGRAMMING (9L+3T=12)						
Integer programming – Cutting plane method – Gomory's Mixed integer method – Branch and Bound method Suggested Reading: System of equations							
MODULE 4: A	ASSIGNMENT AND TRANSPORTATION PROBLEM (9L+3T=12)						
Hungarian M solution of Transportatio Suggested Re	lethod – Maximization and unbalanced assignment problem – Basic feasible transportation problem – Modi method – Degeneracy – Unbalanced on problem. eading: Arithmetic Calculation	CO-3 BTL-4					
MODULE 5: F	PERT AND CPM (9L+3T=12)						
Network diag probabilities Suggested Re	gram – Representation – Labeling – CPM – PERT probabilities of CPM – PERT of project duration. eading: Basics of graphs	CO-4 BTL-4					
TEXT BOOKS							
1.	Chandrasekaran A. (2017). A Textbook of Operation Research", Dhanam Public	ations, Chennai.					
2.	V. Sundaresan, K. S. Ganapathy Subramanian, K. Ganesan. (2014). <i>Resource Mo</i> <i>Techniques</i> , A. R. Publications.	anagement					
3.	S. D. Sharma. (2012). Operation Research, Kedarnath Ramnath & Co.						
<b>REFERENCE B</b>	OOKS						
1.	Hamdy A. Taha. (2010). <i>Operations Research: An Introduction,</i> Prentice Hall, 9 th	^h edition.					
2.	D S Hira & Prem Kumar Gupta. (2012). <i>Introduction to Operations Research,</i> S. Publishing	Chand					
E BOOKS							
1.	http://nptel.ac.in/courses/112106134/1						
2.	https://onlinecourses.nptel.ac.in/noc17 mg10/preview						
MOOC							
1.	https://www.edx.org/course/operations-management-iimbx-om101-1x						

COUR	RSE TIT	LE		DE	SIGN O	CR	EDITS			4					
COU	RSE CO	DE	CEB431	L <b>6</b>	COU	RSE C/	ATEGOF	RY		РС		L-T-	·P-S	3-	1-0-1
V	ersion		1.0		Ар	proval	Details	5	24th 30.5	ACM - .2018	LE	ARNIN	IG LEVE	LB	TL-3
ASSES	SSMEN ⁻	<b>SCHE</b>	ME												
First Asso	Periodio essmen	cal t	Secono Periodic Assessmo	d al ent	Semir	nar/ Ass Proje	signmen ect	its/	Surpri Q	se Test / luiz	,	Atten	dance		ESE
	15%		15% 10% 5% 5%									5	50%		
C Des	course criptio	n C	his course urrent coo	e deal de of p	s with th practice	ne limi	t state o	desigr	of stee	el struct	ural co	ompoi	nents as	s per th	ie
C Ob	Course Djective		<ol> <li>To get con con</li> <li>To let ten</li> <li>To let con</li> <li>To let con<td>gain k nectio be fan sion. under npress be fan nding. acqua oletior sign th</td><td>nowledg ons. niliar wi stand th sion. niliar wi inted wi n of this ine conne</td><td>ge in the th the ne desi, th the th the course ections</td><td>design gn conc design design ce, the st</td><td>state conce conce conce conce cuden</td><td>design pts of s of the s pts of s pts of th ts will b structu</td><td>of steel teel stru tructura tructura ne comp ne able t ural mer</td><td>struct uctura al stee al mer bonent co mbers</td><td>ures a l mem l mem nbers ts of in using</td><td>and the obers su bers su subject odustria bolts ar</td><td>design bjected bjected ed to I struct</td><td>of d to d to ures.</td></li></ol>	gain k nectio be fan sion. under npress be fan nding. acqua oletior sign th	nowledg ons. niliar wi stand th sion. niliar wi inted wi n of this ine conne	ge in the th the ne desi, th the th the course ections	design gn conc design design ce, the st	state conce conce conce conce cuden	design pts of s of the s pts of s pts of th ts will b structu	of steel teel stru tructura tructura ne comp ne able t ural mer	struct uctura al stee al mer bonent co mbers	ures a l mem l mem nbers ts of in using	and the obers su bers su subject odustria bolts ar	design bjected bjected ed to I struct	of d to d to ures.
Ou	itcome		<ol> <li>Design the structural members subjected to tension.</li> <li>Design single and compound compression members.</li> <li>Design laterally supported and unsupported beams.</li> <li>Design the components of industrial structures.</li> </ol>												
Prerec	quisites	: Struc	tural Ana	lysis, /	Advance	ed stru	ctural a	nalys	is			-			
CO, P	O AND	PSO N	IAPPING												
со	PO - 1	РО- 2	PO- 3	РО -4	PO-5	РО- 6	РО- 7	PO -8	РО- 9	PO - 10	PO- 11	PO -12	PSO -1	PSO -2	PS O-3
CO-1	1	2	3	3	1	3	1	3	1	2	1	3	2	3	-
CO-2	1	2	3	3	1	3	1	3	1	2	1	3	2	3	-
CO-3	1	2	3	3	1	3	1	3	1	2	1	3	2	3	-
CO-4	1	2	3	3	1	3	1	3	1	2	1	3	2	3	-
CO-5	CO-5       1       2       3       3       1       3       1       2       1       3       2       3       -														
1: Weakly related, 2: Moderately related and 3: Strongly related															
MOD	ULE 1: I	NTRO	DUCTION									(12L+	·3T)		

Properties of steel - Structural steel sections - Limit State Design Concepts - Loads on Structures - Metal joining methods using welding, bolting - Design of bolted, and welded joints - Eccentric connections - Efficiency of joints - High Tension bolts										
MODULE 2 : TENSION ME	MBERS (9L+3T)									
Types of sections - Net are connections in tension me lag	ea - Net effective sections for angles and Tee in tension - Design of embers - Use of lug angles - Design of tension splice - Concept of shear	CO-2 BTL-3								
MODULE 3: COMPRESSIO	N MEMBERS (9L+3T)									
Types of compression r compression member de compression members -	members - Theory of columns - Basis of current codal provision for sign - Slenderness ratio - Design of single section and compound section Design of lacing and battening type columns- Built up columns.	CO-3 BTL-3								
MODULE 4: BEAMS (9L+3T)										
Design of laterally supported and unsupported beams – Built up beams., Design of Plate Girder										
MODULE 5: ROOF STRUCT	FURES AND INDUSTRIAL STRUCTURES       (6L+3T)									
Roof trusses - Roof and s end bearing– Introductio	side coverings - Design loads, design of purlin and elements of truss; on to pre-engineered buildings.	CO-5 BTL-3								
Self-study Topic: Pre-engi	neered buildings.									
TEXT BOOKS										
1	N.Subramanian. (2011). <i>Design of Steel Structures</i> , Oxford University pre	ess.								
2	S.K.Duggal. (2010). <i>Limit State Design of Steel Structures,</i> Tata McGrraw Education Pvt. Ltd.	Hill								
REFERENCE BOOKS										
1	Teaching Resources for Structural Steel Design - Vol. I & II", INSDAG, Kol	katta.								
2	Dr.Ramachandra, Virendra Gehlot. (2010). Limit State Design of Steel St Scientific Publishers, New Delhi.	ructures,								
3	Dr. V.L. Shah, S.S. Karve. (2009). <i>Limit State Design of Steel Structures</i> , S Publications.	tructures								
E BOOKS	1									
1	https://www.pdfdrive.net/design-of-steel-structures-e38351494.html									
2	https://www.pdfdrive.com/search?q=steel+structures&pagecount=&pu earchin=&em	ibyear=&s								
моос										
1	https://en.learncafe.com/courses/steel-structural-design									
2	https://onlinecourses.nptel.ac.in/noc17_ce21									
3	https://www.udemy.com/structural-steel-design/									

COURSE	TITLE		HYDRAULIC ENGINEERING							C	CREDITS		4	ļ	
COUI COE	RSE DE	CEB4203				COURSE CATEGORY			PC		L-T-P	P-S	<b>3-1</b> -	-0-0	
Version		1.0			Δ	Approval Details			24th ACM - 30.5.202	18	LEARNING LEVEL		BT	L-3	
ASSESSMENT SCHEME															
First Per Assessi	iodical ment	Second Periodical Assessment			nt	Seminar/ Assignments/ Project			Surpris Test / Qu	e uiz	Attend	ance	ES	SE .	
159	%	15%					10%			5%		5%	5	50%	
Cou Descrip	rse otion	This course introduces the students to the basic concepts of open channel flow and describes the type of flow. The working principles of pumps and turbines are also introduced.													
Course Objective		<ol> <li>To understand the principles behind open channel flow.</li> <li>To differentiate between uniform and non- uniform flow.</li> <li>To study the impulse momentum principle.</li> <li>To study the design concepts of turbines.</li> <li>To be familiar with the design the concepts of pumps</li> </ol>													
Course Outcome		<ul> <li>Upon completion of this course, the students will be able to <ol> <li>Demonstrate the types of Open channel flow</li> <li>Identify uniform and non-uniform flows and determine the most Economical sections</li> <li>Analyze the force exerted by a jet of water on various plates using impulse momentum principle</li> <li>Apply the concept of impulse momentum principle on turbines to design and select turbines.</li> <li>Apply the concept of impulse momentum principle on pumps to design and select Pumps</li> </ol> </li> </ul>													
Prerequi	Prerequisites: CEB4203- Mechanics of Fluids														
CO, PO /				PO	PO	PO	DO	PO	DO	DO	DO	DO	DCO	DC	DC
СО	1	2	3	4	-5	6	-7	8	-9	10	-11	-12	-1	0-2	-3 0-3
CO-1	1	2	2	3	-	3	2	1	1	1	-	2	3	2	-
CO-2	1	2	2	3	-	3	2	1	1	1	-	2	3	2	-
CO-3	1	2	2	3	1	3	2	1	1	1	-	2	3	2	-
CO-4	1	2	2	3	1	3	2	1	1	1	-	2	3	2	-
CO-5	1	2	2	3	-	3	2	1	1	1	-	2	3	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related															

MODU	JLE 1: OPEN CHANNEL FLOW	(9L+3T)													
Open	Open channel flow – Types of flow – Velocity distribution in open channel – Wide open														
channel –Specific energy – Critical flow and its computation.															
MODULE 2: UNIFORM AND NON UNIFORM FLOW (															
Unifor	iform flow – Velocity measurement – Manning's and Chezy's formula – Determination of														
roughness coefficients – Most economical rectangular and trapezoidal sections- Hydraulic															
Jumps															
MODULE 3 :IMPULSE MOMENTUM PRINCIPLE															
Application of momentum principle – Introduction to impact of jets on vanes – velocity															
triangles.															
MODULE 5: PUMPS															
Centrifugal pump – multistage Pumps – Jet and submersible pumps – reciprocating pump –															
negati	negative slip – flow separation conditions – air vessels –indicator diagram.														
MODULE 5: TURBINES															
Impulse Turbine-pelton wheel- Reaction Turbines- Francis Turbine- Kaplan Turbine-															
Characteristics curves															
TEXT BOOKS															
1.	Subramanyam K. (2015). Flow in Open channels, Tata McGraw-Hill Publishing Compar	ny.													
2	P.N.Modi, S.M.Seth. (2005). <i>Hydraulics and Fluid Mechanics</i> , 12 th Edition.														
3	R.K. Bansal. (2016). <i>Fluid Mechanics and Hydraulic Machines</i> , Laxmi Publication (P) Publishing House (P) Ltd, 9 th Edition.														
4	Subramanyam K, (2015). Flow in Open channels, Tata McGraw-Hill Publishing Company.														
REFERENCE BOOKS															
1	Ven Te Chow. (2009). Open-Channel Hydraulics, The Blackburn Press.														
2	John A. Roberson. (2013). Hydraulic Engineering, John Wiley &Sons, Incorporated.														
E BOOKS															
1	http://www.engineeringbookspdf.com/civil-engineering-hydraulics-3rd-edition/														
2	http://www.engineeringbookspdf.com/hydraulics-in-civil-and-environmental-engineering-third-edition-by- andrew-chadwick-and-john-morfett/														
моос															
1	https://www.coursera.org/learn/fluid-power														
2	https://www.class-central.com/course/nptel-fluid-machines-6562														
COURS	SE TITL	.E		PROFE	SSION	AL ETH		ND LIFE	SKILL	5	С	REDITS	;	2	
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CO CC	URSE DDE		GE/	4316		C CA	OURSI TEGOF	E RY		BS		L-T-P	P-S	2-0-	0-1
Ve	rsion			1.0		Appro	oval De	etails	24t 30	h ACM	- 3	LEARN LEVI	ING EL	BTI	3
ASSES	SMEN	T SCH	EME												
First P Asses	eriodic ssment	al	Second Asse	Period ssment	ical	So Assi I	eminar, ignmen Project	/ its/	Surp	rise Tes Quiz	st /	Attend	ance	ES	E
1	5%		15%         10%         5%         50%												
Co Desc	urse ription	TI po ac	his course covers concepts related to professional ethics and life skills. It includes both ersonal and professional aspects. It also includes several aspects of life skills that can dd value into one's life significantly.												
Co Obje	urse ective		<ol> <li>To</li> <li>To</li> <li>To</li> <li>To</li> <li>To</li> <li>To</li> <li>To</li> </ol>	o intro o expla o elabo o intro o expla	duce v ain theo orate o duce b ain abo	alue sy ories al n the r asic life ut socia	stems bout lif ights a e skills al sens	that m e and r persor e and r	ake hu moral ( n can h respon	manity dilemm ave in sibilitie	y to thi nas. his em es for c	rive. iploym commu	ent nal harr	nony.	
Co Out	urse come	U	pon cor 1. E: 2. A 3. E: 4. A 5. E:	mpletic xplain pply th xplain pply ba xplain	on of th human heories how sa asic life the imp	nis cour value about fety an skills l portanc	rse, the system moral id right earned ce of so	e stude ns. dilemn ts are c d in bot ocial se	nts wi nas in l ritical ch life a nse an	ll be ak life. in a pro and pro d resp	ole to ofessio ofessio onsibil	n. n. ities.			
Prereq	uisites	: Nil													
CO, PO	) AND	PSO N	MAPPIN	IG											
со	PO- 1	PO- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	PO- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	1	2	1	2	1	2	2	3	2	1	1	2	2	3	3
CO-2	1	2	1	2	1	2	2	3	2	2	2	2	2	3	3
CO-3	1	2	1	2	1	3	2	3	2	2	2	1	2	3	3
CO-4	1	2	1	2	1	2	2	3	2	2	2	2	2	3	3
CO-5	1	2	1	2	1	2	2	3	2	2	2	2	2	3	3
			1: We	eakly ro	elated,	2: Mo	derate	ly relat	ted an	d 3: St	rongly	related	d		

MODULE 1: HU	JMAN VALUES (9L)	
Definition of E Virtue-Respec Commitment- meditation for Discovery failu	thics-Morals values and ethics – Integrity-Work ethics- Service Learning-Civic t for Others-Caring-Sharing-Honesty-Courage-Valuing Time-Cooperation- Empathy-Self-Confidence-Character-Spirituality-Introduction to Yoga and r professional excellence and stress management. Self-Study: Case study of ire.	CO-1 BTL-3
MODULE 2: EN	IGINEERING ETHICS (9L)	
Senses of 'Eng – Moral Autor Models of pro Religion – Use	ineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas nomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – ofessional roles - Theories about right action – Self-interest – Customs and s of Ethical Theories. Self-study: Study the Bhopal gas tragedy.	CO-2 BTL-3
MODULE 3: SA	AFETY, REPONSIBILITIES AND RIGHTS (9L)	
Safety and Ris Respect for A Occupational (IPR) – Discrin issues.	k – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - uthority – Collective Bargaining – Confidentiality – Conflicts of Interest – Crime – Professional Rights – Employee Rights – Intellectual Property Rights nination. Self-study: Chernobyl explosion, Nuclear and thermal power plant	CO-3 BTL-3
MODULE 4: LII	FE SKILLS (9L)	
Definition, Re value educatio values – Self determination forgiveness) W expectations,	<ul> <li>levance, Types of values, changing concepts of values-aims and values of on- basic etiquette-morals and values in life-dealing with people. Personal</li> <li>Strengths (self-confidence, self-assessment, self-reliance, self-discipline, self-restraint, contentment, humility, sympathy and compassion, gratitude, /eaknesses. Self-study: Influences - Peer pressure, familial and societal media.</li> </ul>	CO-4 BTL-3
MODULE 5:SO	CIETIES IN PROGRESS (9L)	
Definition of change – Sens consciousness Engineers on s	society; Units of society; Communities – ancient and modern – Agents of e of survival, security, desire for comfort and ease sense of belonging, social and responsibility. Self-study: Personal value and professional value of societies perception.	CO-5 BTL-3
TEXT BOOKS		
1	Subramanian R. (2017). Professional ethics, Oxford University press.	
2	Manoharan P.K. (2008). <i>Education and Personality Development</i> , APH Publish Corporation, New Delhi.	hing
REFERENCE BC	DOKS	
1.	Megan J. Murphy, Lorna Hecker. (2016). <i>Ethics and Professional Issues in Co- and Family Therapy</i> , Routledge; 2nd edition.	uple
2.	Andrew Belsey , Ruth Chadwick. (1992). <i>Ethical Issues in Journalism and the (Professional Ethics),</i> Routledge; 1st edition	Media
3.	Warwick Fox. (2000). <i>Ethics and the Built Environment (Professional Ethics)</i> , edition	Routledge, 1st
4.	RuchikaNath, Value Education, APH Publishing Corporation, New Delhi, 2008	3

COURS	E TITLE	E	HYDRAULIC ENGINEERING LAB CREDITS 1													
COURS	SE COD	E	CEI	B4341		C CA	OURSI TEGOF	E RY		РС		L-T-P	-S	0-0-	2-0	
Ver	sion		-	1.0		Appro	oval De	etails	24t 30	th ACN .5.201	1 - 8	LEARN LEVI	ING El	BTI	3	
ASSESS	MENT	SCHE	ME													
CIA					8	0%		ESE						20%		
Co Descr	urse ription	т pi	he exp umps a	erimei and tur	nts in bines	Hydrau and he	ilic Eng elps to	gineeri study ⁻	ng lab the pe	demor rforma	nstrate ance of	es the v f hydra	vorking ulic ma	g princip achines	les of	
Co Obje	urse ective		<ol> <li>To study the performance of centrifugal pump</li> <li>To study the performance of displacement pump</li> <li>To study the characteristics of gear oil pump</li> <li>To study the performance of impulse turbine.</li> <li>To study the performance of reaction turbine</li> </ol>													
Co Outo	urse come	U	pon cc 1. C 2. C 3. S 4. C 5. E	omplet Classify entrifu Draw th Compan Evaluat	ion of pump ugal, s ne cha he per re the e the	this co os base ubmers racteri rforman perfor power	urse, t d on e sible ar stic cu nce of mance produ	he stu fficien nd jet p rves of Impuls of Pel ced by	dents cy and oump Recip se turb ton w a turb	will be draw procatin bine. heel ar bine	able t the ch ng pum nd read	o aracter np and ction tu	ristic cu Gear o urbines	irves of il pump		
Prerequ	isites:	CEB4	317- H	ydrauli	ic Eng	ineerin	g									
CO, PO	AND P	SO M	APPIN	G												
со	PO- 1	РО -2	PO -3	РО- 4	PO -5	PO- 6	РО- 7	PO -8	РО -9	PO- 10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3	
CO-1	1	2	3	1	3	3	1	1	3	1	-	-	3	-	-	
CO-2	1	2	3	1	3	3	1	1	3	1	-	-	3	-	-	
CO-3	1	2	2 3 ¹ 3 3 1 1 3 1 3 -										-			
CO-4	1	2	2 3 ¹ 3 3 1 1 ³ 1 3													
CO-5	1	2	3	1	3	3	1	1	3	1	-	-	3	-	_	
			1: Wea	akly re	lated,	2: Mo	derate	ly rela	ted an	nd 3: St	rongly	relate	ed	·		

#### LIST OF EXPERIMENTS

- 1. Study on the Performance of Centrifugal pump
- 2. Study on the Performance of submersible pump.
- 3. Study on the Performance of Jet pump.
- 4. Study on the Performance of Reciprocating pump.
- 5. Study on the Performance of Gear oil pump.
- 6. Study on the Performance of Turbo Impulse Turbine.
- 7. Study on the Performance of Pelton Wheel Turbine
- 8. Study on the Performance of Francis Turbine.
- 9. Study on the Performance of Kaplan Turbine.

REFERENCE BOO	DKS
1	Ven Te Chow. (2009). Open-Channel Hydraulics, The Blackburn Press.
3	John A. Roberson. (2013). Hydraulic Engineering, John Wiley & Sons.
4	Streeter, Victor, L. and Wylie, Benjamin E. (2010). Fluid Mechanics, McGraw-Hill Ltd.

COUR	SE TITI	LE	СОМ	PUTEF		D STR	JCTUR	AL AN	ALYSIS	S LAB	CR	EDITS		1	
CO CI	URSE ODE		CEI	34342		C CA	OURSI	E RY		РС	L	-T-P-S		0-0-2-2	2
Ve	rsion			1.0		Appro	oval Do	etails	24th 30.!	n ACM 5.2018	- LEA	ARNING LEVEL		BTL-3	
ASSES	SMEN	T SCH	EME												
			C	CIA								ESE			
			8	0%								20%			
Co Desc	Course       This course provides hands on experience to students to work with software's for solving analysis problems.         1. Use ETABS for structural analysis of structures         2. Training on with solved lab														
Co Obj	Course1. Use ETABS for structural analysis of structuresCourse3. Analyze Beams and Portal Frames using ETABS/SAP200/STAAD.PRO software.Objective4. Compute forces in Trusses using ETABS/SAP200/ STAAD. Pro software.5. Find forces in building members using ETABS/SAP200/ STAAD. Pro software.														
Co Out	ourse		Upo 1. 1 2. 1 3. 1 4. 1 5. 1	n com Fo anal Fo con Fo sc ETABS/ Fo ider softwa Fo anal	pletio lyze B duct e lve SAP2 SAP2 re. lyze a	n of th uilding xperim the in 000/ ST ne inter buildin	is cour s using nents u nterna AD. I mal for g and	se, the ETAB sing vi I for Pro so rces in find th	e stude S irtual la ces i ftware Trusse e force	ents wi ab n Bea es usin es in th	ll be al ams g ETAE ne mer	ole and P BS/SAP2 nbers.	ortal 00/ STA	Frames AD. Pro	using
Prereq	luisite	<b>s:</b> Stru	ctural .	Analys	is I, M	lechani	cs of S	tructu	res II						
CO, P	O AND	PSO I	MAPPI	NG											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
CO-1	2	2	3	4	3	2	-	0 1	у -	10	11	2	 1	2	- 5
CO-2	2	3	3	3	3	2	_	1	_	-	1	2	1	3	
CO-3	2	3	3	3	3	2	_	1	_	-	-	2	- 1	3	_
CO-4	2	3	3	3	3	2	-	1	_	-	1	2	1	3	_
CO-5	2	3	3	3	3	2	-	1	-	1	1	2	1	3	
	<u> </u>	<u> </u>	1: W	eakly I	relate	d, 2: M	lodera	tely re	lated	and 3:	Strong	gly relat	ed		
						LIS	ST OF I	EXPER	IMENT	S					
1	Introd	ductior	n to ET	ABS.											

2	Introduction to Structural Engineering virtual lab
3	Analysis of Beams and Portal Frames
4	Analysis of Trusses
5	Analysis of Multi Storied Buildings- Residential Buildings, Commercial Buildings
	LIST OF SOFTWARE
1	
1.	ETABS
2	SAP2000
1. 2 3	SAP2000 STAAD. Pro

COL TI	JRSE TLE		DESIGN PROJECT IV     CREDITS     1       COURSE     DOUT DOUT DOUT DOUT DOUT DOUT DOUT DOUT													
CO CC	URSE DDE		CEE	84343		( CA	COURS	E RY		РС		L-T-P	P-S	0-0-	-2-0	
Vei	rsion		1	L. <b>O</b>		Appr	oval D	etails	24t 30.	h ACN .5.201	1 - 8	LEARN LEV	IING EL	ВТ	L-5	
ASSES	MENT	PATTE	RN													
	First R	eview		Seco	nd Rev	view		Thire	d Revi	ew		Pro	ject Re	port &		
	(C) 20	A)			(CIA) 20			3	(CIA) 0				Viva (C 30	IA)		
Co Desci	urse ription	To de teo	o pro evelop chnica	ovide oment al skill	suffici and a sets i	ient h analys n the o	ands- is of s choser	on lea uitable i field.	rning e proc	expe luct /	rienco proc	e relat ess so	ed to as to	the de enhanc	esign, e the	
Co Obje	Course Objective1. To enable the students to apply the theoretical knowledge in practice2. To enable them to plan and organize a small Civil Engineering project and write a report on the work3. To improve the level of confidence in presenting the civil engineering concepts.															
Co Outo	urse come	Upor 1 2 3 4 5	n com L. Foi 2. Pei 3. Co the L. syr 5. Do	pletion rmulat rform l nduct e result othesis cumer	n of th e spec iterati experi ts. the re t the r	is cour ific pro- ure sea ments esults a results	rse, the oblem arch in / Desi and arr in the	e stude statem the are gn and ive at s form c	nts wil ents fo ea of ir Analys scientil	I be at or real nterest sis / so fic con nical ro	ole to life pr t. olutior clusio eport	roblems n iterati ns / pro / prese	s ons and oducts , ntation	d docum / solutio	n	
Prereq	luisites	: Knov	vledge	e on Ba	isic Co	re Cou	irses									
CO, P	O AND	PSO N	ΙΑΡΡΙ	NG		1						1				
со	PO- 1	PO-	PO- 2	РО- л	PO-	PO-	PO- 7	PO-	PO- a	PO- 10	PO- 11	PO-	PSO-	PSO-	PSO-	
CO-1	- 1	3	2	2	2	2	2	2	-	2	1	3	2	2	2	
CO-2	-	2	-	-	-	2	2	-	-	2	1	2	1	2	2	
CO-3	2	3	3	3	3	3	3	3	3	3	2	3	2	3	3	
CO-4	2	3	3     3     3     3     3     3     3     3     2     3     2     3     2     3     2     3     3     3     3       3     3     3     3     3     2     3     2     1     3     2     3     2													
CO-5	-	-	-	-	-	-	-	-	3	3	-	2	-	-	-	
			1: We	akly re	elated,	, 2: Mo	oderate	ely rela	ted ar	nd 3: S	trong	ly relate	ed			
						LIS	T OF E	KPERIN	IENTS							

#### **B.TECH – CIVIL ENGINEERING**

In this project each group consisting of four/five members is expected to design and develop practical solutions to real life problems related to Industry and Civil Engineering research. Software usage should be followed during the development. The theoretical knowledge gained from the subject should be applied to develop effective solutions to various computing problems. At the end of the course the group should submit a complete report of the project work carried out.

COURSE TITLE	FOUN	IDATION ENGINEE	RING	CREDITS	4
COURSE CODE	CEB4401	COURSE CATEGORY	PC	L-T-P-S	3-1-0-1
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%
Course Description	This course de suitable found	eals with the need o dation.	of soil investig	ation, and the c	lesign of
Course Objective	<ol> <li>To get invest</li> <li>To kno shallor</li> <li>To get piles.</li> <li>To be</li> <li>To be walls.</li> </ol>	a basic understand igation. w the types of fou w foundation. exposed to the de familiar with the ar familiar with the la	ding of the geo ndation and th termination of nalysis of stabi teral pressure	ne design conce f load carrying c lity of slopes. acting on the re	pts of apacity of etaining
Course Outcome	Upon con 1. Apply 2. Find th founds 3. Descri capaci 4. Analyz metho 5. Detern walls a	npletion of this cou different technique ne safe bearing cap ations in cohesive a be the type of piles ty and settlement of se stability of slopes od. mine the active and and the pressure or	rse, the studer es for soil explo acity and settl and cohesions and determin of single pile a s and suggest s h passive earth of the wall due	nts will be able oration ement of shallo soils. ne the load carr nd group of pile suitable slope p pressure on re to line loads.	to ww ying es. rotection taining
Prerequisites: NIL					

СО, РС	) AND P	SO MA	PPING												
0	PO -	PO-	PO-	РО	PO-	PO-	РО	PO-	PO-	PO -	PO-	PO-	PS	PS	PS
0	1	2	3	-4	5	6	-7	8	9	10	11	12	0-1	0-2	0-3
CO-1	1	2	3	3	-	3	-	3	-	1	-	3	1	3	-
CO-2	1	2	3	3	3	3	-	3	-	1	-	3	1	3	-
CO-3	1	2	3	3	-	3	-	3	-	1	-	3	1	3	-
CO-4	1	2	3	3	-	3	-	3	-	1	-	3	1	3	-

CO-5 1 3 2 3 3 3 1 3 1 3 1: Weakly related, 2: Moderately related and 3: Strongly related **MODULE 1: SITE INVESTIGATION AND SELECTION OF FOUNDATION** (6L) Scope and objectives - Methods of exploration- Wash boring and rotary drilling - Depth of boring -Spacing of bore holes - Sampling - Representative and undisturbed sampling - sampling techniques -CO-1 Split spoon sampler, thin tube sampler, Stationary piston sampler - Bore log report - Penetration tests BTL-2 (SPT and SCPT) **MODULE 2: SHALLOW FOUNDATION** (12L+6T)Introduction - Location and depth of foundation - Codal provisions - bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's formula and BIS formula - factors affecting bearing capacity - problems - Bearing Capacity from insitu tests (SPT, plate load) - Allowable bearing pressure, CO-2 Settlement - Components of settlement -Allowable settlements- Methods of minimizing settlement, BTL-3 differential settlement. Types of foundation - Contact pressure distribution below footings and raft -Isolated and combined footings - types - proportioning of combined fooling mat foundation - types. **MODULE 3: PILE FOUNDATIONS** (9L+3T) Types of piles and their functions - Factors influencing the selection of piles - Load carrying capacity single pile in granular and cohesive soil - Static formula – dynamic formulae (Engineering news a CO-3 Hiley's)-Negative skin friction - uplift capacity - Group capacity by different methods BTL-3 (Field's ru Converse Labarra formula) - Settlement of pile groups – Interpretation of pile load test – under reamed piles **MODULE 4: STABILITY OF SLOPES** (9L+6T) Slope failure mechanisms - Modes - Infinite slopes - Finite slopes - Total and effective stress analysis CO-4 - Stability analysis for purely cohesive and C- soils - Method of slices - Friction circle method - Stability BTL-2 number - problems - Slope protection measures. **MODULE 5 : LATERAL EARTH PRESSURE** (9L) Plastic equilibrium in soils - active and passive states - Rankine's theory - cohesion less and cohesive CO-5 soil - Coloumb's wedge theory - condition for critical failure plane - Earth pressure on retaining walls BTL-2 of simple configurations - Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load. **SELF STUDY TOPIC:** Case Studies on Pile foundations **TEXT BOOKS** Arora K.R. (2016). Soil Mechanics and Foundation Engineering, Standard Publishers. 1. 2. Purushothama Raj. P. (2013). Soil Mechanics and Foundation Engineering. 2nd Edition, Pearson Education. 3. Gopal Ranjan and Rao A.S.R. (2016). Basic and Applied soil mechanics. New Age International Pvt Ltd; Third edition. 4. Varghese, P.C. (2005). Foundation Engineering. Prentice Hall of India Private Limited, New Delhi. **REFERENCE BOOKS** 

**B.TECH – CIVIL ENGINEERING** 

1.	Das, B.M. (2015). <i>Principles of Foundation Engineering</i> , Thompson Asia Pvt. Ltd., Singapore. 5 th edition.
2.	Bowles J.E. (2017). Foundation analysis and design. McGraw-Hill.
3.	Swami Saran. (2008). <i>Analysis and Design of Substructures – Limit state Design</i> , Oxford IBH Publishing Co-Pvt. Ltd., New Delhi.
4.	Kaniraj, S.R. (2016). <i>Design aids in Soil Mechanics and Foundation Engineering</i> , Tata McGraw Hill publishing company Ltd., New Delhi.
5.	B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain. (2017). Soil Mechanics and
	Foundations. Laxmi Publications; Sixteenth edition.
E BOOKS	
1	https://www.pdfdrive.net/principles-of-foundation-engineering-7th-edition-e18909928.html
2	https://www.pdfdrive.net/foundation-engineering-e33514153.html
моос	
1	https://www.online.colostate.edu/courses/CIVE/CIVE550.dot
2	https://ocw.mit.edu/courses/civil-and-environmental-engineering/
3	http://academicearth.org/masters-in-geotechnical-engineering/

COUI TITI	RSE LE		TRANSPORTATION ENGINEERING - II       CREDITS       3         CEB4304       COURSE CATEGORY       PC       L-T-P-S       3-0-0-0         1.0       Approval Details       24th ACM - 30.5.201 8       LEARNING LEVEL       BTL-3         CHEME													
COU COI	RSE DE		CEB43	304		CA		SE DRY		РС		L-	T-P-S	3-	0-0-0	
Vers	ion		1.0	)		Appr	oval [	Details	241 - 30	th ACM 0.5.201 8	1 L	LEARN LEV	JING EL	B1	ſL-3	
ASSESS	MENT	SCHEN	ИE		·											
Fir: Period Assess	st dical ment	Se	cond Pe Assessr	riodic nent	al	S Ass	emina ignme Projec	r/ nts/ t	g	Surprise Test / Quiz	2	Attend	lance	E	SE	
15	%		15% 10% 5% 5% 50%													
Cou Descri	rse ption	This tran else thes	This course provides students with basic introduction of three major aspects of transportation: railways, airports, and seaports. (Road transport is covered elsewhere earlier in another course). It also provides a broad outlook on how these systems are critical in our country's growth and productivity.													
Cou Objec	rse tive	1 2 3 4 5	To in cour To n in ra 3. To t 4. To t 5. To t	ntrodu ntry's nake s iilway each a each f xplair	develo develo tuden s work about t now to n how l	idents opmei ts fan the im desig harbo	s abou nt. niliariz nporta gn bas urs ar	it how e abo nce o ic layc nd por	ut how f civil outs fo ts are	ay syst w some engine or airpo built.	e of th ering orts.	ays a e criti side o	major cal cor f airpo	role in ntrol sys rts.	stems	
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Prerequ	isites:	Nil.														
CO, PO	AND P	SO M	APPING	i												
со	PO- 1	PO -2	PO- 3	PO -4	PO	PO	PO -7	PO	PO _9	PO- 10	PO	PO	PS 0-1	PSO- 2	PSO	
CO-1	1	2     3     1     1     2     1     2     1     1     2     1       2     3     1     1     2     1     2     1     1     2     1     3     3     -														
CO-2	1	2	2     3     2     1     2     1     1     1     2     1     3     3     -													
CO-3	1	2	3	1	2	2	1	1	1	1	2	1	3	3	-	

CO-4	1	2	3	1	1	2	1	1	1	1	2	1	3	3	-
CO-5	1	2	3	1	1	2	1	1	1	1	2	1	3	3	-
		1: \	Weakly	relate	ed, 2:	Mode	rately	relat	ed and	d 3: St	rongly	, relat	ed		•
MODU	LE 1: R/	AILWA	Y PLAN	INING		DESIG	δN	(9L)							
Role of Indian Railways in National Development - Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipment's) Permanent Way, its Components and Functions of each Component: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density Ballasts – Functions, Materials, Ballast less Tracks Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves (Derivations of Formulae and Problems) MODULE 2: RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION (9L)												rack sing, and ot of nsity acks s in ulae	CO-1 BTL-3		
MODUL	E 2: RA	ILWA	Y TRAC	K CON	ISTRU	CTION	N, MA	INTEN	IANCE	AND	OPER/	ATION	(9L)		
Points a and Tra and Ma upgradi Rolling rail, Hig	and Cro ck Circ Iterials, ng, Tec Stock, T h Spee	ossing uiting Tracl hnolo ractiv d rail a	s - Desi Constr Constr Ogies, R Powe and MR	gn of uction age Tr e-layir er, Trac RTS	Turno & Ma rack M ng of T ck Resi	uts, W ainten Ioderi Track, Istanc	/orkin ance nizatio Lay o e, Lev	g Prin – Con on– A uts of el Cro	iciple. ventio utoma Railw ssings.	Signal mal, N ited m ay Sta Introc	ing, In Ioderr ainter tions a Juctio	iterloc n meth nance and Ya n to M	king nods and ards, lono	CO BTI	-2 3
MODUL	E 3: All	RPOR	<b>F PLAN</b>	NING		DESIG	N (9L)								
Advanta Plannin Evaluat Compor Gradier Minimu Clearan	ages an g – Air f ion and nent, W nts (Pro im Sepa ce over	nd Lii traffic I Instit Vind r oblem aration	mitation potent tutiona ose Dia s), Dra n Distar ways ar	ns of ial, Sit I Arran Igram iinage nces, E nd Rail	Air 1 e Selengeme (Prob Taxiv Design	ransp ction, ents R lems), vay D Speed	oort, Desig unwa Geor Design d, Airp	Comp gn of C y Des metric – G port D	onent: Compo ign- O c Desig eomet rainag	s of A ments, rientat gn and tric De e. Airp	Airpor Cost tion, C Corre esign port Zo	ts Air Estima Cross v ections Eleme oning	port ates, wind s for ents,	CO BTI	-3 3
MODUL	E 4: All	RPOR	<b>LAYO</b>	UTS, V	/ISUAI	AIDS	, AND	AIR 1	RAFF		ITROL	(9L)			
Airport Circulat function Aids – Taxiway Helipad	Layout ion Pa ns, Plan Runwa / Lighti s, Hang	s – Ap ttern, ining ( iy and ngs A gars, S	ron, Te Case Concep d Taxiw ir Traff ervice I	rmina studie t, Prin vay N fic Coi Equipr	l Build s of / ciples larking ntrol - nent's	ing, H Airpor of Pas gs, W - Basi	anger t Laye ssenge ind D c Act	s, Mo outs er Flov virectio ions,	tor Ve Airpor w, Pas on Inc Air Tra	hicle P t Builc senger licator affic C	Parking lings Facili s, Ru ontro	g Area – Prir Ities Vi nway I Netv	and nary isual and vork	CO- BTL	-4 -3
MODUL	E 5: HA	RBOL	JR ENG	INEER	ING &		ER MO	DDES	OF TR/	ANSPC	)RT (9	L)			
Definiti Soundir Site Sel Waves Anchor Shoals Materia Positi Wareho	on of ng, Area ection and Tid ing Gro Shore ols, Coa on of ouse, T	Terms a, Dep & Sele al Cur unds, Consi ast Li Light ransit	s - Hai oth, Sat ection I rents, L Geolog ideratio nes Di t Hous	rbours ellite I nvesti; ittora gical Cl ons- P ry an es, N	5, Pori Ports I gation I Trans haract Proxim d We avigat	ts, Do Requir – Sport v eristic ity to t Do ing T	ocks, remer eed of with E cs, Win o Tow cks, I ermir	Tides nts an f wate rosior nds & vns/Ci Planni nal Fa	and d Class er, Dre n and I Storm ties, I ng ar acilities	Waves sificati dging, Deposi ns, Pos Utilitie nd Lay s –	5, Litt on of Rang tion, S ition a s, Co vouts Port	oral E Harbc e of Ti Soundi and Siz nstruc Entra Buildi	Drift, burs. des, ngs, ee of tion nce, ngs,	CO BTL	-5 - <b>3</b>

Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders Coastal Shipping, Inland Water Transport and Container Transportation. Pipe Ways, Rope Ways.

TEXT BO	DOKS										
1	C Rangwala. (2011). Railway Engineering. Charotar Publishing House.										
2	S.C. Rangwala. (2011). Airport Engineering, Charotar Publishing House.										
3	Kadiyali L R.	Kadiyali L R. (1999). Traffic Engineering and Transport Planning, Khanna publishers.									
4	Dr. Purusho	thama Raj. (2013). Railways, Airports and Harbour Engineering, Sri Krishna									
	Hitech Publi	Hitech Publishing Company Pvt.Ltd.									
5	Saxena Sub	Saxena Subhash C and Satyapal Arora. (2011). A Course in Railway Engineering, Dhanpat									
,	Rai and Sor	s, Delhi.									
REFERE	NCE BOOKS										
1.	Oza and Oza	. (2012). A course in Docks & Harbour Engineering, Charotar Publishing House.									
2.	Bureau of In	dian Standards (BIS) Publications on Highway Materials									
3.	Specification	ns for Road and Bridges, MORTH (India)									
E BOOK	S										
		https://www.pdfdrive.net/ism-for-transportation-engineering-an-									
1.	introduction-e19463916.html										
моос											
1.	https://cee.illinois.edu/academics/graduate-programs/cee-online-										
	%20program/cee-online-transportation-engineering										
2.		https://www.mastersportal.com/studies/161540/transportation.html									

COURSE TITLE	ESTIM	IATION AND QU SURVEYING	CREDITS	3					
COURSE CODE	CEB4403	COURSE CATEGORY	PC	L-T-P-S	3-0-0-1				
Version	1.0 Approva Details		24th ACM - 30.5.2018	LEARNIN G LEVEL	BTL-3				
ASSESSMENT SCHEME									
First Periodical Assessment	Second Periodical Assessme nt	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendan ce	ESE				
15%	15%	10%	5%	5%	50%				
Course Description	Estimate th and sanitar analysis, va	e quantities of it y works, road wo luation of prope	tem of works orks and irriga rties	involved in tion work, a	buildings, water supply and ability to do rate				
Course Objective	The course 1. Knov 2. Fam 3. Be fa inclu 4. Be fa 5. Und	should enable th w about various iliar with the est amiliar with the e uding estimation amiliar with spec erstand the proc	ne students to methods of es imated of load estimate of sa of roads and ification and a redures involv	stimates d bearing & nitary and cross draina analysis of r red in valuat	framed structures. water supply works age works. rates. tion of structure.				
Course Outcome	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Explain the various types of estimates.</li> <li>2. Prepare an estimate of quantities for a building</li> <li>3. Prepare estimates for various structures.</li> <li>4. Prepare cost estimates for construction works.</li> <li>5. Estimate the valuation of buildings by various methods</li> </ul>								

#### **Prerequisites: Nil**

СО, РО /	CO, PO AND PSO MAPPING														
0	PO-	PO-	РО	РО	PO-	РО	РО	РО	PO-	PO-	PO-	РО	PSO	PSO	PSO
co	1	2	-3	-4	5	-6	-7	-8	9	10	11	-12	-1	-2	-3
CO-1	1	2	-	-	1	2	-	1	2	1	2	-	2	-	-
CO-2	3	-	2	-	-	2	1	1	2	1	2	-	2	-	-
CO-3	3	-	2	-	-	2	1	1	2	1	2	-	2	-	-
CO-4	3	-	2	-	-	2	1	1	2	1	2	-	2	-	-
CO-5	3	-	2	-	-	2	1	1	2	1	2	-	2	-	-

1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION (9)									
Units of measureme – Advantages	nts and conversion, Types of estimates, Methods of estimate	CO-1 BTL-2							
MODULE 2: ESTIMAT	TE OF BUILDINGS	(9)							
Load bearing and fr brick work, PCC, RCC problems	ramed structure – Calculation of quantities of earth work, C, plastering, painting walls and doors and windows – Simple	CO-2 BTL-3							
MODULE 3: ESTIMATE OF OTHER STRUCTURES AND ROAD WORK(9)									
Estimating of septic tank, soak pit – retaining wall – culvert – bituminous and concrete road, simple problemsCO-3BTL-3									
MODULE 4 :SPECIFICATION AND RATES (9)									
Schedule of rates, analysis of rates – RCC, Brick work, Plastering, SpecificationCO-4– RCC, Brick work, plasteringBTL-3Self study: Specification for different items of workBTL-3									
MODULE 5: VALUAT	ION	(9)							
Methods of valuation – Land and building method, rent capitalization method, depreciation, calculation of rent, mortgage, lease, approved valuers Self-study:CO-5Online certification from American Society of ProfessionalBTL-3									
TEXT BOOKS									
1.	Dutta. B.N. (2016). <i>Estimating and Costing in Civil Engineer</i> Distributors Pvt. Ltd.	ring, UBS Publishers &							
2.	Rangwala. S.C. (2017). Estimation, costing and valuation, Jai	n Book agency, New Delhi.							
	REFERENCE BOOKS								
1.	CPWD, CPWD Specification, Government of India, New Delh	ni, 2016.							
2.	CPWD, Delhi Schedule of rates, Government of India, New D	Delhi, 2016							
3.	CPWD, CPWD Analysis of Rates, Government of India, New	Delhi, 2016.							
E BOOKS	E BOOKS								
1. <u>http://www.uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf</u>									
моос									
1	https://www.coursera.org/learn/construction-cost-estimate	ting							
2	http://www.billingengineer.com/quantity-surveying-blog.html								
3	https://ww2.rics.org/en-in/events/e-learning/distance-lea foundation-programme/	rning/quantity-surveying-							

COU	RSE TITL	E	QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION     CREDITS     3														
COU	RSE COD	)E	CEB	84404	(	COURS	E CAT	EGOR	Y	РС		l	T-P-	S		3-0-0	)-1
v	ersion		1	L.0		Appr	oval D	etails	- 1	24th AC 30.5.20	M 18	LE	ARNII LEVEI	NG L		BTL-	3
ASSES	SMENT	SCHEN	1E														
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	15%		<b>15% 10% 5% 5%</b>											50%	6		
C Des	Course scription		Quality control is the contractor's definition of how the project quality will be managed during construction of the project. Quality assurance is the process of identifying or deciding on all the quality requirements for a project.														
Course	e Object	ive	1. 1 2. 1 3. 1 4. 1 5. 1	Γο unde Γο be fa Γο iden and in c Γο acqu Γο be fa	erstanc amiliar tify th juality ire kno amiliar	l the fi with t e qual metho wled with c	unctio he qua ity im ods. ge in q constru	ns of ( ality si portai uality uction	Quality andar nce in assura qualit	y manag ds and plannin ance an cy impro	geme syste ng, e d co ovem	ent s ems. ergor ontro nent.	itake l nomic l requ	holde s, tag iirem	rs. guch ents	ni's con S.	ncept
Course	e Outcor	ne	<ol> <li>Upon completion of this course, the students will be able to</li> <li>Explain the various responsibilities of construction teams.</li> <li>Prepare quality standard documents.</li> <li>Apply quality policy to attain highest level of customer satisfaction in projects.</li> <li>Summarize the quality control measures to be taken during the execution of the project.</li> <li>Apply the relevant codes and standards for quality construction.</li> </ol>														
Prereq	uisites: l	Nil															
СО, РС	D AND P	SO MA	PPING									<u> </u>					
co	PO-1	PO-2	РО	PO-	PO-	РО	РО	РО	PO-9	PO	Ρ	0-	РО	PSO	<b>D</b> -	PS	PS

<b>0</b>	PO-1	PO-2							PO-9				100		
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CO-2	-	1	1	1	-	1	-	2	1	-	2	3	2	2	-
CO-3	1	1	1	1	-	2	1	2	2	-	2	3	2	2	-
CO-4	1	1	1	1	-	2	-	2	2	-	2	3	2	3	-
CO-5	-	1	1	-	-	2	-	2	2	-	3	3	1	2	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														
MODU	MODULE 1: QUALITY MANAGEMENT 9L														

Quality - Introduction, Definitions, Objectives and Management functions, Types of Quality Organizational Structure- Responsibilities and authorities, Total Quality System, Inspection, Control and Improvement- Quality circles and Improvement Teams- Construction Team- Owner, engineers, Architect, Contractors.	CO-1 BTL-2							
MODULE 2: QUALITY SYSTEMS9L								
Requirement-       Preparing       quality       system       standard-       Iso       ranny       or       standards       and       structure         Requirement-       Preparing       quality       systems       Documents-       Quality       related       training       -       CO-2         Implementing       Quality       system-       Third party certification.       BTL-2								
MODULE 3: QUALITY PLANNING 9L								
Quality Policy, Objectives and methods in construction Industry - Consumers Satisfaction- Ergonomics-Time of completion - Statistical tolerance - Taguchi's concept of quality - Contract Documents and Construction Programming - Factors influencing construction Programme- Cost of Quality.CO-3 BTL-3Contract Documents and Construction Programming - Factors influencing construction Programme- Cost of Quality.BTL-3								
MODULE 4: QUALITY ASSURANCE AND CONTROL	9L							
Definitions and Objectives - Techniques and needs of QA/QC- Regulatory agent, Contract and Construction oriented objectives and methods- Technical Control and Financial Control Different aspects of quality – Appraisals – organizing for quality and safety, Quality control by statistical methods, statistical quality control with sampling by attributes and variables – Quality control register, Quality control for concrete durability – Prescriptive specification, Maintenance of quality control register for road works and								
MODULE 5: QUALITY IMPROVEMENT 9!	•							
Selection of Construction materials -Influence of drawings, detailing, work and material specifications – IS codes, Standardization-Bid Preparation-Construction Activity- Environmental safety, Social and Environmental factors -Natural causes and speed of construction- Life cycle costing- Value Engineering and value analysis.	CO-5 BTL-2							
TEXT BOOKS								
1.James, J.O Brian. (2002). Construction Inspection Handbook - Quality Assurance and Quality Control. Van Nostrand, New York.								
2. Kwaku A., Tenah and Jose M.Guevera. (2005). <i>Fundamental of Construction Management and Organization</i> , Prentice Hall of India								
3. Kumar Neeraj Jha. (2015). <i>Construction Project Management</i> , Pearson.								
REFERENCE BOOKS								
1. Juran Frank, J.M. and Gryna, F.M. (2003). <i>Quality planning and Analysis</i> , Tata McGraw Hill.								
2. Clarkson H. Oglesby. (2007). <i>Productivity Improvement in Construction</i> , McGraw Hill.								

E BOOKS	
1.	http://www.e-booksdirectory.com/details.php?ebook=6368
моос	
1	http://www.nptel.ac.in/courses/105103093
2	https://videoken.com/videodetail?videoID=nly3cxgsXOA&videoDuration=2945&videoNam %20e=Mod01%20Lec12%20Principles%20of%20quality%20control%20in%20concrete%20co nst%20ructi%20on&keyword=Construction%20Management.
3	https://videoken.com/videodetail?videoID=ksR4Xy6tFcM&videoDuration=3442&videoNa%2 Ome=Lec13%20Total%20Quality%20Management&keyword=Construction%20Managemen <u>%20t</u> .

COUF	RSE TITI	.E	COM	IPUTER		D DESI	GN AN	ID DR/	AFTING	G LAB	CR	EDITS	1				
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V	ersion			1.0		Appro	oval Do	etails	24th 30.	n ACM - 5.2018	- LEA	ARNING .EVEL		BTL-3			
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				CIA								ESE					
			8	80%					20%								
C Des	ourse criptior	T N N	he cou eat str	urse he uctura	lps st I engi	udents neerinរ្	to des g draw	ign im ings fc	portar or aidin	nt civil e Ig in coi	engine nstruc	ering st tion.	ructure	s and m	ake		
Cours Objec			<ol> <li>To learn the design and drafting of deep beams and flat slab.</li> <li>To acquire knowledge on the design and drafting of the solid slab bridge deck.</li> <li>To learn the design and drafting of water tanks</li> <li>To acquire knowledge on the design and drafting of steel trusses</li> <li>To learn the design and drafting of plate girders with stiffeners</li> </ol>														
Cours	se ome		Upc	on com 1. To 2. To 3. To 4. To 5. To	pletio desigi desigi desigi desigi desigi	n of th n and d n and d n and d n and d n and d	is cour raft st raft de raft wa raft tru raft pla	se, the ructur etails c ater ta usses ate gir	e stude al drav of the s nks ders w	ents wil vings fo olid sla vith stiff	l be at or dee b brid feners	ole p beams ge deck	and fla	ıt slab.			
Prere	quisites	s: Desi	gn of (	Concre	te Stri	uctures	, Desig	in of Si	teel Sti	ructure	s						
CO, P	O AND	PSO I	MAPPI	NG	[			[									
со	PO-	РО- 2	PO- 3	РО- 4	PO- 5	PO-	PO- 7	PO- 8	PO- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO-		
CO-1	2	3	3	3	3	2	-	1	-	1	1	2	1	3	-		
CO-2	2	3	3	3	3	2	-	1	_	1	1	2	1	3	-		
CO-3	2	3	3	3	3	2	-	1	-	1	1	2	1	3	-		
CO-4	2	3	3	3	3	2	-	1	-	1	1	2	1	3	-		
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						LI	ST OF I	EXPER	IMENT	ſS							
1	Struct	ural d	esign a	and dra	atting	ot dee	p bean	ns and	flat sla	ab.							
2	Struct	ural d	esign a	and dra	atting	of the	solid s	lab bri	dge de	eck.							
3	Struct	ural d	esign a	and dra	atting	of wat	er tank	(S									
4	Struct	ural d	esign	and dra	afting	of trus	ses										

5	Structural design and drafting of plate girders with stiffeners
	LIST OF EQUIPMENTS
1.	AutoCAD 2022 on P5 systems

COURSE TITLE	COMPREHENSION CREDITS													1	
COURSE CODE		CEB4432 COURSE PC L-T-P-S CATEGORY 24th ACM - LEARNING													-2-0
Version		1	L.O			Аррі	oval I	Details	5 <b>2</b>	4th A 30.5.2	CM - 018	LEAI LE	RNING EVEL	BT	'L-3
ASSESSMENT SC	HEME														
	CIA ESE										SE				
	100%											0	%		
Course Description	CourseThis course helps the student to equip themselves for employability by practicing the basicDescriptionconcepts of Civil Engineering and aptitude														
Course Objective	<ol> <li>To provide students an understanding of the expectations of industry.</li> <li>To improve employability skills of students.</li> <li>To bridge the skill gaps and make students industry ready.</li> <li>To provide an opportunity to students to develop inter-disciplinary skills.</li> <li>To mould students as job providers rather than job seekers.</li> </ol>														
Course Outcome	Upc 1. 2. 3. 4. 5.	on con Meet Demc Analy Devel Equip	npletio the in onstra ze and op int them	on of th ndustry te the s d give so er-disci selves f	nis co requ skills olutio iplina for ei	urse, f ireme requir ons to ary ski mploy	the sto nts. ed for the c lls. ability	udents emple omple v with	s will b oyme x prol soft s	oe able nt. blems kills	e to in Civ	il Engi	neering.		
Prerequisites: All	Core Co	urses	of Civi	l Engine	eerin	g									
CO, PO AND PSO	MAPPIN	NG													
со	PO- 1	PO -2	PO -3	PO -4	РО -5	PO -6	РО -7	РО -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2	PSO -3
CO-1	1	2	3	2	2	2	2	1	1	2	1	2	3	3	2
CO-2	CO-2         1         2         3         2         2         2         2         1         1         2         1         2         3									3	2				
CO-3	1	2	3	2	2	2	2	1	1	2	1	2	3	3	2
CO-4	1	2	3	2	2	2	2	1	1	2	1	2	3	3	2
CO-5	1	2	3	2	2	2	2	1	1	2	1	2	3	3	2
	1: \	Weakl	y rela	ted, 2:	Mod	eratel	y rela	ted an	nd 3: 9	Strong	ly rela	ited			
TEXT BOOKS															

1.	Trishna. (2020). GATE Civil Engineering. Pearson Publishers.
REFERENCE BOOKS	
1.	L.S Blake. (2017). Civil Engineer's Reference Book, CRC Press, Fourth Edition.
E BOOKS	
1.	https://www.amazon.in/Basic-knowledge-civil-engineering-including- ebook/dp/B07SHPSWHG
моос	
1.	https://www.my-mooc.com/en/categorie/civil-engineering

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ASSES	MENT	PATTE	RN														
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Cou Obje	urse ective		<ol> <li>To enable the students to apply the theoretical knowledge in practice</li> <li>To enable them to plan and organize a small Civil Engineering project and write a report on the work</li> <li>To improve the level of confidence in presenting the civil engineering concepts.</li> </ol>														
Cou Outo	<ul> <li>Upon completion of this course, the students will be able to         <ol> <li>Formulate specific problem statements for real life problems</li> <li>Perform literature search in the area of interest.</li> <li>Conduct experiments / Design and Analysis / solution iterations and document the results.</li> <li>Synthesize the results and arrive at scientific conclusions / products / solution</li> <li>Document the results in the form of technical report / presentation</li> </ol> </li> </ul>														ment tion		
Prereq	uisites	: Know	ledge	e on Ba	isic Co	re Cou	irses										
СО, РС	D AND	PSO M	APPI	NG													
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO	PO-	PSO-	PSO-	PSO-		
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#### **B.TECH – CIVIL ENGINEERING**

In this project each group consisting of four/five members is expected to design and develop practical solutions to real life problems related to Industry and Civil Engineering research. Software usage should be followed during the development. The theoretical knowledge gained from the subject should be applied to develop effective solutions to various computing problems. At the end of the course the group should submit a complete report of the project work carried out.

	COURSE PROJECT WORK & VIVA VOCE CREDITS 8															
COU TI	URSE TLE		PROJECT WORK & VIVA VOCE     CREDITS     8       CER4441     COURSE     PC     L T P S     0.02													
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Ve	rsion		1	.0		Appr	oval D	etails	24t 30.	h ACN 5.201	l - 3	LEARN LEV	IING EL	BT	L-6	
ASSES	SMENT	PATT	ERN										·			
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Co Obje	ourse ective		<ol> <li>To enable the students to apply the theoretical knowledge in practice</li> <li>To enable them to plan and organize a small Civil Engineering project and write a report on the work</li> <li>To improve the level of confidence in presenting the civil engineering concepts.</li> </ol>													
Co Out	ourse come	Up	2. P 2. P 3. C th 4. S 5. D	mpletio ormula erform onduct ne resu ynthes ocume	on of t ate spe litera t expe lits. ize the ent the	his con ecific p ture so riment e resul e resul	urse, th problem earch i ts / Des ts and ts in th	ne stud n statei n the a sign an arrive a e form	ents w ments rea of d Anal ⁱ at scien of tec	rill be a for rea intere ysis / s ntific c hnical	able to al life p st. olutio onclus report	orobler n itera sions / t / pres	ns tions ar produc entatio	nd docu ts / solu n	ment tion	
Prerec	quisites		wiedge	e on Ba		re Cou	irses									
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CO-1	-	3	2	2	-	1	1	-	3	3	1	3	2	3	3	
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CO-3	2	3	2	3	3	2	3	2	3	2	1	3	2	3	3	
CO-4	2	3	2	3	3	2	3	2	3	2	1	3	2	3	3	
CO-5	2	3	3     2     3     2     2     2     2     3     3									3	3	3	3	

1: Weakly related, 2: Moderately related and 3: Strongly related

The Project Work shall be carried out in any of the Civil Engineering areas such as Structural Engineering, Environmental Engineering, Water Resources Engineering, Transportation Engineering, Soil Mechanics and Remote sensing. Students shall work in convenient groups of not more than four members in a group. Every Project Work shall have a Guide who is a member of the faculty of the University. During this period the students shall receive directions from the Supervisor for the progress of the Project Work. The students shall give periodical presentations of the progress made in the Project Work.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, Project work details and conclusions. This final report shall be typewritten form as specified in the guidelines.

# **DEPARTMENT ELECTIVES**

COURSE TITLE	ENGINEERING GEOLOGY CREDITS 3													
COURSE CODE	CEC4251	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0									
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3									
ASSESSMENT SC	HEME													
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE									
15%	15%	10%	5%	5%	50%									
Course Description	Engineering geolog of assuring that th operation and main 1. To know about	Engineering geology is the application of geology to engineering study for the purpose of assuring that the geological factors regarding the location, design, construction, operation and maintenance of engineering works are recognized and accounted for.												
Course Objective	<ol> <li>To know about</li> <li>To study about</li> <li>To know about</li> <li>To know about</li> <li>To understand to constructions</li> </ol>	the physical properti different classificatio seismic and electrica the geological condit	es and engineeri n of rocks and it I methods for Civ ions necessary fo	ing significance s engineering p vil Engineering or Civil Enginee	of minerals. properties. investigations. ring									
Course Outcome	<ul> <li>Upon completion of this course, the students will be able to</li> <li>Explain the earth structures, composition and earthquake belts.</li> <li>Familiarize the physical properties of minerals.</li> <li>Differentiate the types of rock materials.</li> <li>Classify the seismic and electrical methods for Civil Engineering investigations.</li> <li>Recognize remote sensing and GIS techniques in the field of Civil Engineering</li> </ul>													

# **Prerequisites: Nil**

CO, PO	CO, PO AND PSO MAPPING														
6	PO-	РО	PO-	PO-	РО	PO-	PO-	PO-	РО	PO-	РО	PO-	PSO-	PSO-	PSO-
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CO-1	-	-	1	-	-	1	-	-	-	-	-	-	-	2	-
CO-2	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-
CO-3	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-
CO-4	-	-	1	-	-	-	-	-	2	-	-	-	-	2	-

CO-5	-	-	1	-	-	-	-	-	-	-	-	3	-	2	-
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MODU	LE 1: P	HYSIC	AL GEO	DLOGY	,					9L					
Geology	/ in civi	lengir	neering	g – brai	nches	ofgeol	ogy – s	structu	re of e	arth ar	nd its c	ompos	sition		
– weath	nering (	of rock	ks – sca	ale of v	veathe	ering –	soils -	- landf	orms a	nd pro	cesses	s assoc	iated	со	-1
with riv	er, wir	nd, gro	undwa	ater an	id sea	– rele	vance	to civil	engin	eering	. Plate	tector	nics –	BTL	2
Earth qu	Jakes -	- Seisn	nic zon	ies in i	ndia.										
MODUL	.E 2: M	IINERA	LOGY	9L											
Propert	ies of ı	minera	als - stu	udy of	rock f	ormin	g mine	erals - (	Quartz	family	. Febl	dpar fa	imily,		
Augite,	Hornb	lende	, Bioti	te, Mı	uscovi	te, Ca	lcite, (	Garnet	- pro	pertie	s, beł	naviour	and	со	-2
enginee	ering si	gnifica	ince of	clay r	ninera	ls - Fu 	ndame	entals	of pro	cess of	form	ation c	of ore	BTI	L-2
minerai	s - Coa	i and p	petrole	eum - I	neir o	rigin a	na occ	urrend	ce in in	dia.					
MODUL	.E 3: PE	TROL	OGY 9	L											
Classif	ication	of ro	cks - c	listinct	ion be	etweer	n igneo	ous, se	dimer	itary a	nd me	etamor	phic		
rocks,	Descr	iption	occur	rence,	engir	neering	g prop	oerties	and	, distribi	ution	of roc	ks -		
Igneou	ıs rock	ks - G	ranite,	Syeni	te, Di	orite,	Gabbr	o, Peg	gmatite	e, Dole	erite a	and Ba	salt,	со	-3
Igneous rocks - Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basal Sedimentary rocks - sandstone, Limestone, shale conglo, Conglomerate and brecci												ccia,	BTI	L-3	
Sedimentary rocks - sandstone, Limestone, shale conglo, Conglomerate and breccia Metamorphic rocks - Quartizite, Marble, Slate, Phyllite, Gniess and Schist.															
MODUL	.E 4: S1	RUCT	URAL	GEOLO	GY AN	ND GEO	OPHYS		1ETHO	DS		<u> </u>	9L		
Geolog	ical m	aps –	attitu	de of	beds,	study	of str	ructure	es — to	olds, ta	iults a	ind joi	nts –		
relevan	ce to c	ivii en	gineer	ing. Ge	eopnys	iicai m	ethods	s – Seis	smic ar	id Elec	trical r	metho	as for	CO	-4
Subsuri		estiga		elated		nı Eliği	neenn	ıg.						BIL	2
MODUL	.E 5: G	EODES	SY										9L		
Remote	Sensi	ng –	Conce	pt, Ap	plicati	on an	d its I	Limitat	ions;	Geogra	phic	Inform	ation		
System	(GIS)	and G	lobal	Positio	ning S	System	(GPS	) – Co	ncept	and tl	neir u	se reso	ource	CO	-5
mappin	g. LAN	DSAT I	mager	y –Def	initior	n and i	ts use.	Impac	t of M	ining, (	Quarry	/ing an	d	BTL	2
Reservo	oirs on	Enviro	nment	t.											
TEXT BO	DOKS														
1	•	Pa	arbin S	ingh. (i	2015).	Engin	eering	and G	eneral	Geolo	gy, S.K	K. Katar	ria and S	Sons	
2	•	Kr	ynine	and Ju	dd. (20	005). <i>E</i>	ngine	ering G	ieology	and G	Geotec	hnique	es, CBS I	Publishe	er.
REFERE	NCE BO	OOKS													
1	•	Sub	oinoy G	iangop	adhya	y. (202	13). En	gineer	ing Ge	ology,	Oxfor	d Univ	ersity P	ress.	
2	•	Ala	n E Keł	new. (2	2016).	Geolo	gy for	Engine	ers an	d Envir	onme	ntal Sc	ientists,	, Pearso	n India
E BOOK	S														

1.	http://www.geology.cz/projekt681900/vyukove-materialy/Priloha%20JV 4.pdf
MOOC	
1.	http://www.open.edu/openlearn/science-maths-technology/science/geology

COURSE TITLE	IRRIG	GATION ENGINEERIN	G	CREDITS	3								
COURSE CODE	CEC4252	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0								
Version	1.0	Approval Details	24th ACM - 30.5.2018	LEARNING LEVEL	BTL-3								
ASSESSMENT SC	HEME												
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE								
15%	15%	10%	5%	5%	50%								
Course Description	This course deals v irrigation schedulin irrigation managem	This course deals with the different cropping patterns and crop water requirements, irrigation scheduling, strategies in water use, operation of canal irrigation system and irrigation management.											
Course Objective	<ol> <li>To understand t</li> <li>To be familiar w</li> <li>To gain knowled</li> <li>To understand t</li> <li>To be familiar w</li> </ol>	the different croppin vith irrigation schedu dge on the strategies the operation of cana vith participatory irrig	g patterns and ci ling. in water use. al irrigation syste gation managem	rop water requ em. ent.	irements.								
Course Outcome	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Explain the need for irrigation.</li> <li>2. Design an irrigation system for different types of soils.</li> <li>3. Develop knowledge on the diversion and impounding structures</li> <li>4. Design the canal irrigation system</li> <li>5. Explain the importance of cross drainage and canal regulation works.</li> </ul>												

# **Prerequisites: Nil**

CO, PO	CO, PO AND PSO MAPPING														
6	PO-	РО	PO-	PO-	РО	PO-	PO-	PO-	РО	PO-	РО	PO-	PSO-	PSO-	PSO-
co	1	-2	3	4	-5	6	7	8	-9	10	-11	12	1	2	3
CO-1	-	1	2	-	3	3	-	-	-	-	-	-	-	3	-
CO-2	-	1	2	-	3	3	3	-	-	-	-	-	-	3	-
CO-3	-	1	2	-	3	3	-	-	-	-	-	-	-	3	-
CO-4	-	1	2	-	3	3	3	-	-	-	-	-	-	3	-
CO-5	-	1	2	-	3	3	-	-	-	-	-	-	-	3	-
		1	L: Wea	kly rel	ated,	2: Moo	derate	ly rela	ted an	d 3: St	rongly	relate	ed		

MODULE 1: INT	RODUCTION 9L	
Classification of	of soil water- soil moisture contents- depth of soil water available to	<b>CO</b> 1
plants perman	ent and ultimate wilting point- Crop and crop seasons - consumptive	
use of water - I	Duty -Factors affecting duty - Irrigation efficiencies.	DIL-2
MODULE 2: IRR	IGATION METHODS AND DESIGN OF IRRIGATION CHANNEL	9L
Canal irrigatio	n - Lift irrigation - Tank irrigation - Flooding methods - Merits and	
demerits - Spri	nkler irrigation - Drip irrigation, FSL of canal- design of canal in alluvial	CO-2
soil and non-al	luvial soils- use of Garrets diagrams and Lacey's Regime diagrams-lining	BTL-3
of irrigation cha	annels.	
MODULE 3: DIV	ERSION AND IMPOUNDING STRUCTURES	9L
Weirs - elemer	ntary profile of a weir - weirs on pervious foundations - Types of	CO-3
impounding str	uctures- Tanks, Sluices and Weirs - Gravity dams - Earth dams - Arch dams	BTL-2
- Spillways – Fa	ctors affecting location and type of dams - Forces on a dam.	DIL-2
MODULE 4: CAN	IAL IRRIGATION	9L
Classification c	of canals - Alignment of canals- Canal drops -Cross drainage works - Canal	CO-4
Head works - C	anal regulators - River Training works.	BTL-2
	DSS DRAINAGE AND CANAL REGULATION WORKS 9L	
Types- selection	on of suitable type of CD works- aqueduct and Syphon aqueduct	
determination	of maximum flood discharge and waterway for drain, fluming of canal-	CO-5
design of bank	connections: Canal fail- necessity and location- types of fails- Cross	BTL-2
regulator and c	distributary head regulator- their functions, Silt control devices, Canal	
escapes- types	of escapes.	
TEAT BOOKS	S.K. Garg "Irrigation Engineering And Hydraulic Structures", Khanna pub	lichars 2004
1.	S.K. Garg, imgation Engineering And Hydraulic Structures , khanna pub	11311813, 2004
2	Sharma R.K., and Sharma T.K., "Irrigation Engineering", S. Chand and com	pany, New
2.	Delhi,2008.	
REFERENCE BOO	DKS	
1	A.M.Michael. (2008). Irrigation, Theory and Practices, Vikas Publishing Ho	ouse Pvt.Ltd,
<b></b>	Second Edition.	
2	Dilip Kumar Majumdar. (2015). Irrigation Water Management (Principles	& Practices),
۷.	Prentice Hall of India (P), Ltd.	
E BOOKS		
1.	https://archive.org/details/irrigationengine00davirich	
2	https://insightgovtexam.com/irrigation-engineering-and-hydraulic-struc	tures-by-santo
۷.		
MOOC		
1.	https://www.mooc-list.com/tags/irrigation	
2.	https://www.coursera.org/courses?languages=en&query=civil%20engir	leering

COURS	SE TITL	.E	RENEWABLE ENERGY     CREDITS     3       CEC42E3     COURSE     DE     LTDS     3 0.00														
CO CC	URSE ODE		CEC	24253		C CA	OURS	E RY		DE		L-T-P	P-S	3-0-	0-0		
Ve	rsion		:	1.0		Appro	oval D	etails	24t 30	h ACM	- 3	LEARN LEV	ING EL	BTI	3		
ASSES	SMEN	T SCH	IEME														
First P Asses	eriodic ssment	al	Second Asse	Period ssment	ical	So Assi I	eminar ignmer Project	/ its/	Surp	rise Tes Quiz	st /	Attend	ance	ES	έE		
1	.5%		1	.5%			10%			5%		5%		50	%		
Co Desc	ourse ription	ר i k	This elec ncludes pio-mass	tive co the ba 5.	ourse co sic ren	overs c ewable	oncept e energ	ts and v gy sour	ways o ces suo	f harne ch as sc	essing blar, w	renewa ind, tid	able ene al, hydr	ergy. It Topowei	and		
Co Obje	ourse ective	1 2 3 4 5	. To ex . To int . To ex . To int . To ex	To explain techniques that are related to harness solar energy To introduced methods of harnessing wind energy To explain techniques of thermal and tidal energy conversion To introduce harnessing methods related to hydropower To explain innovative ways on bio-mass driven energy													
Co Out	ourse come	U	Jpon cor 1. Ex 2. Ex 3. Id 4. Ex 5. Id	mpletic xplain : xplain : lentify xplain : lentify	on of ti suitabl approp techni approp the wa	his cour e techr priate to ques to priate to ays for	rse, the niques echniq harne echniq harves	e stude to harr ues to ess the ues to ting en	ents wi ness so harnes rmal ar harnes hergy fi	ll be ab plar ene ss wind nd tidal ss hydro rom bic	energy energ l energopowe o-mass	gy gy er					
Prereq	uisites	: Nil															
CO, PO	O AND	PSO	MAPPIN	IG													
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-		
CO-1	1	2	1	4	5 1	1	2	0 1	9 1	10	1	12	-	2	5		
CO-2	1	2	2	1	2	2	1	2	1	1	1	1		3	-		
CO-3	1	2	2	1	2	2	1	2	1	1	1	1	-	3	-		
CO-4	1	2	1	1	1	3	1	1	1	1	1	1	-	3	-		
CO-5	1	2	1	1	1	3	1	1	1	1	1	1	-	3	-		
	_	_	1: We	akly re	elated,	, 2: Mo	derate	ly rela	ted an	d 3: Str	ongly	relate	d	_			

MODULE 1: SC	DLAR ENERGY (9L)	
Sun as a source environment, present and fu	e, availability of solar energy, nature of solar energy, solar energy and application of solar energy, photo thermal, photovoltaic, photosynthesis, application of solar energy.	CO-1 BTL-3
MODULE 2: W	IND ENERGY (9L)	
Basics and por applications, v generation, site	wer analysis, wind resource assessment, power conversion technologies and wind power estimations, principles of wind turbine designs, wind turbine e selection, cost economics and viability of wind farm.	CO-2 BTL-3
MODULE 3: GE	OTHERMAL, TIDE AND WAVE ENERGY (9L)	
Availability of various types of generation usi thermal techn	Geo-thermal energy- size and distribution, recovery of Geo-thermal energy, of systems to use Geo-thermal energy, direct heat applications, power ng geo-thermal heat, sustainability of Geo-thermal source, status of Geo- ology, economics of Geo-thermal energy.	CO-3 BTL-3
MODULE 4: HY	(DEL (9L)	
Hydro power: Microhydelpor hydel, merits, in India. Integr MODULE 5:BIC Biomass: Gen residues usec	potential, Hydro power generation and distribution, Mini and wer(MHP), Generation: classification of hydel plants, concept of micro MHP plants: Components, design and layout, Turbines, efficiencies, status rated energysystems and their cost benefit analysis. <b>D MASS ENERGY (9L)</b> eration and utilization, Properties of biomass, Agriculture Crop & Forestry I as fuels. Biochemical and Thermo-Chemical Conversion, Combustion,	CO-4 BTL-3
Gasification, B Engines, Biom energy: Photo materials Ther	iomass gasifiers and types etc. Applications of Gasifiers to thermal power and ass as a decentralized power generation source for villages Concept of Bio- synthesis process, Bio-fuels, Biomass resources Bio based chemicals and mo-Chemical Conversion: Pyrolysis, Combustion, Gasification, Liquefaction.	CO-5 BTL-3
TEXT BOOKS		
1	Godfrey Boyle. (2012). <i>Renewable Energy Power for a sustainable future</i> , Ox Press.	ford University
2	John Twidell, Tony Weir. (2005). <i>Renewable Energy Resources</i> , Routledge.	
REFERENCE BC	ООКЅ	
1.	Jeremy Shere. (2013). <i>Renewable – The World –Changing Power of Alternati</i> <i>Energy</i> , St. Martin's Press.	ve
2.	<i>Guidelines for the Design of Rigid Pavements for Highways</i> , IRC:58-1998, The Congress, New Delhi.	Indian Roads

COURS	SE TITL	E	HOUSING PLANNING AND MANAGEMENTCREDITS3CEB4305COURSEDEL-T-P-S3-0-0-0													
COI CC	URSE DDE		CEB	4305		C CA	OURS TEGOI	E RY		DE		L-T-P	-S	3-0	-0-0	
Ver	rsion		1	L. <b>O</b>		Appro	oval Do	etails	24t 30	h ACM	1 - 8	LEARN LEVE	ING EL	BT	'L-3	
ASSES	SMENT	SCHE	ME								-					
First Pe Asses	eriodica ssment	al S	econd Asses	Period ssment	ical	Se Assi F	eminar, gnmen Project	/ its/	Surp	rise Tes Quiz	st /	Attenda	ance	E	SE	
1	5%		1	5%			10%			5%		5%		50	0%	
Co Descr	urse ription	Tl hc m an	housing projects. The course focuses on cost effective construction materials and methods. Emphasis has also been given on the principles of sustainable housing policies and programmes. The course should enable the students to													
Course Object	e .ive	Tł	ne cour 1. m 2. lo 3. lo e 4. A p 5. lr p	rse sho nake u lentify rograr lentify valuat ttains rincipl npart rojects	ould e se of f the r nmes the c ion. adequ es of know	nable th the basi ole of p lifferent uate kno sustaina ledge o	ne stud ic term oublic, t types owledg able ho f const	dents t ns of ho private s of site ge in co pusing tructio	ousing, e and r es and ost effe policie n proje	, housin ion-gov improv ective c es and f ect app	ng law vernm ve the constru fundin praisal	vs and c lent org ir know uction r lg agen and fin	control ganizati vledge i nateria cy s ancing	regulation ion hous n desigr ls and m of hous	ons ing and ethods, ing	
Course Outcor Prerequ	Course       Upon completion of this course, the students will be able to         1. Explain the policies and regulations in housing         2. Recall the various housing programs         Outcome         3. Plan a housing project         4. Choose appropriate construction technique and cost effective construction materials         5. Evaluate Housing finance and cash flow analysis of housing projects         Prerequisites: Nil         CO, PO AND PSO MAPPING														aterials	
со	РО- 1	ΡΟ- 2	РО- 3	РО- 4	PO- 5	PO- 6	РО- 7	8 8	РО- 9	РО- 10	РО- 11	PO- 12	PSO- 1	PSO- 2	PSO-3	

60	PO-	PSO-	PSO-												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	F30-3
CO-1	-	-	2	-	-	2	•	2	2	-	3	3	-	2	2
CO-2	-	-	2	-	-	2	1	2	-	-	-	3	-	2	2
CO-3	2	3	1	-	-	2	-	-	-	-	-	-	-	2	2
CO-4	-	-	-	2	-	2	3	2	-	-	-	3	-	2	2

CO-5	2	3	2	2	-	2	1	-	-		-	-	-	2	2
1: Weakly related, 2: Moderately related and 3: Strongly related															
MODULE 1: INTRODUCTION TO HOUSING (9)															
Definition of Basic Terms - House, Home, Household, Apartments, Multi-storeyed															
Buildings, Special Buildings, Objectives and Strategies of National Housing Policies,										licies,	CO-1				
Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural											'L-3				
Local Bodies - levels - Development Control Regulations, Institutions for Housing at															
National, State and Local levels.															
MODULE 2:HOUSING PROGRAMMES(9)															
Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services,									ices,	<b>CO 3</b>					
Neighbournoods, Open Development Plots, Apartments, Rental Housing, Co-operative									ative						
Organisations											DIL-3				
MODULE 3: PLANNING AND DESIGN OF HOUSING PROJECTS(9)															
Formulation of Housing Projects – Site Analysis Layout Design Design of Housing Units – CO-3															
Formulation of Housing Projects - Site Analysis, Layout Design, Design of Housing Units (Design Problems)									Units	BTL-3					
MODULE 4 :CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS (9)										(9)					
Now Construction Techniques Cost Effective Meders Construction Meterials															
new (	constr ng Con		Concor	nques	- COSL		ve ivio orform		onstru Tvaluat		viateria	315,		CO-4	
Building Centres - Concept, Functions and Performance Evaluation n BTL-3											L-3				
MODULE 5:HOUSING FINANCE AND PROJECT APPRAISAL (9)															
Appraisal of Housing Projects - Housing Finance, Cost Recovery - Cash Flow Analysis,									CO-5						
Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).										BT	L-3				
SELF STUDY: Development Control Regulations															
TEXT BOOKS															
1	1.Meera Mehta and Dinesh Mehta. (2009). Metropolitan Housing Markets, Sage Publications Pvt. Ltd, New Delhi.														
2	2.	Francis Cherunilam and Odeyar D Heggade. (2008). Housing in India, Himalaya Publishing House, Bombay.													
3	8.	GO Pov	GOI, <i>National Urban Housing and Habitat Policy 2007</i> , Ministry of Housing and Urban Poverty Alleviation, Government of India, New Delhi, 2001.												
4	I.	Gautam Bhatia. (2015). Laurie Baker Life, Work & Writings, Penguin Books, India.													
5	5.	Pet	Peter Birch. (2013). The Swedish housing market: Trends and risks, university of												
REFERENCE BOOKS															
1. Development Control Bules for Chennai Metropolitan Aera, CMDA, Chennai, 2002															
1															
2	2.	Nat	ional F	lousin	g Polic	y, Gov	ernme	nt of I	ndia						
3	Isaacs, N., Camilleri, M., French, L., Pollard, A., Saville-Smith, K., Fraser, R., Rossouw and P.         3.       Jowett, J. (2006). Analysis on the Household Energy End-use Project, Judgeford, New         Zealand									w and P., w					
E BOOKS															
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1.	https://www.rejinpaul.com/2016/10/ce6007-housing-planning-and-management- syllabus-notes-question-with-answers.html														
моос															
1.	https://nptel.ac.in/courses/124/107/124107001/														

COURSE TITLE	MODERN CONSTRUCTION MATERIALS CREDITS 3										
COURSE CODE	CEC4255	255 COURSE DE L-T-P-S 3-0-0-0									
Version	1.0Approval Details24th ACM - 30.5.2018LEARNING LEVELBTL-3										
ASSESSMENT SC	HEME										
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE						
15%	15%	15% 10% 5% 5% 50%									
Course Description	It describes the war floor and wall mate	It describes the water proofing techniques, thermal insulation, acoustic insulation, loor and wall materials and coating materials used in construction industry,									
Course Objective	<ol> <li>To study about</li> <li>To know about</li> <li>To understand t method of layin</li> <li>To gain knowled emulsions, varn</li> </ol>	thermal insulation. acoustic insulation. the various floor and g. dge on the properties ishes.	wall finishing ma	aterials, their p	roperties, aints, enamels,						
Course Outcome	Upon completic 1. Explain the app 2. Familiarize with 3. Choose the prop 4. Choose the floo 5. Apply appropria	<ul> <li>Upon completion of this course, the students will be able to</li> <li>Explain the appropriate water proofing technique in construction.</li> <li>Familiarize with thermal insulation materials to be used in construction.</li> <li>Choose the proper insulation material for acoustics.</li> <li>Choose the floor and wall materials to be used in construction</li> <li>Apply appropriate coating materials to be used in construction</li> </ul>									

## **Prerequisites: NIL**

CO, PO	) AND	PSO	MAP	PING											
6	PO-	РО	PO-	PO-	РО	PO-	PO-	PO-	РО	PO-	РО	PO-	PSO-	PSO-	PSO-
0	1	-2	3	4	-5	6	7	8	-9	10	-11	12	1	2	3
CO-1	-	-	1	-	-	-	-	-	-	-	-	-	1	2	-
CO-2	-	-	-	-	-	2	-	-	-	-	-	-	1	2	-
CO-3	-	-	-	-	-	1	-	-	-	-	-	-	1	2	-
CO-4	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO-5	-	-	1	-	-	-	-	-	-	-	-	-	1	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: DA	MP AND WATER PROOFING	9L							
Damp proofing- hot applied and cold applied- Emulsified asphalt, Bentonite clays, butyl rubber, silicon, vinyl's Epoxy resins and metallic water proofing materials properties, uses.(Water proofing membranes such as rag, asbestos, glass, felt- plastic and synthetic rubber- vinyl, butyl rubber, neoprene polyvinyl chloride (PVC)- Application of the above under various situations- basement floors, swimming pool, terraces, etc.									
MODULE 2: THERMAL INSULATION									
Heat transfer and heat gain by materials- vapor barriers and rigid insulation- properties and uses of spun glass, foamed glass, cork, vegetable fibers, mineral fibers, foamed plastics, and vermiculite and glass fibers. Gypsum- manufacture, properties and uses,CO-2plaster of paris and bydride gypsumBTL-2									
MODULE 3: ACC	DUSTIC INSULATION	(9L)							
Porous, Baffle a partial board, fil above- current	and perforated materials such as acoustic plastic, acoustic tiles, wood, ber board, cork, quilts and muts- Brief study on properties and uses of the developments.	CO-3 BTL-3							
MODULE 4: FLOOR AND WALL COVERINGS 9L									
Floor coverings uses and laying surfaced panelin quarry and ce developments.	s- flooring- softwood, hardwood- Resilient flooring- terrazzo- properties, . Wall coverings - Porcelain, enameled metal, wood veneer, Vinyl, plastic ng - properties uses and lying. Wall and floor tiles- Ceramic glazed mosaic, ement files- properties uses and lying. Market study of current	CO-4 BTL-2							
MODULE 5: PRO	DTECTIVE AND DECORATIVE COATINGS	9L							
Paints - Enamel and application retardant paints	ls, distempers, plastic emulsions, cement-based paints- properties, uses s- defects in painting, varnishes, special purpose paints- luminous & fire- s, properties, uses & application.	CO-5 BTL-2							
TEXT BOOKS	Panguala S.C. (2008) Ruilding Construction Charater Publishing House	Apand India							
1. Rangwala, S.C. (2008). <i>Building Construction</i> , Charotar Publishing House., Anand, India.									
2. Punmia, B.C. (2016). <i>Building Construction</i> , Laxmi Publications Pvt. Ltd., New Delhi.									
3.Arora S.P. and Bindra S.P. (2017). Building Construction Planning Techniques and Method of Construction, Dhanpat Rai Sons.									
REFERENCE BOO	OKS								
1.	1.       Sectnaraman, Chinnasamy. (2012). Construction Techniques, Equipment and Practices,         Anuradha Publications.								
E BOOKS									

1.	https://www.whsmith.co.uk//ebooks-technology-and-engineering-building- construct
моос	
1.	https://onlinecourses.nptel.ac.in/noc15 ce05/course
2.	https://swayam.gov.in/courses/1338-modern-construction-materials

COURS	SE TITL	E			AP	PLIED H	IYDROI	LOGY			C	REDITS	5	3	
CO CC	URSE DDE		CEC4266 COURSE DE L-T-P-S 3-0-0-1												
Vei	rsion		1.0Approval Details24th ACM -LEARNING30.5.2018LEVELBTL-3												
ASSES	SMEN	Т ЅСНЕ	EME												
First Po Asses	eriodic ssment	al S	Second Periodical Assessment         Seminar/ Assignments/ Project         Surprise Test / Quiz         Attendance         ESE												
1	5%		15% 10% 5% 5% 50%												
Co Descr	ourse ription	Th irr irr	his course deals with the different cropping patterns and crop water requirements, rigation scheduling, strategies in water use, operation of canal irrigation system and rigation management.												
Course Object	e :ive	1. 2. 3. 4. 5.	<ol> <li>To understand the concepts of hydrologic cycle.</li> <li>To learn the various methods of measurement of rainfall.</li> <li>To get acquainted with the principles of hydrograph.</li> <li>To understand the concepts behind flood routing and control.</li> <li>To understand the concepts of ground Water hydrology.</li> </ol>												
Course Outco	e me	1. 2. 3. 4. 5.	Upor Expla Analy Apply Apply Expla	n compl iin the yze the y the ui y variou iin the p	letion o various basic o nit hyd us met princip	of this o s comp data for rograp hods of lles of C	course, onents r rainfa h techr f flood Ground	the stu of hyd Ill predi niques a routing water	udents rologic iction. and its g. hydrol	will be cycle f applica ogy.	able t or rair ations.	o Ifall			
Prereq	uisites	: Nil	Jil												
CO, P	PO AN	D PSC	) MAF	PPING											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
<u> </u>	1	2	3	4	-	6 2	-	8	9	10	- 11	12	1 2	2	3
CO-1		-	2	2		2	2						2	2	
CO-2	-	1	2	2	-	3	3	-	-	-	-	-	2	2	-

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1: Weakly related, 2: Moderately related and 3: Strongly related

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CO-4

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MODULE 1: PI	RECIPITATION 9L	
Hydrologic cy -Spatial meas point rainfal precipitation.	cle - Types of precipitation - Forms of precipitation - Measurement of Rainfall urement methods - Temporal measurement methods - Frequency analysis of I - Intensity, duration, frequency relationship - Probable maximum	CO-1 BTL-2
MODULE 2: AB	STRACTION FROM PRECIPITATION 9	L
Losses from process -Infilt rainfall.	precipitation - Evaporation process - Reservoir evaporation - Infiltration ration capacity - Measurement of infiltration - Infiltration indices - Effective	CO-2 BTL-3
MODULE 3: HY	/DROGRAPHS 9L	
Factors affect hydrograph - Hydrograph	ting Hydrograph – Base flow separation - Unit hydrograph - Derivation of unit S curve hydrograph - Unit hydrograph of different deviations - Synthetic Unit	CO-3 BTL-2
MODULE 4: FL	OODS AND FLOOD ROUTING9L	
Flood frequer flood routing	ncy studies - Recurrence interval - Gumbel's method - Flood routing - Reservoir - Muskingum's Channel Routing - Flood control	CO-4 BTL-2
MODULE 5: GR	ROUND WATER HYDROLOGY 9	L
Types of aqui Aquifer - Recu analysis only.	fers - Darcy's law - Dupuit's assumptions - Confined Aquifer - Unconfined uperation test - Transmissibility - Specific capacity - Pumping test - Steady flow	CO-5 BTL-2
TEXT BOOKS		
1.	Subramanya, K. (2000). Engineering Hydrology, Tata McGraw-Hill Publishing C	o., Ltd.
2.	Raghunath, H.M. (2000). <i>Hydrology,</i> Wiley Eastern Ltd.	
REFERENCE BC	DOKS	
1.	Ernest W. Tollner. (2016). <i>Engineering Hydrology for Natural Resources Engine</i> Blackwell, 2 nd edition.	ers, Wiley-
2.	Singh, V.P. (2000). Hydrology, McGraw-Hill Inc., Ltd.	
3.	Dr.Jaya Rami Reddy. (2011). <i>A Text Book of Hydrology</i> , University Science Pres Publications, second edition.	s, Laxmi
E BOOKS		
1.	<u>https://books.google.co.in/books?id=RRwidSsBJrEC&amp;lpg=PP1&amp;pg=PP1#v=on</u> <u>e</u>	epage&q&f=fals
2.	http://blogbook.co/downloads/applied hydrology ven te chow david r n	naidment.pdf
MOOC		
1.	https://www.openlearning.com/courses/hydrology-2	
2.	https://www.class-central.com/tag/hydrology	

COURS	SE TITL	E	REMOTE SENSING TECHNIQUES AND APPLICATIONS CREDITS 3												
CO CC	URSE DDE		CEC4266 COURSE DE L-T-P-S 3-0-0-0												
Ve	rsion		1.0Approval Details24th ACM -LEARNING30.5.2018LEVELBTL-3												
ASSES	SMEN	T SCHE	<b>ME</b>												
First Po Asses	eriodic ssment	al S	Second Periodical Assignments/ Assignments/ Quiz Attendance ESE												
1	5%		15% 10% 5% 5% 50%												
Co Descr	ourse ription	Tł pr co	nis cou inciple ncepts	rse dea s of m s of ear	als wit apping th scie	h the c g flood nce. Cc	concep risk z over	ts of el one, co	lectron oncept	nagneti s behii	ic radia nd agr	ance, ty iculture	ypes of e, fores	land use t and se	e/land, oil and
Course Object	e tive	1. 2. 3. 4. 5.	<ul> <li>To understand the concepts of Electromagnetic radiance.</li> <li>To learn the various types of land use/ land cover.</li> <li>To get acquainted with the principles of mapping flood risk zone.</li> <li>To understand the concepts behind agriculture, forest and soil.</li> <li>To understand the concepts of earth science.</li> </ul>												
Course Outco	e me	1. 2. 3. 4. 5.	Upon Illust Analy Ident Prepa Use t	rate the ze the ify grou are cro he prin	letion e vario basic und wa p inver nciples	of this o bus com data for ater po ntory m of litho	course, iponen r urbar tential napping ological	the stu ts of el land u zones, g and au and st	udents ectrom ise plai rechar rrive at ructura	will be nagneti nning ge area t produ al mapp	able t c radia a and a ction e bing.	o tion ssess d stimat	rought. ion.		
Prereq	uisites	: Nil	il												
CO, P	PO AN	D PSC	) MAF	PPING											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
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CO-2	-	-	-	2	2	3	3	-	-	-	-	1	-	2	-
CO-3	-	1	-	2	2	3	3	-	-	-	-	1	_	2	-
CO-4	-	-	-	2	2	3	3	-	-	-	-	-	-	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related

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CO-5

MODULE 1: IN	TRODUCTION 9L									
Definition - P	hysics of remote sensing - electromagnetic radiation (EMR) - remote sensing	CO-1								
windows - int	eraction of EMR with atmosphere, earth surface, soils, water and vegetation -	BTI-2								
platform and	nd sensors - image interpretations.									
MODULE 2: LA	ND USE STUDIES9L									
Definition of	land use - land use / land cover classification - schemes and levels of	<b>60 3</b>								
classification	systems with RS data - land use mapping - change detection - urban land use									
planning, site	suitability analysis, transportation planning.	DIL-3								
MODULE 3: W	ATER RESOURCES 9L									
Arial assessm	ent of surface water bodies - Capacity survey of water bodies - mapping of	CO-3								
snow - covere	d areas - flood risk zone mapping - identification of groundwater potential	BTI-2								
zones, rechar	ones, recharge areas - droughts, definition, drought assessment and management.									
MODULE 4: AG	MODULE 4: AGRICULTURE, SOIL AND FORESTRY 9L									
Crop inventory mapping - production estimation - command area monitoring - soil mapping CO-4										
- crop stress d	etection - estimation of soil erosion - forest types and density mapping - forest	BTL-2								
		QI								
		JL								
landforms - id	entification - use of remote sensing data for landslides - targeting mineral	CO-5								
resource - Eng	gineering geology and Environmental geology.	BTL-2								
TEXT BOOKS										
1.	Michael Hord, R. (1986). <i>Remote Sensing Methods and Application</i> , John Wiley York.	y and Sons, New								
REFERENCE BC	REFERENCE BOOKS									
1.	Thomas Lillesand, Ralph W. Kiefer & Jonathan Chipman. (2015). <i>Remote Sensitive Interpretation</i> , Wiley, 7 editions.	ng and Image								
E BOOKS										
1.	http://ebooks.iospress.nl/									
2.	https://www.topfreebooks.org/tag/remote-sensing/									
моос										
1.	https://www.coursera.org/learn/gis-applications/lecture/wr6Kd/remote-ser	sing-basics								
2.	https://www.mooc-list.com/tags/remote-sensing									

COURS	SE TITL	E	AIR POLLUTION MANAGEMENT CREDITS 3												
COI CC	URSE DDE		CEC4268 COURSE DE L-T-P-S 3-0-0-0												
Ver	rsion		-	1.0		Appro	oval Do	etails	24t 30	h ACM .5.2018	-	LEARN LEV	ling El	BT	L-2
ASSES	SMEN [.]	T SCHE	ME												
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Co Descr	urse ription	Tł an	This course describes various types of Air Pollutants, their effects and control methods, and various Air Pollution dispersion models.												
Course Object	e ive	1. 2. 3. 4. 5.	<ol> <li>Understand the various types of Air Pollutants and their effects of human beings, materials, vegetation's and animals.</li> <li>Understand the meteorological factor responsible for dispersion of pollutants.</li> <li>Know about the measurement of the Air Pollutants in the ambient air using high volume air samplers.</li> <li>Study about the control methods adopted for different types of Air Pollutants coming out from different types of industries.</li> <li>Study about the noise pollution problems and the noise standards.</li> </ol>												
Course Outcor Prereq	e me uisites	Ur 1. 2. 3. 4. 5. <b>: CSB2</b>	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Categorize the various types of Air Pollutants from different sources.</li> <li>2. Demonstrate the dispersion of pollutants, meteorological factors and dispersion models.</li> <li>3. Select appropriate control equipment to minimize the air pollution problems in industries.</li> <li>4. Explain the need for EIA and the importance of Air quality standards</li> <li>5. Summarize the sources, effects, assessment, standards and control techniques for noise pollution</li> </ul>												
CO, P	O AN	D PSC	) MAF	PPING											
со	PO	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO	PO-	PO-	PSO-	PSO-	PSO-
CO-1	-1 -	2	3 2	4	5	- -	7	8 -	9 1	-10 -	-	12	1	2	3

CO-2	-	1	2	1	-	-	1	-	1	-	-	1	1	2	2		
CO-3	-	1	2	1	-	-	1	-	1	-	-	1	1	2	2		
CO-4	-	1	2	1	-	-	1	-	1	-	-	1	1	2	2		
CO-5	-	1	2	1	-	-	1	-	1	-	-	1	1	2	2		
1: Weakly related, 2: Moderately related and 3: Strongly related										d							
MODU	JLE 1:	SOUR	CES AN	D EFFE		AIR P	OLLUT	ANTS						9L			
Classif	Classification of air pollutants - Particulates and gaseous pollutants - Sources of air pollution											lution					
- Sourc	Source inventory - Effects of air pollution on human beings, materials, vegetation, animals										nimals	CO	-1				
- global warming-ozone layer depletion, Sampling and Analysis – Indoor Air Pollution- Source										ource	BTL	-2					
and an	nbient	vient sampling – Air Pollution Index															
MODU	LE 2: [	DISPER	SPERSION OF POLLUTANTS										9	L			
Eleme	nts of	atmos	phere	- Mete	orolog	ical fac	ctors -	Wind	roses -	Lapse	rate -	Atmos	pheric				
stabilit	y and	turbu	Irbulence - Plume rise - Dispersion of pollutants -Gaussian Dispersion														
Equati	on- Dis	spersic	ersion models – Applications BTL-2										2				
1000																	
MODU	LE 3: A									David			wal hu	9L			
conce	pts or	contro	JI-Pri ugal fil	Itration		esign (	oloctro	roi me	procipi	s - Pari		es cont	ritoria	CU-3			
for equ	linmer	entint nt - gag	igai, III	nollutai	nt cont	rol by	adsorn	tion a	hsornt		ndens:	tion F	Rio	RTI	-5 -2		
filtratio	on - Pc	ollutior	n contr	ol for s	pecific	maior	indust	ries	501 pt		nachse				. 2		
MODU	LE 4: <i>A</i>	AIR QU	ALITY	MANA	GEMEI	NT								9L			
Air qu	ality st	andar	ds -Air	polluti	on con	trol eff	orts - Z	Zoning	- Towr	n plann	ing reg	gulation	n of				
new in	dustri	es - Le	gislatio	on and	enforc	ement	- Envir	onmer	ntal Im	pact As	sessm	ent an	d Air	CO- BTI	-4 2		
quality	' Act													DIL	-2		
MODU	LE 5: N	OISE	POLLU	TION										9L			
Source	es of no	oise po	ollution	- Effec	ts - Ass	essme	nt - Sta	ndard	s - Cont	rol me	thods -	– Preve	ention	CO- BTL	-5 -2		
TEXT B	OOKS																
1		Anjaneyulu, D. (2002). <i>Air Pollution and Control Technologies</i> , Allied Publishers, Mumbai.									nbai.						
2		La	wrence	e K. Wa	ing, No	rman (	C Perel	ra, Yur	ng-Tse	Hung.	(2004).	Air Po	llution C	òntrol			
		Eng	gineeri	ng, Tol	куо.												
3		Ka <i>Co</i>	rl B. Sc mpliar	hnelle, <i>ce Gui</i>	, Jr., an <i>de,</i> Mc	d Partl Graw-l	na R. D Hill.	ey. (19	999). At	tmospł	neric Di	ispersio	on Mode	ling			
REFER	ENCE E	BOOKS															
1		Da	vid H.F	ELiu, B	ela G. I	.iptak.	(2001)	. Envir	onmen	tal Eng	ineers	' Handl	book, Le	wis Publ	ishers.		
		-															

E BOOKS	
1	https://www.coursera.org/learn/global-environmental-management
2	www.academia.edu//Ebook Download Air Pollution Control Engineering Full B
моос	
1	https://www.mooc-list.com/tags/air-quality
2	https://www.coursera.org/learn/global-environmental-management

COURS	SE TITL	E			CON		CRED	ITS	3						
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ASSES	SMEN	T SCHE	ME												
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Co Descr	urse iption	Th of	This course deals with the properties of cement, types of admixtures, mechanical properties of aggregate, mix proportioning of concrete and durability of concrete.												
Course Object	e ive	1. 2. 3. 4. 5.	<ol> <li>To study about the properties of cement.</li> <li>To get exposure to different types of admixtures.</li> <li>To know about the mechanical properties of aggregates.</li> <li>To understand the concepts of mix proportioning of concrete.</li> <li>To study about the properties and durability of concrete.</li> </ol>												
Course Outcor	e me	<ul> <li>Upon completion of this course, the students will be able to</li> <li>Recognize the properties of cement and its ingredients</li> <li>Use appropriate admixtures in constructions</li> <li>Illustrate the properties of aggregates.</li> <li>Carry out mix design for concrete</li> <li>Illustrate the durability properties of concrete</li> </ul>													
Prereq	uisites	: Nil													
CO, P	O AN	D PSC	) MAF	PPING											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
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CO-2	-	-	1	2	3	2	3	-	-	-	-	-	-	3	-

CO-4

CO-5

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1: Weakly related, 2: Moderately related and 3: Strongly related

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MODULE 1: CE	EMENT 9L	
Composition	of OPC-Manufacture-Modified Portland Cements-Hydration process of	CO-1
Portland cem	ents-Structure of Hydrated cement Pastes.	BTL-2
MODULE 2: AD	DMIXTURES	9L
Mineral adm	nixtures-Slags-Pozolanas and Fillers-Chemical Admixtures-Solutes	
Retarders-Air	Entraining Agents-Water proofing compounds-Plasticizers and Super	CO-2
Plasticizers.		BIT-3
MODULE 3: AG	GREGATES	9L
Shape and M	echanical Properties-Absorption and Physical Durability-Chemical stability and	CO-3
packing Chara	acteristics	BTL-2
MODULE 4: FR	ESH CONCRETE	9L
Mix proportio	oning-IS and ACI codal Methods-Workability-Test -Mixes incorporating Fly-Ash	CO-4
Mixes for Hig	n performance concrete-Fibre reinforced concrete.	BTL-2
MODULE 5: PR	OPERTIES AND DURABILITY OF CONCRETE	9L
Interfacial	Transition Zone-Fracture Strength-Mechanical Properties-High	CO-5
Strength Con	crete-Shrinkage-Creep- Other properties. Basic consideration-Stability of	8TI-2
constituents-0	Chemical Attack-Corrosion of Reinforcing steel.	
TEXT BOOKS		
1.	Neville, A.M. (2012). Properties of concrete, Longman, 4th edition	
2.	M. S. Shetty. (2006). Concrete Technology, S. Chand &. Company Ltd, New Del	hi.
REFERENCE BC	OCKS	
1	Metha P.K. and Montreio P.J.M. (2012). <i>Concrete Structure Properties and Mo</i> Hall, 2 nd Edition.	aterials, Prentice
E BOOKS		
1.	https://civilread.com/download-concrete-tehnnology/	
моос		
1.	https://nptel.ac.in/courses/105102012	

COURS	SE TITL	.E	WATER RESOURCES ENGINEERING CREDITS 3												
CO CC	URSE DDE		CEC	24270		C CA	OURSI TEGOF	E RY		DE		L-T-P	P-S	3-0-	-0-0
Ve	rsion		-	1.0		Appro	oval De	etails	24t 30.	h ACM .5.2018	-	LEARN LEV	ING EL	BT	L-3
ASSES	SMEN	T SCHE	<b>ME</b>												
Fi Perio Asses	irst odical ssment	s t	econd Asses	Period ssment	ical :	Se Assi F	eminar gnmer Project	r/ its/	Surp /	orise Te ' Quiz	est	Attend	ance	ESE	
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Co Desci	ourse riptior	To n ma	To expose the students with the National water policy and reservoir planning and management.												
Course Object	e tive		<ol> <li>Know about the economics of water resources planning and National water policy.</li> <li>Gain knowledge on the analysis of hydrologic data.</li> <li>Know about estimation of water requirement, water budget and development plan.</li> <li>Be familiar with reservoir planning and management.</li> <li>Understand the benefits of cost Analysis and discounting techniques.</li> </ol>												
Course Outco	e me	Up	000 cor 1. [ 2. <i>A</i> 3. S 4. <i>A</i> 5. E	npletic Describ Analyze Gumma Analyze Explain	on of the e the we rize the e reservent the be	nis cour various ydrolog e wate voir cap enefit c	rse, the ways o gic data r requi bacity a ost ana	e stude of wate a for wa remen as per r alysis fo	nts wil er resou ater re t for va equire or basiu	l be ab urce pla source arious p ment n plann	le to anning develo ourpos ing	for de opmen es	velopm(	ent	
Prereq	uisites	: Mec	hanics	of Flui	ds										
CO, P	<b>O</b> AN	D PS(	) MAF	PPING											
со	PO -1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	PO- 7	РО- 8	РО- 9	PO -10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	-	1	1	1	-	1	1	-	-	1	1	-	1	2	-
CO-2	-	1	1	1	-	1	-	-	-	1	1	-	1	2	-
CO-3	-	-	1	1	-	1	1	-	-	1	1	-	1	2	-
CO-4	-	1	1 1 1 -		-	1	1	-	-	1	1	-	1	2	-
CO-5	-	-	3	1	-	1	1	-	-	1	1	-	1	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related								
MODULE 1: G	ENERAL	9L						
Water resourd resources plar data - Nationa resources deve	ces survey - Water resources of India and Tamil Nādu - Description of water nning - Economics of water resources planning, physical and socio-economic I Water Policy - Collection of meteorological and hydrological data for water elopment.	CO-1 BTL-2						
MODULE 2: NE	TWORK DESIGN	9L						
Hydrologic measurements - Analysis of hydrologic data - Hydrologic station network - Station network design - Spatial and temporal characteristics of water resources, constraints for its development like non-reversibility; planning region and horizon.       CO-2 BTL-3								
MODULE 3: W	ATER RESOURCE NEEDS	9L						
Consumptive irrigation, for of master plan development p	and non-consumptive water use - Estimation of water requirements for drinking and navigation - Water characteristics and quality - Scope and aims - Concept of basin as a unit for development - Water budget and plan.	CO-3 BTL-2						
MODULE 4: RE	SERVOIR PLANNING AND MANAGEMENT	9L						
Reservoir - Si Strategies for flood walls –	ngle and multipurpose - Multi objective - Fixation of Storage capacity - reservoir operation - Sedimentation of reservoirs - Design flood-levees and Channel improvement Case study	CO-4 BTL-3						
MODULE 5: EC	CONOMIC ANALYSIS	9L						
Estimation of Discounting te criteria; social	cost and Evaluation of Benefits - Discount rate - Discounting factors - chniques - Computer Applications. Estimation of benefits and costs; Appraisal benefit cost analysis. Basin planning; inter-basin transfer of water	CO-5 BTL-3						
	Lindow D.K. and Franzini I.D. (2000) Mater Resources Engineering McGrow							
1 I	Linsley R.K. and Franzini J.B. (2000). Water Resources Engineering, McGraw-	-חווו וווכ.						
2	Douglas J.L. and Lee R.R. (2000). <i>Economics of Water Resources Planning</i> , Ta Inc.	ata McGraw-Hill						
REFERENCE BC	DOKS							
1	Chaturvedi M.C. (2007). Water Resources Systems Planning and Manageme McGraw-Hill Inc., New Delhi.	ent, Tata						
2	Duggal, K.N. and Soni, J.P. (2005). <i>Elements of Water Resources Engineering</i> International Publishers.	, New Age						
E BOOKS								
1	http://www.a-zshiksha.com/forum/viewtopic.php?f=149&t=61486							
моос								
1	https://www.class-central.com/tag/water%20management							

COURS	E TITLE		BUILDING SERVICESCREDITS3														
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ASSESS	MENT	SCHEI	ME														
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Cou Descri	ırse iption	lt re	It describes the machineries, electrical systems, principles of lighting and illumination, refrigeration principles and fire safety aspects in the buildings.														
Course Objectiv	/e	1. 2. 3. 4. 5.	<ol> <li>To study about machineries used in the civil engineering field.</li> <li>To acquire knowledge about electrical systems in the buildings.</li> <li>To gain knowledge on the principles of Lighting and Illumination in the buildings.</li> <li>To understand the refrigeration principles and its applications.</li> <li>To create an awareness of the fire safety aspects in the buildings.</li> </ol>												ngs.		
CourseUpon completion of this course, the students will be ab1. Explain the various machineries used in construction.2. Familiarize with various electrical systems used in build3. Design the acoustics and illumination in buildings.4. Explain the air conditioning techniques in buildings.5. Summarize the fire safety installations in buildings.										ole to lings.							
Prerequ	Prerequisites: Nil																
CO, PC	) AND	PSO	MAP	PING													
со	РО- 1	РО -2	РО- 3	РО- 4	РО -5	РО- 6	РО- 7	РО- 8	PO -9	РО- 10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3		

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MODULE 1: MA	ACHINERIES 9L	
Geysar – Roon physically chall generators – ho	n and centralized – Lifts and escalators – special features required for enged – Conveyors – vibrators – concrete mixers – batching plant – ist.	CO-1 BTL-2
MODULE 2: ELE	CTRICAL SYSTEMS IN BUILDING9L	
Basics of electi installations, ea system, planni Transformers a	ricity – Single and three phase supplies, protective devices in electrical rthing for safety, types of earthing, BIS specification, types of wire, wiring ng electrical wiring for building, main and distribution boards – nd circuit breakers, layout of substation.	CO-2 BTL-2
MODULE 3: PRI	NCIPLES OF ILLUMINATION AND ACCOUSTIC DESIGN9L	
Visual tasks – fa of ligh additive a illumination util for stores, offic required and m elderly in buildi	actor affecting visual tasks – modern theory of light and colour – synthesis and subtractive synthesis of colour – luminous flux – candela – solid angle lization factor – depreciation factor – design of modern lighting – lighting schools, hospital and house lighting. Elementary ideal of special features inimum lev of illumination required for physically handicapped and ng types. Acoustics design auditorium, NRC factors.	CO-3 BTL-3
MODULE 4: REF	RIGERATION PRINCIPLES & APPLICATIONS, SOLAR POWER 9L	
Thermodynami sensible heat la super heated va refrigerants – v control devices window type at water piping – o protection again	cs – Heat – Temperature, measurements transfer – change of state – tent heat of fusion, evaporation, sublimation – saturation temperature – apour subcooled liquid – pressure temperature relationships for liquids – vapour compression cycle – compressors – evaporators – refrigerant – electrical motors, starters – air handling units – cooling towers – nd packaged air conditioners – chilled water plant – fan coil systems – cooling load – air conditioning system for different types of buildings – nst fire to be caused by A.C system. Solar panel – installation – subsidy.	CO-4 BTL-2
MODULE 5: FIR	E SAFETY INSTALLATION 9L	
Causes of fire building, like n escape and A. building types firefighting pur	in buildings – safety regulations – NBC – Planning consideration in on-combustible materials, construction of stair case and lift lobbies, fire C systems. Special features for physically handicapped and elderly in – heat and smoke detectors – Fire alarm system, snorkel ladder – mps and water storage – Dry and wet risers – automatic sprinklers.	CO-5 BTL-2
TEXT BOOKS		
1.	Uday Kumar, R. (2007). A Text book of Building Services, Eswar Publication	۱.
REFERENCE BOO	DKS	
1.	Ambrose. (2000). <i>Heat pumps and Electric Heating</i> , John and Wiley and Sector	ons, New York.
2.	National Building Code. (2016).	
E BOOKS		

1.	https://www.safaribooksonline.com/library/view/building- services/9780415631402/
2.	https://www.whsmith.co.uk//ebooks-technology-and-engineering-building- construct
моос	
1.	https://www.mastersportal.eu/studies/46963/building-services-engineering.html
2.	https://about.futurelearn.com//free-online-course-backed-by-uk-government- explor

COURS	SE TITL	E		CONC	EPTS I	C	REDITS		3						
COL CC	URSE DDE		CEC	24351		C CA	OURSI TEGOI	E RY		DE		L-T-P	P-S	3-0-	0-0
Ver	rsion			1.0		Appro	oval De	etails	24t 30.	h ACM	- 3	LEARN LEV	ING EL	BTI	L-3
ASSES	SMEN [.]	r schi	ME		I										
Fi Peric Asses	irst odical ssment	S	econd Asse	Period ssment	lical t	Se Assi F	eminar gnmer Project	r/ nts/	Surp /	orise Te Quiz	est	Attend	ance	ES	SE
1	5%		15% 10% 5% 5%									50	%		
Co Descr	ourse	To pr	To introduce the student the basic theory and concepts of various impact assessment procedures to protect the Environment.												
Course Object	e ive	Tr	1. Ki pi 2. Si 3. U 4. G in 5. Si pi	se sho now at rovisio tudy at nderst nvironi et kno npacts tudy th rojects	uld ena pout th nal in E pout th and an ment. wledge e impa	able the e basic EIA. le vario d asses e about act due	e stude s of En us met ss the i the er to higi	ents to: vironm chodolo mpact nvironn hway p	iental l ogies ir of vari nental rojects	mpact n EIA. ous de manag s, airpo	Asses: velopr ement rt proj	sment nental t plan t ects an	(EIA) an activitie o take c id other	d the leg s on are of ac infrastru	gal dverse ucture
CourseUpon completion of this course, the students will be a 1. Describe the importance of EIA studies.Course2. Apply the various methods for carrying out EIA 3. Apply the various techniques for predicting and 4. Explain the adverse impacts arising out of deve 5. Design the EIA reports for various projects									l be ab ut EIA s ng and ^E develo s	le to studies assess opmer	ing the Ital pro	impact jects.			
Prereq	Prereguisites: NIL														
CO, P	O AN	D PS(	) MAI	PPING											
	PO	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	РО	PO-	PO-	PSO-	PSO-	PSO-
	-1	2	3	4	5	6	7	8	9	-10	11	12	1	2	3
CO-1	-	-	1	-	-	1	1	1	-	2	-	-	-	2	2

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CO-4	-	-	1	-	-	1	1	1	-	2	1	1	-	2	2
CO-5	-	-	1	-	-	1	1	1	-	2	1	1	-	2	2
			1: W	eakly r	elated	, 2: Mo	oderat	ely rela	ated an	d 3: St	trongly	relate	d		
MODU	JLE 1:	INTRO	DUCTI	ΟΝ ΤΟ	ENVIR	ONME	NTAL	IMPAC	T ASSE	SSME	NT				9L
Introd	uction	- defir	nitions	and co	nconte	- histo	vrical d	avelon	ment		EIA fo	r ongin	oors -		
enviro	nment	al imp	act sta	tement	t - envi	ronme	ntal ap	praisa	l - envi	ronme	ental in	i engin ipact fa	actors	CO	-1
and ar	eas of	consid	leratio	า.				-				-		BTL	2
MODU	LE 2: :	ENVIR	RONME	NTAL	MPAC	T ASSE	SSME		rhodo	LOGY					9L
Measu	iremei	nt of ei	nvironr	nental	impac	t - orga	nizatio	on, scop	be and	metho	dologi	es of El	A - Six		
generi	c step	os - d	escript	ive ch	ecklist	s - siı	nple i	nterac	tion m	natrix	-stepp	ed ma	atrix -	BTI	-z L-2
unique	eness r	atio - ł	nabitat	evalua	ition sy	/stem.									
MODU	LE 3: E	NVIRC	ONMEN		ЛРАСТ	ASSES	SMEN	T IN IN	DIA						9L
Public	involv	rement	t techn	iques -	comp	rehens	ive env	vironm	ental ir	npact	study -	variou	S	CO	-3
project	t types	s - EIA I	Models	5 - EIA F	Regula	tions ir	India.							BTI	<b>3</b>
MODULE 4: ENVIRONMENTAL MANAGEMENT PLAN 9L															
Plan for mitigation of adverse impact on environment - options for mitigation of impact on								act on	CO-4						
water, air and land, flora and fauna; addressing the issues related to the Project Affected								ted	BTL-2						
People - ISO 14000.															
MODU	LE 5: (	CASE S	TUDIES	5									•		9L
EIA for	infras	tructu	re proj	ects - B	ridges	- Stadi	um - Hi	ighway	rs - Dan	ns - Mu	ulti-sto	rey Bui	ldings	CO	-5
- Wate	r Supp	ly and	Draina	ge Pro	jects.									BTL	3
TEXT B	OOKS														
1		R.	Pannirs	selvam	and S.	Karthi	keyan.	(2005	). Envir	onmer	ntal Im	oact As	sessme	nt, SPGS	
		Pu	blisher	s, Cher	nai.										
2		Jar	mes T.	Maugh	an. (20	013). E	nvironi	nental	Ітрас	t Analy	/sis: Pr	ocess a	ind Met	hods, CR	۲C
		Pre	ess; 1 e	dition.											
3		La	rry.W.	Canter	, (2002	.). Envi	ronme	ntal Im	pact A	ssessm	nent, N	ICGRA	N HILL,	publicat	ions.
REFERE	ENCE E	BOOKS													
1		Lav	wrence	, D.P. (	2003).	Enviro	nment	al Imp	act Ass	essme	nt - Pro	actical	solution	s to recu	ırrent
		pro	oblems	, Wiley	-Inters	cience	, New J	lersey.							
E BOOK	(S														
1		ht	ttps://\	www.so	cribd.c	om//	Enviro	nment	al-Impa	act-Ass	sessme	nt-Me	thodolo	gies-2nc	<u>l-Edi</u>
MOOC															

1	https://www.mooc-list.com/tags/environmental-impacts
2	https://www.coursera.org/browse/and/environmental-science-and-sustainability?.

COURS	SE TITL	.E	GEO-ENVIRONMENTAL ENGINEERING CREDITS 3												
CO CC	URSE DDE		CEC	24352		C CA	OURSE	E RY		DE		L-T-P	P-S	3-0-	0-0
Ve	rsion			1.0		Appro	oval De	etails	24t 30.	h ACM .5.2018	-	LEARN LEVI	ING EL	BTI	L-3
ASSES	SMEN	T SCHE	EME												
F Peri Asses	irst odical ssment	t S	econd Asses	Period ssment	lical t	Se Assi F	eminar gnmen Project	/ its/	Surp /	orise Te ' Quiz	est /	Attend	ance	ESE	
1	5%		1	.5%			10%			5%		5%		50	%
Co Desci	ourse riptior	To 1 th	To introduce the student the basic theory and concepts of geotechnical applications in the field of Environmental Engineering.												
Course Object	e .ive		<ul> <li>The course should enable the students to:</li> <li>1. Know about the basics of soil problems in Geotech engineering</li> <li>2. Study about the applications of geotechnical concepts in waste disposal</li> <li>3. Get the knowledge on Landfill designing</li> <li>4. Know the knowledge on Landfill designing</li> <li>5. Attain knowledge on various soil remediation techniques.</li> </ul>												
Course Outco	e me	Uţ	500 COI 1. E 2. A 3. D 4. E 5. [	mpletic xplain pply th Design t xplain Design	on of th the So ne Geo the Lar the var the Ex	nis cour il intera technic ndfill ar rious co plain th	rse, the action prin ad its e ompon ne vario	e stude probler ciples i nvironi ents of pus tec	nts wil ms asso in wast mental leacha hnique	ll be ab ociated te dispo l compo ate coll es and r	le to I with ( osal. onents ection metho	Geotec and re dology	h engin moval s on Soil	eering system Remedia	ation.
Prereq	uisites	s: Envi	ronme	ntal En	gineer	ing & C	Geotec	hnical	Engine	ering					
CO, PO	D AND	PSO N	ΛΑΡΡΙΝ	IG											
со	PO -1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO -10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	-	-	1	1	-	1	1	1	-	-	-	-	1	2	-
CO-2	-	1	1	1	-	1	1	1	-	-	-	-	1	2	-
CO-3	-	1	1	1	-	1	1	1	-	-	-	-	1	2	-
CO-4	-	-	1 1 -		-	1	1	1	-	-	-	1	1	2	-
CO-5	-	-	1	1	-	1	1	1	-	-	-	-	1	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related								
MODULE 1: IN	ITRODUCTION TO GEO-ENVIRONMENTAL ENGINEERING	9L						
Introduction a Engineering, So source, classifi characterizatio	and Soil-water-environment interaction: Introduction to geo environmental oil-water-environment interaction relating to geotechnical problems, Waste:- cation and management of waste, Physical, chemical and geotechnical on of municipal solid waste, Impact of waste dump and its remediation	CO-1 BTL-2						
MODULE 2: : G	EOTECHNICAL APPLICATION OF WASTE DISPOSAL	9L						
Geotechnical application of waste and disposal: Geotechnical use of different types such as Thermal power plant waste, MSW, mine waste, industrial waste. Waste disposal facilities, Parameters controlling the selection of site for sanitary and industrial landfill. Site BTL-3 characterization. MoEF guidelines.CO-2								
MODULE 3: LA	NDFILLS	9L						
Landfill Comp Types and fur liner, method	oonents: Landfill layout and capacity, components of landfill and its functions. Inctions of liner and cover systems, Compacted clay liner, selection of soil for ology of construction.	CO-3 BTL-3						
MODULE 4: LE	ACHATE, GAS MANAGEMENT AND GEOSYNTHETICS	9L						
Management of Leachate and gas. Various components of leachate collection and removal system and its design. gas disposal/utilization. Closure and post closure monitoring system.CO-4Geo synthetics- Geo membranes – geo synthetics clay liners -testing and design aspects.BTL-3								
MODULE 5: SO	DIL REMEDIATION	9L						
Investigation saturated soil. thermal remed Remediation	of contaminated soil, sampling, assessment Transport of contaminants in Remediation of contaminated soil- in-situ / exit remediation, bio remediation, liation, pump and treat method, phyto remediation and electro-kinetic	CO-5 BTL-3						
TEXT BOOKS								
1	Donald L. Wise, Debra J. Trantolo, Hilary I. Inyang, Edward J. Cichon. (2000). Engineering of Contaminated Soils, Marcel Dekker Inc.	Remediation						
2	Koerner, R.M. (2005). Designing with Geosynthetics. Prentice Hall, New Jers	ey, Fifth Edition						
3	Dr. G V Rao and Dr. R S Sasidhar. (2009). <i>Solid waste Management and Engi</i> Landfills, Sai master Geoenvironmental Services Pvt. Ltd. Publication.	neered						
REFERENCE BC	OCKS							
1	Hari D. Sharma, Krishna R. Reddy. (2004). <i>Geoenvironmental Engineering: S. Remediation, Waste Containment, and Emerging Waste Management Tech</i> Wiley & Sons Inc.	ite nologies, John						
E BOOKS								
1	https://www.elsevier.com/books/geoenvironmental-engineering							

MOOC	
1	http://nptel.ac.in/courses/105103025/

COURS	SE TITL	E	GROUND IMPROVEMENT TECHNIQUES CREDITS 3												
CO CC	URSE DDE		CEO	C4353		CA		E RY		PC		L	-T-P-S		<b>3-0-0-</b> 1
Vei	rsion			1.0		Appr	oval De	etails	24 ⁻ 30	th ACM ).5.2018	- 3	LEARN	IING LEV	/EL	BTL-3
ASSES	SMEN	т SCHE	ME												
First Po Asses	eriodic ssment	al	Second Asse	Periodi ssment	cal	S Ass	eminar, ignmen Project	/ ts/	Surp	orise Tes Quiz	it /	At	tendance	9	ESE
1	5%		1	.5%			10%			5%			5%		50%
Co Desci	ourse riptior	Th soi	This course impart knowledge of identification of the problems encountered on site related to oils and educate students with principles and methods.												
Course Object	e :ive	1. 2. 3. 4. 5.	Learn Know Learn condi Study Learn	about suitab to ider tions. to app to sele	differe le dew ntify th ly the ect the	ent grou atering le apt g earth ro approp	und imp techni round i einforce priate g	orovem ques fo mprov ement routing	ent teo or cons ement technic mater	chnique tructior technic ques for ials and	es. n sites que for r retain l techn	variou: iing wa iques t	s types o Ils and sl o streng	of soils a lopes. then th	and site e soil.
Course Outcol	e me	Up 1. 2. 3. 4. 5.	oon con Selec Ident Ident condi Apply Selec simpl	npletion t suitab ify suita ify the tions. t the ea t the ap e and c s of St	n of th le grou able de apt gro rth rei opropri ompou	is cours und imp waterin bund im nforcer iate gro und bar	e, the s provem ng tech prover ment te puting n s using	student ent teo niques nent te chniqu nateria direct	ts will k chnique for con echniqu es for i ls and f applica	be able es. nstructi le for va retainin techniq ation of	to on site arious 1 g walls ues to Hooke	s types o s and slo strengt 2's Law.	f soils ar opes. hen the	nd site soil.An	alyse
CO. P	PO AN	D PS(	) MAP	PING											
СО	PO- 1	PO- 2	РО- 3	PO- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	РО- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	-	2	3	3	3	3	-	3	-	2	2	3	2	3	-
CO-2	-	2	3	3	3	3	-	-	-	2	2	3	2	3	-
CO-3	-	2	3	3	3	3	-	-	-	2	2	3	2	3	-
CO-4	-	2	3	3	3	3	-	-	-	2	2	3	2	3	-

CO-5	-	2	3	3	3	3	-	-	-	2	2	3	2	3	-
			1: \	Weakly	relate	d, 2: M	oderat	ely rel	ated ar	nd 3: St	rongly	relate	d		
MODU	JLE 1	: INT	RODL	ICTION	١									(9	L)
Role o Geoteo improv	of grou chnical vement	und ir prob t techr	nprove lems i niques	ement n alluv based c	in fou ial, lat on soil d	ndatior erite a conditio	n engi and bla on	neering ack co	g - me tton so	ethods pils -Se	of gro	ound i n of si	mprove uitable	ment - ground	CO-1 BTL-3
MODULE 2 : DRAINAGE AND DEWATERING       (9L)													_)		
Draina two-dir	ge tech mensic	nnique onal flo	s - Wel ow-fully	ll points y and pa	s - Vacu artially	ium an penetr	d elect ating s	ro osm lots in	otic me homog	ethods · enous d	- Seepa deposit	age ana ts (Sim	alysis for ole case	r s only).	CO-2 BTL-3
MODU	ILE 3:	IN-S	ΒΙΤυ Τ	REAT	MENT	OF CO	OHESI	ONLE	SS AN	ND CO	HESI	/E SO	ILS	(9	_)
In-situ consoli - Stone limitati	densifi dation colum ons.	ication - Vibr nns - Li	of coh ofloati me pile	iesion le on - Sar es - Inst	ess and nd pile allatior	conso compa n techn	lidation ction - iques d	n of col Preloa only - r	nesive s ding wi elative	soils -Dy th sand merits	ynamic I drains of vario	c comp s and fa ous me	action a abric dra thods a	nd ains nd their	CO-3 BTL-3
MODU	ILE 4:	EAF	RTH R	EINFO	RCEM	ENT								(91	_))
Concer Geotex land sli	pt of re tiles fo ding a	einforo or filtra nd tec	cement ation, c hnique	: - Type: Irainage s adopt	s of rei e and so ed for	nforcer eparati the sar	nent m on in r ne.	nateria oad an	l - Appli d other	ications works.	s of reii Preve	nforceo ntion c	d earth · of	- use of	CO-4 BTL-3
MODU	ILE 5:	GRO	DUT T	ECHNI	QUES									(9L	_)
Types Stabil	of gro	outs - C n with	Groutin cemen	g equip t, lime a	oment a and che	and ma emicals	chiner - Stabi	y - Inje ilizatioi	ction m n of exp	ethods bansive	- Grou soils.	ıt moni	toring -		CO-5 BTL-3
Self-s	tudy T	Topic	: Geot	echnic	al Eng	ineerir	ng								
TEXT B	OOKS														
1	Puru	shoth	ama Ra	ај, Р. (20	016). <i>G</i>	round I	mprov	ement	Technie	ques, La	axmi Pu	ublicati	ons.		
2	Niha	r Ranj	an Patr	a. (201	2). Gro	und Im	proven	nent Te	chniqu	<i>es,</i> S. C	hand P	ublishe	ers.		
3	Pete Hein	r Nich emma	olson. In.	(2014).	Soil Im	proven	nent ar	nd grou	nd moo	dificatic	on meti	hods, B	utterwo	orth	
REFERE	NCE B	OOKS													
1	Robe	ert M.	Koerne	er. (201	2). Des	igning	with Ge	eosyntl	hetics, \	/ol. 1&:	2, Xlibr	is; 6 th e	dition.		
2	Jie H	an. (20	015). P	rinciple.	s and P	ractice	of Gro	ound Im	nproven	nent, Jo	ohn Wi	ley & S	ons.		
3	Braja	a M Da	as. (201	15). Prir	nciples	of Four	ndation	Engin	eering,	CL Engi	neerin	g, 8 th e	dition, 2	2015.	
E BOOK	s														
1	http	s://bo	oks.goo	ogle.co.	in/boo	ks/abo	ut/Gro	und Ir	nprove	ment T	echnic	ques P	<u>B.html</u>		
2	http	s://ww	vw.else	vier.co	m//so	oil-imp	rovem	entgr	ound	metho	ds//9	78-0-1	2-4080	7	
MOOC															

1	https://nptel.ac.in/downloads/105108075/
2	www.ncl.ac.uk > > Collaboration > Short Courses (CPD) > Course List

COURS	E TITLI	E	E EARTHQUAKE ENGINEERING CREDITS 3												
COURS	E COD	E	CEC	4354		C CA	OURSI TEGOI	E RY		DE		L-T-P	P-S	3-0-	0-0
Ver	sion		1	L.O		Appro	oval Do	etails	24t 30	h ACM	- 3	LEARN LEVI	ING EL	BTI	3
ASSESS	MENT	SCHEI	ME												
First Pe Asses	eriodica sment	nl S	econd Asses	Periodi ssment	ical	Se Assi I	eminar, gnmen Project	/ its/	Surj	prise Te / Quiz	st	Attenda	ance	ES	E
15	5%		1	5%			10%			5%		5%		50	%
Course Descrip	tion	Tł m	This course aims at introducing the phenomena of earthquakes, the process, measurements, and the factors that affects the design of structures in seismic areas.												
Course Objectiv	ve	1. 2. 3. 4.	Unde Unde Unde Fami meth	erstand erstand erstand iliarize nodolo	d the d d char d eartl with t gy.	causes acteris nquake the coc	of ear tics of e desig le prov	thquak ground n philo visions	e and d moti sophy and th	its cha on and '. ne eartl	racter its ef hquak	istics. fects o e resis	n buildi tant de	ngs. sign	
Course Outcom	1e	Up 1. 2. 3. 4. 5.	oon con Sum Pred Desig Desig Adog	mpleti marize ict the gn eart gn eart ot tech	on of the ca chara chqual chqual nique	this con auses a cterist ke resis ke resis s to rec	urse, tl and eff ics of g stant n stant R duce v	he stuc fects of ground nasonr CC bui ibratio	dents v Fearth motic y builc Idings n in bu	will be a quake on durii dings uildings	able to ng ear	o thquał	ke		
Prerequ	isites:	NIL													
CO, P(	) AND	) PSO	MAP	PING											
со	РО- 1	PO -2	PO- २	РО- 4	PO -5	PO- 6	РО- 7	РО- я	PO _9	PO- 10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	2	1	1	0	0	2	1	2	2	1	2	3	2	1	-
CO-2	2	2	1	1	0	2	2	2	2	1	2	3	2	1	-
CO-3	3	2	3	1	1	1	1	1	1	1	2	3	2	3	-
CO-4	2	1	1	2	1	2	2	1	1	1	2	3	2	3	-
CO-5	3	2	2	2	3	1	1	2	3	1	3	2	1	2	-
MODUI	LE 1: IN	NTROD	UCTIC	ON TO	SEISM	OLOG	Y							(9)	

Earth's Interior and Plate Tectonics - Causes of Earthquakes - Seismic Zoning of India - Earthquake Effects - On ground and soil liquefaction, buildings, structures, power plants, switch, yards, equipment's & other lifeline structures. Secondary Effects - Land and rock slides, liquefaction, fires, tsunamis, floods, release of poisonous gases and radiation. MODULE 2: EARTHQUAKE PHENOMENON (9) Focus, epicenter, seismic waves - Measurement of Earthquakes and Measurement										
MODULE 2: EAR	THQUAKE PHENOMENON (9)									
Focus, epicente parameters-ma acceleration - c recording instru - Concept of for protection o	er, seismic waves - Measurement of Earthquakes and Measurement gnitude, intensity, intensity scale and its correlation with ground characteristics of strong ground motions and attenuation - earthquake ments Time History Records and Frequency Contents of Ground Motion Response Spectrums of Earthquake - Design Spectrum. Do's and Don'ts f life and property	CO-2 BTL-2								
MODULE 3: EAR	THQUAKE RESISTANT DESIGN OF MASONARY BUILDINGS (9)									
Structural Syste Philosophy and Resistant Design Guidelines	ems - Types of Buildings - Causes of damage - Planning Considerations - Principle of Earthquake Resistant Design - Guidelines for Earthquake n Earthquake Resistant Masonry Buildings - Design consideration –	CO-3 BTL-3								
MODULE 4: EAR	THQUAKE RESISTANT DESIGN RCC BUILDINGS	(9)								
Earthquake Res	istant Design of R.C.C. Buildings - Material properties - Lateral load	<b>CO 4</b>								
analysis – Capad	city based Design and detailing – Rigid Frames – Shear walls.	BTL-3								
analysis – Capac MODULE 5: VIB	city based Design and detailing – Rigid Frames – Shear walls. RATION CONTROL TECHNIQUES (9)	BTL-3								
MODULE 5: VIB Vibration Contr Seismic Base Isc	city based Design and detailing – Rigid Frames – Shear walls.  RATION CONTROL TECHNIQUES (9)  ol - Tuned Mass Dampers – Principles and application, Basic Concept of blation – various Systems- Case Studies, Important structures.	CO-4 BTL-3 CO-5 BTL-2								
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COURS	E TITLE	E	WIND ENGINEERING CREDITS 3												
COURS	E COD	E	CEC	4355		C CA	OURSI TEGOF	E RY		DE		L-T-P	-S	3-0-	0-0
Ver	sion		1	1.0		Appro	oval De	etails	24t 30	h ACM	l - B	LEARN LEVI	ING El	BTL	3
ASSESS	MENT	SCHE	ME												
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15	5%		1	.5%			10%			5%		5%		50	%
Course Descrip	tion	Tl m w	This course aims at introducing the phenomena of wind and cyclones, the process, neasurements, and the factors that affects the design of structures due to effect of wind.												
Course Objectiv	ve	1. 2. 3. 4. 5.	Unde Unde Unde Desig Fami	erstan erstan erstan gn tow iliarize	d the k d the r d the o vers ar with y	oasic co respon code pi id roof wind tu	oncept se of d rovisio trusse unnel e	is of wi ifferen ns for i s to re experin	nd gei It type the sai sist wi nents.	neratio of stru fe desig nd load	n and Icture gn of I ds.	flow. s to win nigh-ris	nd pres e struct	sure. tures.	
		Սր 1.	oon co Sum local	mpleti marize lity	on of t the b	this cor asic co	urse, tl ncepts	he stuc s of wir	dents v nd flov	will be v and i	able to nterpr	o et the	nature	of wind	in a
Course		2.	Pred	lict the	respo	nse of	differe	ent typ	e of st	ructur	es to v	wind pr	essure.		
Outcom	ie	3.	Sum	marize	the c	ode pr	ovisior	ns for t	he saf	e desig	n of h	igh-rise	e struct	ures.	
		4. 5.	Desig Dem the g	ionstra given e	ite win Ite mer	id roor id tunn it	el expe	erimer	its and	deterr	nine A	verody	namic c	oefficier	nts for
Prerequ	isites:	NIL													
CO, PO	) AND	PSO	MAP	PING											
со	РО- 1	PO -2	РО- 3	РО- 4	PO -5	РО- 6	РО- 7	РО- 8	РО -9	РО- 10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	1	-	2	1	2	2	1	-	-	-	-	1	1	1	-
CO-2	1	2	2	1	-	1	2	-	-	-	-	1	1	1	-
CO-3	-	1	1	2	-	1	2	-	-	-	-	2	1	1	-
CO-4	2	1	1	2	-	1	2	-	-	-	-	1	1	2	-
CO-5	1	2	3	2	2	2	2	-	-	-	-	2	2	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: INTRODUCTION (9)										
Terminology - V height -Shape fa	Vind Data - Gust factor and its determination - Wind speed variation with actor - Aspect ratio - Drag and lift.	CO-1 BTL-2								
MODULE 2: EFF	ECT OF WIND ON STRUCTURES (9)									
Static effect - D	ynamic effect - Interference effects (concept only) - Rigid structure - Aero	CO-2								
elastic structure	e (concept only).	BTL-2								
MODULE 3: EFF	ECT ON TYPICAL STRUCTURES(9)									
Effect of wind o	n tall buildings - Low rise buildings - Roof and cladding - Chimneys, towers	CO-3								
and bridges		BTL-2								
MODULE 4: APP	PLICATION TO DESIGN	(9)								
Design forces o	n multi-storey building, towers and roof trusses	CO-4								
		BTL-3								
MODULE 5: INT	RODUCTION TO WIND TUNNEL (9)									
Wind Tunnels -	Types of models (Principles only) - Basic considerations –Measurements -	CO-5								
Examples of tes	ts and their use	BTL-2								
TEXT BOOKS										
1	Solari, Giovanni. (2019). Wind Science and Engineering -Origins, Develop Fundamentals and Advancements, Springer.	ments,								
2	Ted Stathopoulos & Charalambos C. Baniotopoulos. (2007). Wind Effects of Design of Wind-Sensitive Structures, Springer.	on Buildings and								
3	Tamura, Yukio, Kareem, Ahsan (Eds.). (2013). Advanced Structural Wind E Springer.	ngineering,								
<b>REFERENCE BOO</b>	DKS									
1	Dr. Kishor Mehta, Dr. Doug Smith & Dr. Scott Norville, Dr. James McDona Wind Loads on Structures, American Society of Civil Engineers.	ld. (2003).								
2	IS875-Part 3-Wind load on structures,2015.									
E BOOKS										
1	https://www.amazon.in/WIND-ENERGY-PRACTICE-SIRAJebook//B01	8K2BVF								
2	https://web.mit.edu/windenergy/windweek/Presentations/Wind%20En	ergy%20101.p								
MOOC										
1.	https://www.coursera.org/learn/wind-energy									
2.	https://www.mooc-list.com/tags/wind-energy-engineering									

COURSE TITLE	Ξ	INDUSTRIAL WASTE MANAGEMENT CREDITS 3												
COURSE CODE		CEC	24356		C CA	OURSI	E RY		DE		L-T-P	9-S	3-0-	0-0
Version		1	1.0		Appro	oval De	etails	24t 30.	h ACM 5.2018	-	LEARN LEV	ING El	BTI	L- <b>2</b>
ASSESSMENT	SCHE	ME												
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15%		1	.5%			10%			5%		5%	•	50	%
Course Description	To pro teo	Fo familiarize the students about characteristics of industrial wastewater, cleaner production, recycling of waste, various types of industrial waste waters, treatment cechnologies and hazardous wastes management.												
Course Objective	Th	e cour 1. l 2. 3. 4. 5.	se sho Jnders heir ef Study contro Study produ Know tanne Study	uld en tand t ffects o and ur ol of in and ur ct reco about ries ele abou	able th he varion on the e ndersta dustria ndersta overy. the wa ectro pl t the w	e stude ous typ enviror nd the I waste nd the ste ger ating, aste m	ents to bes of I nmenta variou es. cleane nerateo Pulp ar anager	: Industri Is legisl er prod d and re nd pape ment te	ial was irces. ative n uction, ecyclin er etc., echniqu	te wat neasur , waste g in sel ues.	ers, the es rela e audit, lected	eir chara ted to p recyclii	acteristic preventic ng and b es like te	cs and on and y- extiles,
Course Outcome Prerequisites:	Up NIL	on cor 1. E 2. S 3. A 4. E 5. II II	mpletic xplain umma xpply tl xplain nterpro ndustri	on of t about rize th he vari the m et the ies	his cou the vario ous tre ethodo Industr	rse, the rious ty us Indu atmen logies ial was	e stude ypes of ustrial j it techr to trea te Mar	nts wil indust pollutic nologie t and r nageme	l be ab rial Wa on prev s to tre ecycle ent tec	le to astes a rentior eat the the Inc hnique	nd its g appro Indust dustria es adop	generati bach rial was l waste bted in v	on ites water various	
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CO-2	-	-	1	1	-	1	1	1	-	-	-	-	-	2	2
CO-3	-	-	1	1	-	1	1	1	-	-	-	1	1	2	2
CO-4	-	-	-	1	-	1	1	1	-	-	-	-	-	2	2
CO-5	-	-	1	1	-	1	1	1	-	-	-	1	1	2	2
			1: W	eakly r	elated	, 2: Mc	derate	ely rela	ated ar	nd 3: S [.]	trongly	relate	d		
MODU	JLE 1:	INTRO	DUCTI	ON											9L
Industrial scenario in India - Industrial activity and Environment - Uses of Water by industry       -         - Sources and types of industrial wastewater - Industrial wastewater and environmental       -         impacts - Regulatory requirements for treatment of industrial wastewater - Industrial waste       -         survey - Industrial wastewater generation rates, characterization and variables - Population       BT         equivalent - Toxicity of industrial effluents and Bioassay tests.       MODULE 2: INDUSTRIAL POLLUTION PREVENTION													CO BTL	-1 2	
MODULE 2: INDUSTRIAL POLLUTION PREVENTION															9L
MODULE 2: INDUSTRIAL POLLUTION PREVENTION Prevention vs Control of Industrial Pollution - Benefits and Barriers - Source reduction techniques Waste Audit - Evaluation of Pollution prevention options - Environmental statement as a tool for pollution prevention - Waste minimization Circles.													uction nental	CO BTI	-2 -2
MODU	LE 3: I	NDUST		VASTE	WATEF	R TREA	TMEN	Г							9L
Equal Remo treatr Ozona Techn	izatior val Re nent ation - ologie	n - Neu fractor - Sequ Photo s - Nut	utraliza y orga uencing catalys crient r	ation - nics se g batcl is - We emova	Oil sep paratic h reac et Air O l.	paratio on by a tors - xidatio	on - Flo dsorpt High- on - Eva	otation ion - A Rate r iporati	- Pree erobic eactor on - Io	cipitati and ar s - Cl n Exch	ion - H naerobi hemica ange - I	eavy n c biolo l oxida Membi	netal ogical ation rane	CO BTI	-3 L-2
MODU	LE 4: \	WASTE	WATE	RREU	SE AND	RESIC	OUAL N	1ANAG	EMEN	Т					9L
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MODU	LE 5: C	CASE ST	TUDIES	5											9L
Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles - Tanneries - Pulp and paper - metal finishing - Petroleum Refining - Pharmaceuticals - Sugar and Distilleries - Food Processing - fertilizers -Thermal Power Plants and Industrial Estates.												uction metal sing -	CO BTL	-5 -2	
TEXT BOOKS       1     Eckonfolder, W.W. (2009) Industrial Mater Pollution Control, McCrow Hill															
		EC	ĸentelo	aer, W.	w. (20	09). In	dustria	ı Wate	r Pollu	ition Co	ontrol,	ivicGra	w-Hill.		
REFER	ENCE B	BOOKS													

1	Frank Woodard. (2001). Industrial waste treatment Handbook, Butterworth Heinemann, New Delhi.
2	World Bank Group, Pollution Prevention and Abatement Handbook - Towards Cleaner
	Production, World Bank and UNEP, Washington D.C.
3	Paul L. Bishop. (2000). <i>Pollution Prevention:- Fundamentals and Practice,</i> McGraw-Hill International.
E BOOKS	
1	www.digitalbookindex.org/ search/search010environmenwasterefusea.asp
2	https://books.google.com/books/about/Solid Waste Management.html?id
моос	
1	https://www.coursera.org/learn/solid-waste-management
2	https://www.mooc-list.com/tags/waste-management

COURSE TITLE		GR	EEN A	ND SM	1ART E	BUILDI	NGS		0		S	3	
COURSE CODE	CEC	4366		C CA	OURS TEGOI	E RY		DE		L-T-P	9-S	3-0-	0-0
Version	1	L.O		Appro	oval D	etails	24t 30	h ACM	I - B	LEARN LEVE	ING El	BTI	-3
ASSESSMENT SC	CHEME										·		
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Course Description	lt describ technique	es the es, actu	e conc iator t	epts c echniq	of gree Jues ar	en bui 1d use	ding, mater	renew ials for	able ( greer	energy 1 syster	sourc ns.	es, auto	mation
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CO-1	-	-	1	-	-	2	-	-	-	-	-	-	-	2	2
CO-2	-	-	-	-	-	1	1	-	-	-	-	-	-	2	2
CO-3	-	1	-	-	-	-	-	-	-	-	-	-	-	2	2
CO-4	-	-	1	-	-	-	-	-	-	-	-	1	-	2	2
CO-5	-	-	1	-	-	-	-	-	-	-	-	-	-	2	2
		1	1: Wea	kly re	ated,	2: Mo	derate	ly rela	ted an	d 3: St	rongly	relate	ed		
	NCEPT OF GREEN BUILDINGS	9L													
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Green building initiatives, its origin, characteristics of a green building, green buildings in India, certification of green buildings. Criteria for rating – sustainability. Depleting natural resources of building materials; renewable and recyclable resources; energy efficient materials; green cement, biodegradable materials, smart materials, engineering evaluation of these materials. Case study.															
MODULE 2: SOU	JRCES OF ENERGY	9L													
Renewable and hydro, geotherr with reference Forecasting, con environmental	Renewable and non-renewable sources of energy; coal, petroleum, nuclear, wind, solar, hydro, geothermal sources; potential of these sources, hazards, pollution; global scenario with reference to demand and supply in India. Energy arises. Carbon Emission: Forecasting, control of carbon emission, air quality and its monitoring carbon foot print; environmental issues, minimizing carbon emission.														
MODULE 3: INT	ELLIGENT BUILDINGS	9L													
Intelligent buil buildings-Green residence, offic	dings-Building Automation-Smart buildings- Building services in high rise n Buildings-Energy efficient buildings for various zones-Case studies of e buildings and other buildings in each zone. Case Study.	CO-3 BTL-3													
MODULE 4: ACT	UATOR TECHNIQUES	9L													
Actuator and a	ctuator materials – Piezoelectric and Electro strictive Material – Magneto														
structure Mate actuation – Role	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials.	CO-4 BTL-2													
structure Mate actuation – Role MODULE 5: M	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS	CO-4 BTL-2 9L													
structure Mater actuation – Role MODULE 5: M. Green materia Nanotech Mater Paints, Roofs, M Optical Interfere	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS Is, including biomaterials, biopolymers, bioplastics, and composites rials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, ence Sensors Thermo- light-, and stimulus-responsive smart materials.	CO-4 BTL-2 9L CO-5 BTL-2													
structure Mater actuation – Role MODULE 5: M. Green materia Nanotech Mater Paints, Roofs, M Optical Interfere TEXT BOOKS	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS Is, including biomaterials, biopolymers, bioplastics, and composites rials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, ence Sensors Thermo- light-, and stimulus-responsive smart materials.	CO-4 BTL-2 9L CO-5 BTL-2													
structure Mater actuation – Role MODULE 5: M. Green materia Nanotech Mate Paints, Roofs, M Optical Interfere TEXT BOOKS 1.	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS Is, including biomaterials, biopolymers, bioplastics, and composites rials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, ence Sensors Thermo- light-, and stimulus-responsive smart materials. Charles J. Kibert. (2012). Sustainable Construction: Green building desig John Wiley & Sons; 3rd edition	CO-4 BTL-2 9L CO-5 BTL-2 n and delivery,													
structure Materactuation – Role MODULE 5: M. Green materia Nanotech Mate Paints, Roofs, M Optical Interfere <b>TEXT BOOKS</b> 1. 2.	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS Is, including biomaterials, biopolymers, bioplastics, and composites rials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, ence Sensors Thermo- light-, and stimulus-responsive smart materials. Charles J. Kibert. (2012). Sustainable Construction: Green building desig John Wiley & Sons; 3rd edition Yudetson, J. (2007). <i>Green Building A to Z</i> . New Society Publishers.	CO-4 BTL-2 9L CO-5 BTL-2 n and delivery,													
structure Materactuation – Role MODULE 5: M. Green materia Nanotech Mater Paints, Roofs, M Optical Interfere 1. 2. REFERENCE BOO	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS Is, including biomaterials, biopolymers, bioplastics, and composites rials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, ence Sensors Thermo- light-, and stimulus-responsive smart materials. Charles J. Kibert. (2012). Sustainable Construction: Green building desig John Wiley & Sons; 3rd edition Yudetson, J. (2007). <i>Green Building A to Z</i> . New Society Publishers.	CO-4 BTL-2 9L CO-5 BTL-2 n and delivery,													
structure Materactuation – Role MODULE 5: M. Green materia Nanotech Mater Paints, Roofs, M Optical Interfere 1. 2. REFERENCE BOO 1.	rial – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic e of actuators and Actuator Materials. ATERIALS FOR "GREEN" SYSTEMS Is, including biomaterials, biopolymers, bioplastics, and composites rials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Walls, and Cooling. Multifunctional Gas Sensors, Biomimetic Sensors, ence Sensors Thermo- light-, and stimulus-responsive smart materials. Charles J. Kibert. (2012). Sustainable Construction: Green building desig John Wiley & Sons; 3rd edition Yudetson, J. (2007). <i>Green Building A to Z</i> . New Society Publishers. DKS Sinopoli, J. (2016). Advanced Technology for Smart buildings, Artech Hou	CO-4 BTL-2 9L CO-5 BTL-2 n and delivery, se Publishers.													

1.	https://www.springer.com/in/book/9789811010002
2.	https://www.elsevier.com/books/smart-buildings/casini/978-0-08-100635-1
моос	
1.	https://www.mooc-list.com/tags/green-building

COURS	SE TITL	.E	PRESTRESSED CONCRETE										S		3
CO CC	URSE DDE		CI	EC4367	,	C CA	OURSI TEGOI	E RY		DE		L-	Г-Р-S	3	-0-0-0
Vei	rsion			1.0		Appro	Approval Details 24th ACM - 30.5.2018					LEARNI	NG LEV	EL	BTL-3
ASSESSMENT SCHEME															
First PeriodicalSecond PeriodicalAssessmentAssessment						Seminar/ Assignments/ Project Surprise Test Quiz					st /	Attendance			ESE
1	5%			15%			10%			5%		:	5%		50%
Co Descr	ourse ription		This course describes the design principles of prestressed concrete and the design of prestressed structural elements.												of
Course Object	e ive		<ol> <li>To be familiar with the basic principles of prestressed concrete</li> <li>To be familiar with the design of prestressed concrete elements.</li> <li>To know about the design of prestressed concrete tanks, poles and sleepers.</li> <li>To know about the design of concrete composite members.</li> <li>To throw light on the principles of pre tensioned and post tensioned concrete bridge decks</li> </ol>											ridge	
Course Outco	e me		Up 1. Cla 2. De 3. De 4. De 5. De	on comp ssify the sign the sign pres sign the monstra	oletion syster prestrestrestresse concre te the	of this ms and essed c ed conc ete com princip	course methe concret rete ta nposite lles of p	e, the s ods of p e elem nks, po e memb ore ten	tudent prestre lients a ples an pers. sioned	ts will b ssing. s per tl d sleep and po	be able he cod bers. Dost ten	e to al prov sioned	isions. concret	e bridg	e decks.
Prereq	uisites	s: De	sign	of Con	crete	Struct	ures								
CO, P	'O AN	D P	<b>SO M</b> A	APPINO	Ţ		1	I	I						
со	РО- 1	PC	- PO	- PO- 4	PO-	PO- 6	РО- 7	РО- 8	PO- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO-
CO-1	2	2	3	2	1	2	1	1	1	2	2	3	2	3	-
CO-2	2	2	3	3	1	1	1	2	1	2	3	3	2	3	-
CO-3	2	2	3	3	1	2	1	2	1	2	3	3	2	3	-
CO-4	2	2	3	3	1	2	1	2	1	2	3	3	2	3	-
CO-5	2	2	3	3	1	2	1	2	1	2	3	3	2	3	-
			1: \	Veakly	elated	l, 2: Mo	oderat	ely rela	ated ar	nd 3: St	trongly	y relate	d		10-1
MOD	ULE 1	: IN	TROD	UCTIO	N - TH	IEOR	y and	BEH	AVIO	JR					(9L)

Basic concepts - Advantages - Materials required - Systems and methods of prestressing - Analysis of sections - Stress concept - Strength concept - Load balancing concept - Effect of loading on the tensile stresses in tendons - Effect on tendon profile on deflections - Factors influencing deflections - Calculation of deflections - short term and long term deflections - Losses of prestress- Estimation of crack width							
MOD	ULE 2: DESIGN	9L)					
Flexu conce anchc	ral strength - Simplified procedures as per codes - strain compatibility method - Basic pts in selection of cross section for bending - stress distribution in end block, Design of prage zone reinforcement - Limit state design criteria - Partial prestressing - Applications.	CO-2 BTL-2					
MOD	ULE 3: CIRCULAR PRESTRESSING	(9L)					
Desig	n of prestressed concrete tanks - Poles and sleepers	CO-3 BTL-3					
MOD	ULE 4: COMPOSITE CONSTRUCTION	(9L)					
Anal merr	ysis for stresses - Estimate for deflections - Flexural and shear strength of composite obers.	CO-4 BTL-2					
MOD	ULE 5: PRE-STRESSED CONCRETE BRIDGES	(9L)					
Gene	eral aspects - pretension prestressed bridge decks - Post tensioned prestressed bridge	CO-5					
deck	s - <b>Advantages over</b> R.C. bridges - Principles of design only	BTL-2					
TEXT	BOOKS						
1	Krishna Raju N. (2012). Prestressed concrete, Tata McGraw Hill Company, New Delhi.						
2	David A.Sheppard, William R. and Philips, Plant. (2011). Cast precast and prestressed con design guide, McGraw Hill, New Delhi.	crete – A					
REFER	ENCE BOOKS						
1.	Ramaswamy G.S. (2012). Modern prestressed concrete design, Pitman Publishing, New D	elhi.					
2	Praveen Nagaraja. (2013). Prestressed Concrete Design, Kindersley India.						
E BOO	ĸs						
1	https://books.google.co.in/books/about/Prestressed_concrete.html?id=O9nNYr						
2	https://www.pearson.com.au/products/S-Z/Prestressed%20ConcreteeBook/978148861903	<u>8</u> ?					
MOO							
1	https://nptel.ac.in/courses/105106118/						
2	https://www.iith.ac.in/~prestressed						

COURS	SE TITL	.E	DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES CREDITS												
CO CC	URSE DDE		CEC	C4368		C CA	OURSE	E RY		DE		L-T-P	-S	3-0-	0-0
Vei	rsion		1	1.0		Appro	oval De	etails	24t 30	.h ACM - .5.2018		LEARN LEVI	ING EL	BTI	3
ASSESSMENT SCHEME															
First Pe Asses	eriodic sment	al	Second Asses	Periodi ssment	cal	So Assi I	eminar, gnmen Project	/ ts/	Surp	rise Tes Quiz	st /	Attend	ance	ESE	
1	5%		1	.5%			10%			5%		5%	1	50	%
Co Descr	urse iption	TI cc	This course deals with the principles involved in the analysis and design of steel concrete composite structural members.												ncrete
Course Object	e i <b>ve</b>	1. 2. 3. 4. 5.	<ol> <li>To understand the concepts of limit state design of steel concrete composite structures.</li> <li>To get exposure in the design concepts of steel concrete composite beams.</li> <li>To familiarize with the design concepts of steel concrete composite columns.</li> <li>To understand the design concepts of steel- concrete composite box girder bridges.</li> <li>To Know about the seismic behaviour of composite structures.</li> </ol>												
Course Outcoi	e me	1. 2. 3. 4. 5.	Upor Expla Desi Desi Illust	n comp ain the gn stee gn stee gn stee rate th	letion conce el conc el conc el- conc e seisr	of this pts of I rete co rete co crete c nic bel	course imit sta omposi omposi ompos naviou	e, the s ate des te bear te trus ite box of cor	tudent ign of ms ses and girden nposite	s will b steel co d colun r bridge e struc	e able oncret nns. es tures.	e to e comp	oosite st	ructure	5.
Prereq	uisites	: Des	ign of	Conc	rete S	Struct	ures,	Desig	n of S	teel s	tructu	ires			
CO, P	O AN	D PS	O MAI	PPING											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
0.1	1	2	3	5	3	3	-	5	-	-	2	3	3	3	-
CO-2	1	2	3	3	3	3	-	1	-	-	3	3	3	3	-
CO-3	1	2	3	3	3	3	-	1	-	-	3	3	3	3	-
CO-4	1	2	2 3 3 3 3 - 1 - 3 3 3 -							-					
CO-5	1	2	2	2	2	2	-	1	-	-	2	2	2	2	-
			1: W	eakly r	elated	, 2: Mo	oderate	ely rela	ted ar	nd 3: St	rongly	/ relate	d		
MODU	JLE 1:	INTRO	DUCTI	ON		(	9L)								

Review of Limi composite stru with concrete	Review of Limit State Design of steel columns and beams - Introduction to steel concrete composite structures - concepts and Theory - Typical shear connectors and interaction with concrete - Tests for strength of shear connections.								
MODULE 2: DE	SIGN OF COMPOSITE BEAMS (9L)								
Ultimate behaviour of simply supported and continuous steel - concrete composite beams CO-2									
with solid deck	slabs and profiled deck slabs.	BTL-3							
MODULE 3: DE	SIGN OF COMPOSITE TRUSSES AND COLUMNS(9L)								
Behavior and	design of steel concrete composite Trusses - Shear connection details -	CO-3							
Design of Stee	el concrete columns.	BTL-3							
MODULE 4: CO	MPOSITE BOX GRIDER BRIDGES	(9L)							
Introduction to	Introduction to hohoviar of hov girder bridges. Design concents								
		BTL-2							
MODULE 5: GE	NERAL (9L)								
Introduction to	o steel concrete sandwich construction - Seismic behavior of composite	CO-5							
structures - cas	se studies on steel-concrete composite construction in buildings.	BTL-2							
TEXT BOOKS									
1	R.P. Johnson. (2012). Composite Structures of Steel and Concrete: Beams, S and Frames for Buildings, Wiley India Pvt Ltd.	Slabs Columns							
REFERENCE BO	OKS								
1.	R.Narayanan. (2019). Steel Concrete Composite Structures, CRC Press, Long	don							
E BOOKS									
1	https://www.scribd.com/doc/223508021/E-book-(Composite-Structures-o	of-Steel-and-							
1.	%20Concrete-Volume-1-Beams-Slabs-Columns-a%20nd-Frames-for-Buildin	igs-R-P-johnson)							
моос									
1.	https://www.mooc-list.com/tags/steel-concrete-composite-structures								

COURS	SE TITL	E	REPAIR AND REHABILITATION OF CRE								REDITS		3		
CO CO	URSE ODE		CEC	4369				Ξ <b>Ο</b> Ξ RY		DE		L-T-P	-S	3-0-	-0-0
Ve	rsion		:	1.0		Approval Details 24th ACM - LEARNING 2015 2018 LEVEL							BT	L-3	
ASSES	SESSMENT SCHEME														
F Perio Asses	irst odical ssment	:	Second Periodical AssessmentSeminar/ Assignments/ ProjectSurprise Test / QuizAttendance						ance	ES	SE .				
2	0%		1	.5%			15%			5%		5%	,	50	9%
Co Desci	ourse ription		To familiarize the students about testing methodologies, Repair and rehabilitation of concrete structures with the knowledge of choosing suitable repair methodology to access the existing concrete structures.												
Course Object	e tive	I	<ol> <li>To enable the students to learn the theoretical knowledge in about testing methodologies of concrete structures</li> <li>To enable them to select the suitable repair methodologies of concrete technology.</li> <li>To improve the knowledge about the repair and rehabilitation of concrete structures.</li> </ol>												
Course Outcol Prereg	e me uuisites	U	<ol> <li>Upon completion of this course, the students will be able to</li> <li>Assess the distressed structures using non-destructive Engineering testing.</li> <li>Interpret the mechanisms of degradation of concrete structures.</li> <li>Select the suitable repair materials and adopt the appropriate repair techniques.</li> <li>Select suitable strengthening technique for concrete structures.</li> <li>Demonstrate the demolition procedures used for dilapidated structures.</li> </ol>												
CO. PC	O AND	PSO I	VAPPIN	IG											
	PO	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	РО	PO-	PO-	PSO-	PSO-	PSO-
0	-1	2	3	4	5	6	7	8	9	-10	11	12	1	2	3

CO-1	-	-	1	1	-	1	1	1	-	1	-	-	1	3	-
CO-2	-	-	1	1	-	1	1	1	-	1	-	-	1	3	-
CO-3	-	-	1	1	-	1	1	1	-	1	-	1	1	3	-
CO-4	-	-	-	1	-	1	1	1	-	1	-	-	1	3	-
CO-5	-	-	1	1	-	1	1	1	-	1	-	1	1	3	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														
MOD	ULE 1	: MAI	NTEN	ANCE	AND	REPA	IR ST	RATE	GIES	(9)					
Mainte	enance	, rep	air an	nd reh	nabilita	tion,	Facets	of I	Mainte	nance,	impo	ortance	e of	0	1
Mainte	enance	variou	us aspe	cts of I	nspect	ion, As	sessm	ent pro	ocedure	es for e	evaluat	ing a		BTL	-1
damag	ed stru	ucture.	Cause	s of de	teriora	tion.					TE	(0)			
MODU	JLE 2	SER	VICE				KABIL					(9)	1:4.		
Quality	assur al nron	ance to	or cond and cra	crete co	– Effec	tion co	ncrete to clim	e prope	erties –	ture c	gth, pei bemica	rmeabi	lity,		
– desig	n and	constr	uction	errors	– Effec	ts of c	over th	icknes	s and c	rackin	ρ.	ais, coi	1031011	CO	-2
u cong	, in an a	0011011	uccion	0.1.010	2						ο.			BII	L-3
MODI				0.41							(0)				
MODU	JLE 3		ERIAL	_5 AN	DIE					R .	(9)				
Special	conc	retes	and m	iortar,	concre t nob	ete ch	emical	s, spe	cial ele	ement	s tor a	acceler	forro		
cemen	t Fihre	reinfo	ansive arced c	oncret	e Rust	elimin	ators a	e, suip nd nol	vmers	coatin	o for re	hars di	iring		
repair,	foame	ed con	crete,	mortai	r and c	Irv pac	k, vacı	ium co	oncrete	e, Guni	te and	Shotc	rete,	CO	-3
Epoxy	injectio	on, Mo	ortar re	pair fo	r crack	s, shor	ing and	d unde	rpinnir	ng, Met	thods o	of corro	osion	BTI	L-3
protect	tion, c	orrosio	on inhik	oitors,	corrosi	on resi	stant s	teels, d	coating	s and	cathod	lic			
protect	tion.														
MODU	JLE 4:	: REP	AIRS,	REHA	BILIT	ATIO	N AND	RET	ROFIT	TING	OF S	TRUC	TURES	5	(9)
Structu	iral co	ncrete	streng	thenin	g in co	lumn, s	slabs, k	eams,	jacket	ing teo	hnique	e, Exter	nal		
bondin	g tech	nnique, C	, stren	gtheni	ng by	FRP, S	IMCON	l, Repa	airs to	overc	ome w	eather	ing	CO	-4
corrosi	on, we	ear, fire	е, іеака	age and	a marir	ie expo	sure, C	Juidell	nes tor	seism	ic rena	DIIItati	on	BTL	3
MODI					CHN		•							(	9)
Engine	ered o	lemolit	tion te	chniqu	es for [	Dilanid	ated st	ructur	es - cas	e stud	ies			) ()	-5
21181110				ennqu		mapra		lactar		ie staa	105			BTL	3
TEXT B	OOKS														
	1	A.I	R.Santł	na Kum	nar. (20	16). <i>Co</i>	oncrete	Techn	ology,	Oxfor	d Unive	ersity P	ress Ind	ia.	
	<u></u>														
	2	Po PH	onam II Learr	i. Mod ning	i, Chira	g N. Pa	itel. (20	J16). <i>R</i>	epair a	ind Rel	nabilita	ition oj	Concre	te Struc	tures,
REFERE	ENCE E	BOOKS													

1	M.S. Shetty. (2016). Concrete Technology - Theory and Practice, S. Chand and Company,
	New Delhi, 7th edition.
2	World Bank Group, Pollution Prevention and Abatement Handbook - Towards Cleaner
	Production, World Bank and UNEP, Washington D.C.
3	Paul L. Bishop. (2000). Pollution Prevention: Fundamentals and Practice, McGraw-Hill
	International.
E BOOKS	
1	https://cpwd.gov.in/Units/handbook.pdf
2	https://onlinepubs.trb.org/online%20pubs/shrp/SHRP-S-360.pdf
3	https://books.google.co.in/books//Rehabilitation Of Concrete Structures
4	http://www.faadooengineers.com/threads/4209-Basic-Civil-Engineering-Ebook-Lecture-
	Notes-PDF-Download
МООС	·
1	https://nptel.ac.in/courses/114106035/38
2	https://indianconcreteinstitute.org/repair-and-rehabilitation.html

COURS	SE TITL	E	HEALTH AND SAFETY PRACTICES IN CONSTRUCTION INDUSTRY										S	3	
CO CC	URSE DDE		CEB	84370		C CA	OURS	E RY		DE		L-T-P	9-S	3-0-	0-1
Ve	rsion		1	1.0		Appro	oval D	etails	24t 30	h ACN:	1 - 8	LEARN LEVI	ING EL	BTL	3
ASSES	ASSESSMENT SCHEME														
First Po Asses	eriodic ssment	al S	econd Asses	Period ssment	ical	S Assi I	eminar ignmen Project	/ its/	Surp	orise Te Quiz	st /	Attend	ance	ES	E
1	.5%		15% 10% 5% 5%									50	%		
Co Desci	ourse ription	Ir sy as sa	Introduce the foundations on which appropriate health and safety management systems may be built. Occupational health and safety affects all aspects of work, to assist the professional health and safety practitioner in ensuring that there are satisfactory health and safety standards within the organization.											ement ork, to	
Course Object	e tive	Tł	ne cour 1. m 2. U 3. K 4. F 5. U	rse sho nake fa Inders now tl amilia Inders	ould er amiliar tand tl ne edu r with tand tl	nable t in par he acci ication the saf he con	he stud amete dent o and tr fety mo cept of	dents t rs gove ccurre raining easure f safety	o erning nces a of safe s in co y act a	safety nd pre ety per nstruct nd regu	in con ventio sonne tion ulatior	struction n l based	on on cas	e study	
CourseUpon completion of this course, the students will be able to1. Select the suitable safety practices in construction.2. Apply the practices to avoid accidents in construction site.3. Instruct construction workers to be safe in construction site.4. Plan the appropriate safety measure to be followed during construction.5. Recommend rules and reglations related to safety in construction.															
Prereq	uisites	: Nil													
СО, РС	O AND	PSO N	APPI	NG											
со	PO-	PO-	PO-	PO-	PO-	PO-	PO- 7	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-
<b>CO-1</b>	-	2	- -	4	-	2	/ 1	• -	-	1	3	-	-	2	2
CO-2	-	3	-	2	2	2	1	-	-	1	3		_	2	2
CO-3	-	3	-	2	-	2	1	-	-	1	3	-	-	2	2

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	1: Weakly related, 2: Moderately related and 3: Strongly related								
MODULE 1:	MEANING AND SCOPE OF SAFETY IN CONSTRUCTION (9 L)								
Basic Philosop site planning a machinery. He practices of he	Basic Philosophy, peculiarities and parameters governing safety in construction such assite planning and layout, safe access, good housekeeping. Safety in using constructionmachinery. Health and environment management, occupational safety, principles andpractices of health andenvironmental safety management.								
MODULE 2:AC	CIDENT OCCURRENCE AND PREVENTION(9 L)	<u> </u>							
Definition of a Near miss acc factories act disablement, diseases relat principles of a	accident, reportable, non-reportable, fatal, non-fatal, workers insurance. ident, lost time accident, disabling injury. Accidents reportable under the and ESI act. Frequency rate, severity rate, incidence rate. Temporary permanent disablement. Occupational health hazards, occupational ing to construction works. Theories/models of accident occurrence, ccident prevention and financial implications.	CO-2 BTL-2							
MODULE 3: ED	UCATION AND TRAINING (9	L)							
Need for ec techniques ar Safety promo notices at van operations. P ventilation, m	lucation training, elements of training cycle, assessment of needs, nd strategies of training, design and development of training programs. Ition and safety awards, safety incentives, publicity schemes, caution tage points, working at heights, in confined space, underground, tunneling urpose of ventilation, thermal comfort, indices of heat stress, natural echanical ventilation, air conditioning.	CO-3 BTL-3							
MODULE 4 :SA	FETY MEASURES DURING CONSTRUCTION (9	L)							
Health hazar equipment, h PVC, plastics e permits while tunneling etc.	ds and safety measures while handling construction materials and andling cement, lime, steel, glass, paints, varnish, petroleum products, etc., usage of personal protection gear. Safety precautions, planning and demolishing buildings, during concreting, in underground works and	CO-4 BTL-3							
MODULE 5: CA	SE STUDIES, ACTS AND RULES REGARDING SAFETY IN CONSTRUCTION (9	L)							
Case studies o of various Acts other construc 1998, The buil health measur	f recent accidents in construction sites, its reasons and implications. Study s and rules like Workman compensation act and rules, The Building and tion workers (Regulation of employment and conditions of service) 1996, ding and other construction workers welfare Cess Act, 1986 and rules, es and welfare schemes.	CO-5 BTL-3							
SELF STUDY: T	ne building and other construction workers welfare Cess Act, 1986 and rule	es, health							
measures and	welfare schemes.								
TEXT BOOKS									
1.	David L. Goetsch. (2017). Construction Safety and the OSHA Standards (W Trades & Technology), Pearson	/hat's New in							
2. John Schaufelberger and Ken-Yu Lin. (2013). Construction Project Safety, RSMeans.									
REFERENCE BO	OKS								
1.	Richard J. Coble, Jimmie Hinze and Theo C.Haupt. (2000). Construction Sa Management, Prentice Hall Inc.	fety and Health							

2.	Dan Petersen. (2001). <i>Safety Management: A Human Approach,</i> American Society of Safety Engineers.
3.	John Ridley. (2003). <i>Safety at Work,</i> Elsevier Ltd.
4.	Charles D. Reese and James Vernon Eidson. (2006). <i>Handbook of OSHA Construction Safety and Health</i> , Second Edition, CRC Press.
	David V. MacCollum. (2007). Construction Safety Engineering Principles : Designing and
5.	Managing Safer Job Sites, McGraw Hill Education
6.	Employee's Compensation (Amendment) Act, 2017
E BOOKS	
1.	https://manyebooks.org/download/aramco construction safety manual.pdf
MOOC	
1.	https://alison.com/course/HSA-5
2.	https://www.coursera.org/learn/construction-project- %20management/lecture/Yn8K8/safety-%20health-and-environment-management- systems

COURS	SE TITL	.E		PAVEN		DESIGN	AND	ENGIN	EERING	<b>G</b>	С	REDITS	5	3	
CO CC	URSE ODE		CEC	4371		C CA	OURS	e Ry		DE		L-T-P	P-S	3-0-	·0-0
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ASSES	SMEN	T SCH	EME												
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Co Out	<ul> <li>Course</li> <li>Design flexible pavements</li> <li>Design rigid pavements</li> <li>Apply appropriate maintenance operation on pavements</li> <li>Apply appropriate stabilization techniques for pavements</li> </ul>														
Prereq	uisites	: Trar	sporta	tion Er	ngineer	ring -I									
CO, PO	CO, PO AND PSO MAPPING														
со	PO- 1	РО- 2	PO- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	РО- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	3	1	1	1	1	1	2	1	1	1	1	1	3	3	-
CO-2	3	3	3	1	2	2	1	2	1	1	1	1	3	3	-
CO-3	3	3	3	1	2	2	1	2	1	1	1	1	3	3	-
CO-4	3	2	1	1	3	3	1	1	1	1	1	1	3	3	-
CO-5	3	2	1	1	3	3	1	1	1	1	1	1	3	3	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														

MODULE 1: TY	PE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM (9L)									
Introduction -	Pavement as layered structure - Pavement types - rigid and flexible -Stress	CO-1								
and Deflection	and Deflections in pavements under repeated loading. BTL-3									
MODULE 2: DE	SIGN OF FLEXIBLE PAVEMENTS (9L)									
Flexible pavem	nent design - Empirical - Semi empirical and theoretical Methods - Design	CO-2								
procedure as p	per latest IRC guidelines - Design and specification of rural roads.	BTL-3								
MODULE 3: DE	SIGN OF RIGID PAVEMENTS (9L)									
Cement concre	ete pavements - Modified Westergaurd approach - Design procedure as per	CO-3								
latest IRC guid	elines - Concrete roads and their scope in India.	BTL-3								
MODULE 4: PE	RFORMANCE EVALUATION AND MAINTENANCE (9L)									
Pavement Eva	luation, Condition and evaluation surveys (Surface Appearance, Cracks,									
Patches and Po	ot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural	CO-4								
Evaluation By I	Deflection Measurements, Present Serviceability Index, Pavement	BTL-3								
maintenance.	[IRC Recommendations Only]									
MODULE 5:ST	ABILIZATION OF PAVEMENTS (9L)									
Stabilization w	ith special reference to highway pavements - Choice of stabilisers -Testing	CO-5								
and field contr	ol -stabilization for rural roads in India -use of Geo-synthetics (geo-textiles	BTL-3								
& geo-grids) in	roads.									
TEXT BOOKS										
1	Kadiyali, L.R. (2000). <i>Principles and Practice of Highway Engineering</i> , Khanna Delhi.	tech. New								
2	Design and Specification of Rural Roads (Manual), Ministry of rural roads, Go India, New Delhi, 2001	overnment of								
3	C.E.G. Justo and S.K. Khanna. (2014). Highway Engineering, Nem Chand and	Brothers.								
<b>REFERENCE BC</b>	OOKS									
1.	<i>Guidelines for the Design of Flexible Pavements</i> , IRC:37 - 2001, The Indian ro Congress, New Delhi.	ads								
2	Guidelines for the Design of Rigid Pavements for Highways, IRC:58-1998, The	Indian Roads								
۷.	Congress, New Delhi.									
E BOOKS										
1.	https://www.worldcat.org/title/pavement-design-and-materials/oclc/8048	63070								
MOOC										
1.	https://www.mooc-list.com/tags/highway-engineering									

COURS	SE TITL	.E	TRAFFIC ENGINEERING AND MANAGEMENT   CREDITS   3												
CO CC	URSE DDE		CEC	24451		C CA	OURS	E RY		DE		L-T-F	P-S	3-0-	0-0
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ASSES	SMEN	T SCH	SCHEME												
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Co Obje	ourse ective	1. 2. 3. 4. 5.	<ul> <li>road supply, traffic flows and land use.</li> <li>To teach how to perform traffic surveys.</li> <li>To train how to design traffic signals.</li> <li>To train how to design traffic intersections.</li> <li>To introduce the procedures of traffic management and forecasting.</li> </ul>												
Co Out	ourse come	U  1. 2. 3. 4. 5.	Don cor Dem Class Desig Desig	npletic onstra ify the gn traff gn the rate th	on of the te the differe fic sign traffic he proc	nis cour road, tr ent con als and interse edures	rse, the raffic a npone their ctions. involv	e stude nd land nts of t coordir red in t	ents wi d use c raffic s nation. raffic n	ll be al haract surveys nanage	ole to eristics 5. ement	s. and tra	affic for	ecasting	
Prereq	uisites	:Tran	sportat	ion En	gineer	ing -I									
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со	PO- 1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	1	2	2	1	1	1	1	1	1	1	1	1	2	2	2
CO-2	3	3	2	1	3	1	1	1	2	1	1	1	2	2	2
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CO-4	2	3	3	1	1	2	1	1	2	1	1	1	2	2	2
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	1: Weakly related, 2: Moderately related and 3: Strongly related	
MODULE 1: IN	TRODUCTION (9L)	
Significance ar Braking Efficier Use Characteri	d scope, Characteristics of Vehicles and Road Users, Skid Resistance and ncy (Problems), Components of Traffic Engineering - Road, Traffic and Land stics.	CO-1 BTL-3
MODULE 2: TR	AFFIC SURVEYS AND ANALYSIS (9L)	
Surveys and Ar Pedestrian Stu	nalysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, dies, Accident Studies and Safety Level of Services - Problems.	CO-2 BTL-3
MODULE 3: TR	AFFIC CONTROL (9L)	
Traffic signs, Ro Traffic control design.	oad markings, Design of Traffic signals and Signal co-ordination (Problems), aids and Street furniture, Street Lighting, Computer applications in Signal	CO-3 BTL-3
MODULE 4: GE	OMETRIC DESIGN OF INTERSECTIONS (9L)	
Conflicts at Inte channelized In Design, Elemen Grade Separat	ersections, Classification of Intersections at Grade Channelized and Un tersection - Grade Separators (Concepts only), Principles of Intersection nts of Intersection Design, Channelization and Rotary design (Problems), ors.	CO-4 BTL-3
MODULE 5:TR	AFFIC MANAGEMENT (9L)	
Traffic Manage Management ( One-way Stree Lanes - Introdu	ement - Traffic System Management (TSM) and Travel Demand (TDM), Traffic Forecasting techniques, Restrictions on turning movements, ets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus action to Intelligence Transport System (ITS).	CO-5 BTL-3
TEXT BOOKS		
1.	SK Khanna, CEG Justo, A Veeraragavan. (2015). <i>Highway Engineering</i> , Nem C Brothers.	hand &
2.	Kadiyali L R. (2011). Traffic Engineering and Transport Planning, Khanna publ	ishers.
REFERENCE BC	OKS	
1.	Indian Roads Congress (IRC) Specifications: Guidelines and Special Publication Planning and Management.	ns on Traffic
2.	Guidelines of Ministry of Road Transport and Highways, Government of India	э.
3.	Yang, Xiaoguagang. (2017). Traffic Design, S.K Kataria & Sons.	
E BOOKS		
1.	http://nptel.ac.in/downloads/105101008/	
2.	https://books.google.com/books/about/Traffic Engineering and Managen	nent.html?
моос		
1.	https://ocw.mit.edu/courses/transportation-courses/	

COURSE	TITLE				BR	DGE S	TRUCT	URE			C		s	3	
COURSI	E COD	E	CEC	24453		C CA	OURSI TEGOI	E RY		DE		L-T-P	-S	3-0-	0-0
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Course Descript	ion	Tł re	nis cou inforce	rse air ed con	ns to i crete,	ntrodu and pr	ice the estres	basic t sed co	heory ncrete	and co bridge	oncept e as pe	s of de er IRC le	sign of a	steel, conditio	ns
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Course OutcomeUpon completion of this course, the students will be able to1. Classify the types of bridges and evaluate the loads acting on the bridges based the IRC method.2. Design solid slab bridges and T-beam bridges based on IRC Loading.3. Design Girder bridges with and without articulation.4. Design Pre-Stressed Concrete bridges5. Design bearings for slab and girder bridges										ed on					
Prerequi	isites:I	Desigr	n of Co	ncrete	Struc	tures									
CO, PO	AND	PSO	MAP	PING											
со	PO-	РО	PO-	PO-	РО	PO-	PO-	PO-	РО	PO-	РО	PO-	PSO-	PSO-	PSO-
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CO-2	-	2	1	1	-	1	2	-	-	-	1	1	1	3	-
CO-3	-	1	2	2	2	1	-	-	-	-	-	2	1	3	-
CO-4	-	1	1	2	2	1	-	-	-	-	2	1	1	3	-
CO-5	-	1	3	2	2	2	2	-	-	-	2	2	2	3	-
MODUL	E 1: IN	ITROD	ουςτις	DN							(9)				

History of Bridg	ges - Introduction to bridge engineering, classification and components of							
bridges, layout,	planning. Structural forms of bridge decks, beam and slab decks, cellular	CO-1						
decks.Standard	specification for bridges, IRC loadings for road bridges, Loadings for	BTL-2						
Railway Bridges; Railroad data. Pre-design considerations; Railroad vs. Highway bridges.								
MODULE 2: RC SLAB (9)								
Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges CO-2								
- Design of pane	el and cantilever for IRC loading.	BTL-4						
MODULE 3: GIR	DER BRIDGES(9)							
Design of tee b	eam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever	CO-3						
bridges -Deck s	ab - Main girder - Design of cantilever - Design of articulation.	BTL-4						
MODULE 4: PRE	STRESSED BRIDGES	(9)						
Design of prest	ressed concrete bridges - Preliminary dimensions - Flexural and torsional							
parameters - C	ourbon's theory - Distribution coefficient by exact analysis - Design of							
girder section-N	Maximum and minimum pre-stressing forces - Eccentricity - Live load and	CO-4						
dead load shea	ar forces- cable zone in girder - Check for stresses at various sections	BTL-4						
Check for diago	nal tension - Diaphragms - End block - Short term and long term							
deflection.								
MODULE 5: BEA	ARINGS FOR BRIDGES (9)							
Importance of	bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion	CO-5						
bearings; Fixed	bearings; Design of elastomeric pad bearing.	BTL-3						
TEXT BOOKS								
1	Johnson Victor D. (2010). <i>Essentials of Bridge Engineering</i> ", Oxford and II Co., New Delhi.	BH Publishing						
2	M. K. Pant. (2016). Bridge Engineering, S.K Kataria & Sons.							
3	N. Krishna Raju. (2012). <i>Design of Bridges,</i> Oxford & IBH Publishing Co. Pvt. Delhi.	Ltd., New						
REFERENCE BO	OKS							
1	Ponnuswamy S. (2017). Bridge Engineering, Tata McGraw-Hill, New Delhi							
2	IRC Codes – IRC: 5, IRC: 6, IRC: 18, IRC: 27, IRC: 45, IRC: 78, IRC: 83							
E BOOKS								
1	https://books.google.com/books/about/Design_of_Bridge_Structures.h	tml/						
2		<u> </u>						
2	https://www.elsevier.com/books/accelerated-bridge-construction//97 407224	7 <u>8-0-12-</u>						
MOOC	https://www.elsevier.com/books/accelerated-bridge-construction//97	7 <u>8-0-12-</u>						
2 MOOC 1.	https://www.elsevier.com/books/accelerated-bridge-construction//97 407224 https://www.mooc-list.com/course/art-structural-engineering-bridges-e	28-0-12- 28-0-12-						

COURS	SE TITL	E	STORAGE STRUCTURES CREDITS 3												
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ASSES	SMEN	T SCHE	SCHEME												
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Course Object	e tive	1. 2. 3. 4. 5.	<ol> <li>To be familiar with the design of concrete water tanks.</li> <li>To be acquainted with the basic design concepts of steel bunkers and silos.</li> <li>Understand the design concepts of steel bunkers and silos.</li> <li>Understand the principles of circular prestressing.</li> </ol>												
Course Outco	e me	1. 2. 3. 4. 5.	Upor Desi tanks Desi unde Appl Desi Desi	n comp gn the s s with l gn cond ergrour y the d gn cond gn pres	letion steel w nemisp crete w nd tank esign o crete b tresse	of this vater ta oherica vater ta cs. concep ounkers d conc	course anks su I botto anks lik ts in th s and si rete cir	e, the s ich as p im. ce eleva ie desig ilos. rcular v	tudent pressed ated re gn of s water t	ts will b d water ectangu teel bu canks	e able tank a ilar wa nkers	e to and wa iter tan and silo	ter k,circul os.	ar tank a	and
Prereq	uisites	: Desi	gn of S	teel St	ructur	es,Des	ign of	Concre	te Stru	uctures	;				
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CO-1	-	2	3	3	3	3	-	-	-	-	3	3	3	3	-
CO-2	-	2	3	3	3	3	-	-	-	-	3	3	3	3	-
CO-3	-	2	3	3	3	3	-	-	-	-	3	3	3	3	-
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CO-5	-	2	3	3	3	3	_	-	-	-	3	3	3	3	-

	1: Weakly related, 2: Moderately related and 3: Strongly related							
MODULE 1: STEEL WATER TANKS (9L)								
Design of rect and transvers Design of pre bottom water foundation.	tangular riveted steel water tank - Tee covers - Plates - Stays - Longitudinal e beams - Design of staging - Base plates - Foundation and anchor bolts - ssed steel water tank - Design of stays - Joints - Design of hemispherical tank - side plates - Bottom plates - joints - Ring girder - Design of staging and	CO-1 BTL-2						
MODULE 2: CO	DNCRETE WATER TANKS (9L)							
Design of Circ forces and mo dome - Stagin methods and - Check for up	cular tanks - Hinged and fixed at the base - IS method of calculating shear oments - Hoop tension - Design of intze tank - Dome - Ring girders - Conical og - Bracings - Raft foundation - Design of rectangular tanks - Approximate IS methods -Design of underground tanks - Design of base slab and side wall lift.	CO-2 BTL-2						
MODULE 3: ST	TEEL BUNKERS AND SILOS (9L)							
Design of squ plates - Stiffne Ring girder - s	are bunker - Jansen's and Airy's theories - IS Codal provisions - Design of side eners - Hooper - Longitudinal beams - Design of cylindrical silo - Side plates - tiffeners.	CO-3 BTL-3						
MODULE 4: CO	ONCRETE BUNKERS AND SILOS(9L)							
Design of squ Design of cylir	are bunker - Side Walls - Hopper bottom - Top and bottom edge beams - ndrical silo - Wall portion - Design of conical hopper - Ring beam at junction.	CO-4 BTL-3						
MODULE 5: PR	RESTRESSED CONCRETE WATER TANKS (9L)							
Principles of c	circular prestressing - Design of prestressed concrete circular water tanks.	CO-5 BTL-3						
TEXT BOOKS								
1	Rajagopalan K., Storage Structures, Routledge, 2004							
2	N. Krishna Raju. (2013). Advanced Reinforced Concrete Design (IS: 456-2000 Publishers.	)), CBS						
REFERENCE BO	рокѕ							
1.	Subramanian, N. (2013). Design of Reinforced Concrete Structures, Oxford U New Delhi.	Iniversity Press,						
2.	IS 456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of I Standards, New Delhi, 2000	ndian						
3	SP16, IS 456:2000 "Design Aids for Reinforced Concrete to Bureau of Indian	Standards						
4	Sinha, S.N. (2014). Reinforced Concrete Design, Publishing Tata M Company Ltd., New Delhi. Third Edtion.	lcGraw Hill						
5	Punmia B.C, Ashok Kumar Jain, ArunK.Jain. (2012). R.C.C. Designs Reinforced Structures, Laxmi Publications Pvt. Ltd., New Delhi.	d Concrete						

E BOOKS	
1.	https://app-
	u.pulsetip.com/assessing loads on silos and other bulk storage structures.pdf
моос	
1.	https://arvengtraining.com/en/all-courses/api-650-design-of-storage-tanks-course-online/

COURS	E TITLI	E			TA	LL STF	RUCTU	RES			C		s	3	
COURS	E COD	E	CEC	4455		C CA	OURSI	E RY		DE		L-T-P	P-S	3-0-	0-0
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ASSESS	MENT	SCHE	ME												
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Course Objecti	ve	1. 2. 3. 4. 5.	Unde Iden Unde Intro Unde	erstan tify dif erstan oduce v erstan	d the v ferent d the s various d the c	various types tabilit s struc concep	aspec of load y analy tural sy ts of a	ts of p ds cons vsis of v ystems pproxi	lannin sidered various s used mate a	g of tal d in the s struct for the analysis	l build analy cural s const s of St	lings. /sis of t ystems ruction ructura	call structs. n of tall al syster	ctures. building m	gs.
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CO-1	-	-	2	2	1	2	1	-	-	-	2	1	2	1	-
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CO-4	2	2	1	1	1	2	-	-	-	-	2	1	1	2	-
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		-	1: Wea	akly re	lated,	2: Mo	derate	ly rela	ted an	d 3: Sti	rongly	/ relate	ed		
MODU	LE 1: IN	NTROE	ουστια	ON							(9)				

The Tall Buildin Development o Loads - Live Loa Loading -Water Changes of Mat <b>MODULE 2: THE</b> Dispersion of Ve	ng in the Urban Context - The Tall Building and its Support Structure - f High-Rise Building Structures - General Planning Considerations. Dead ads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic and Earth Pressure Loads - Loads - Loads Due to Restrained Volume erial - Impact and Dynamic Loads - Blast Loads -Combination of Loads. <b>VERTICAL STRUCTURE PLANE</b> (9) ertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space rangement - Behaviour of Shear Walls under Lateral Loading. The Floor	CO-1 BTL-2
Structure or H Composite Floo Frame Systems Box Systems.	Iorizontal Building Plane Floor Framing Systems-Horizontal Bracing- r Systems the High - Rise Building as related to assemblage Kits Skeleton - Load Bearing Wall Panel Systems - Panel - Frame Systems - Multi-storey	CO-2 BTL-3
MODULE 3: COI	MMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDE	R LOAD (9)
The Bearing Wa Beam Structure Systems - Flat Sl - Belt Trusses Structural Syste Forms - The Cou	all Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - : Interspatial and Staggered Truss Systems - Frame - Shear Wall Building ab Building Structures - Shear Truss - Frame Interaction System with Rigid - Tubular Systems-Composite Buildings - Comparison of High - Rise ms Other Design Approaches Controlling Building Drift Efficient Building unteracting Force or Dynamic Response	CO-3 BTL-3
MODULE 4: APF	PROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS	(9)
Approximate A Structure the Approximate Ar Lateral Deforma Vierendeel Stru	nalysis of Bearing Wall Buildings the Cross Wall Structure - The Long Wall Rigid Frame Structure Approximate Analysis for Vertical Loading - nalysis for Lateral Loading - Approximate Design of Rigid Frame Buildings- ation of Rigid Frame Buildings the Rigid Frame - Shear Wall Structure - The cture - The Hollow Tube Structure.	CO-4 BTL-4
MODULE 5: OTH	IER HIGH-RISE BUILDING STRUCTURE (9)	
Deep Beam Sys SpaceFrame Ap	tems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings – plied to High Rise Buildings - Capsule Architecture – Case Studies	CO-5 BTL-3
TEXT BOOKS		
1	Bungale S. Taranath. (2011). <i>Structural Analysis and Design of Tall Buildi</i> <i>Composite</i> , Construction, CRC Press.	ngs: Steel and
2	Bryan Stafford Smith & Alex Coull. (2011). <i>Tall Building Structures: Analys</i> Wiley India.	sis and Design,
REFERENCE BOO	DKS	
1	Vicente Lopes Junior, Valder Steffen Jr. & Marcelo Amorim Savi. (2016). <i>D</i> Smart Systemsand Structures: Concepts and Applications. Springer.	Dynamics of
2	David Parker, Antony Wood. (2013). The Tall Buildings Reference Book, Ro	outelege.
E BOOKS		
1	https://www.accessengineeringlibrary.com//tall-and-supertall-buildin	gs-planning
МООС		

1.	https://www.mooc-list.com/course/art-structural-engineering-bridges-edx
2.	https://scholarship-positions.com/blog/structural-engineering-online-course/201601/

COURS	SE TITL	.E												3			
CO CC	URSE DDE		CEO	24456		C CA	OURSE TEGOR	E X <b>Y</b>		DE		L-T-P	-S	3-0-	0-0		
Ve	rsion			1.0		Appro	oval De	etails	24t 30.	h ACM .5.2018	- 3	LEARN LEVI	ING EL	BTI	L-3		
ASSES	SMEN	т ѕсні	<b>EME</b>														
Fi Perio Asses	irst odical ssment	S t	econd Asse	Period ssment	ical	Se Assi F	eminar gnmen Project	/ ts/	Surp /	orise Te ' Quiz	est	Attend	ance	ES	έE		
1	5%		1	.5%			10%			5%		5%	5% 50%				
Co Desci	urse ription	Tc an	To introduce the student to basic theory and concepts of storage structures design and steel and concrete tanks, bunkers and silos.														
Course Object	e :ive		<ol> <li>Familiarize with planning and layout of buildings and its components.</li> <li>Know about the functional requirements of industries.</li> <li>Understand the design concepts of steel storage structures.</li> <li>Understand the design concepts of concrete storage structures.</li> <li>Study the general principles of prefabrication and the functional requirements for Precast concrete units.</li> </ol>														
Course Outco	e me	1. 2. 3. 4. 5.	Upor Narra Expla indus Desig Expla	n comp ate the ain the stries. gn the s gn the o ain the	letion genera functio steel st concret functio	of this al requ onal rec orage s te stora onal rec	course, iremen quirem structu age stru quirem	, the st its for i ents su res like uctures ents of	udents industr ich as l e bunke s like b Preca	s will be ies like lighting ers and unkers st conc	e able ceme g, venti l silos. and si crete u	to nt, che lation a los. nits.	mical ar and fire	nd steel p safety o	olants. f		
Prereq	uisites	: Desi	gn of S	teel str	ucture	S											
СО, РС	O AND	PSO N	ΛΑΡΡΙΙ	NG													
со	РО -1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	РО -10	РО- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3		
CO-1	-	2	2	2	2	2	-	2	-	-	2	2	2	2	-		
CO-2	-	2	2	2	2	2	-	-	-	-	2	2	2	2	-		
CO-3	-	2	3	3	3	3	-	-	-	-	3	3	3	3	-		
CO-4	-	2	3	3	3	3	-	-	-	-	-	3	3	3	-		
CO-5	-	2	3	3	3	3	-	-	-	-	3	3	3	3	-		

1: Weakly related, 2: Moderately related and 3: Strongly related										
MOD	JLE 1: Pl	ANNING (9L)								
Classif	fication o	of Industries and Industrial structures - General requirements for industries	CO-1							
like ce	ment, cł	nemical and steel plants - Planning and layout of buildings and components.	BTL-2							
MODULE 2: FUNCTIONAL REQUIREMENT (9L)										
Lightir	ng - Vent	ilation - Accounts - Fire safety - Guidelines from factories act.	CO-2							
			BTL-2							
MODU	ILE 3: ST	EEL STRUCTURES	(9L)							
Industrial roofs - Crane girders - Mill buildings - Design of Bunkers and Silos										
BTL-3										
MODU	ILE 4: DE	SIGN OF R.C. STRUCTURE	(9L)							
Silos a	nd bunke	ers - Chimneys - Principles of folded plates and shell roofs	CO-4							
BTL-3										
MODULE 5: PREFABRICATION (9)										
Princip	les of pr	efabrication - Pre stressed precast roof trusses- Functional requirements for	CO-5							
Precas	t concre	te units	BTL-2							
TEXT B	BOOKS									
1.	P.Daya	ratnam. (2008). <i>Design of Steel Structure</i> , Chand and Company.								
2.	N. Subi	amanian. (2013). Design of Reinforced Concrete Structures, Oxford.								
REFER	ENCE BC	OKS								
4	Wai Kw	ongLau. 2010). Building Construction with Precast Concrete Structural Elemen	<i>ts,</i> LAP							
1.	Lambe	rt Academic Publishing.								
2.	Andrea	s Achilles & et al. (2015). Basics Building Construction, Birkhauser, 2015								
ſ	Punmia	B.C, Ashok Kumar Jain, ArunK.Jain. (2012). R.C.C. Designs Reinforced Concret	e Structures,							
Laxmi Publications Pvt. Ltd., New Delhi.										
E BOO	KS									
	1.	https://chi.proficom.nl/stability analysis and design of structures.pd								
MOOC										
	1.	https://www.mooc-list.com/tags/industrial-organization								

COURS	SE TITL	.E	PRE-FABRICATED STRUCTURES									REDITS		3	
COI CC	URSE DDE		CEC	24457		CA	OURSE	E RY		DE		Ŀ	-T-P-S		3-0-0-1
Ver	rsion			1.0		Appr	oval De	etails	241 30	th ACM .5.2018	- 3	LEARNING LEVEL		'EL	BTL-3
ASSES	SMEN	т ѕсні	ME								·				
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Course Descri	Course       This course introduces modular construction, industrialised construction and design of         Description       prefabricated elements and construction methods														
Course Objective1. Acquire knowledge on principles and standardization of prefabrication system.2. Learn about the various components of prefabrication system.3. Understand the principles involved in prefabrication system.4. Acquire information on different types of joints involved in structural connections5. Learn to model components to resist earthquakes and cyclones.															
Course Outco	e me	Up 1. 2. 3. 4. 5.	oon con Expla Expla Demo Elabo Mode	npletion in the p in the v onstrate rate dif	n of th princip various e the p fferent bricati	is cours les and compo rinciple types o on com	e, the s standa nents o involv of joint: ponent	student rdizatio of prefa ed in pr s involv cs to res	s will b on of pu abricati refabrio red in s sist ear	oe able refabric on syst cation s tructura thquak	to ation s em. system. al conn es and	eystem.	s es.		
Prereq				of Stru	ctures	1									
CO, PC		P30 N			DO	DO	PO	PO	PO	PO	DO		DSO	DSO	DSO
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CO-1	-	2	3	3	3	3	-	3	-	-	2	3	2	3	-
CO-2	-	2	3	3	3	3	-	-	-	-	2	3	2	3	-
CO-3	-	2	3	3	3	3	-	-	-	-	2	3	2	3	-
CO-4	-	2	3	3	3	3	-	-	-	-	2	3	2	3	-
CO-5	-	2	3	3	3	3	-	-	-	-	2	3	2	3	-
	1: Weakly related, 2: Moderately related and 3: Strongly related														

MODU	LE 1: INTRODUCTION (8L+1T)	
Need fo Produc	or prefabrication - Principles - Materials - Modular coordination - Standardization - Systems - tion - Transportation - Erection.	CO-1 BTL-3
MODUL	LE 2 : PREFABRICATED COMPONENTS (8L+1T)	
Behavic	our of structural components - large panel constructions - Construction of roof and floor slabs -	CO-2
Wall pa	nels - Columns - Shear walls	BTL-3
MODUL	LE 3: DESIGN PRINCIPLES (8L+1T)	
Disuniti	ng of structures- Design of cross section based on efficiency of material used - Problems	CO-3
design b	pecause of joint flexibility - Allowance for joint deformation.	BTL-3
MODUL	LE 4: JOINT IN STRUCTURES (8L+1T)	
Joints fo	or different structural connections - Dimensions and detailing - Design of expansion joints	CO-4 BTL-3
MODUL	LE 5: DESIGN FOR ABNORMAL LOADS (8L+1T)	
Progre	essive collapse - Code provisions - Equivalent design loads for considering abnormal effects	CO-5
such a	s earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.	BTL-3
Self-stu	dy Topic: Progressive collapse.	
TEXT BO	ООКЅ	
1	Kim S. Elliott. (2019). Precast Concrete Structures, CRC Press	
REFERE	NCE BOOKS	
1	Koncz T. (2012). Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH,	
2	Structural design manual, Precast concrete connection details, Society for the studies in the	
	use of precast concrete, Netherland Betor Verlag,	
E BOOK	s	
1	https://rtvacademy.org/a14e5/design-principles-of-prefabricated-structures.pdf	
2	https://personal.cityu.edu.hk/~bswmwong/photo_lib/pdf/prefabricated.pdf	
3	https://books.google.com/books/about/Prefabricated Structures	
MOOC		
1	www.tatainteractive.com//Designing MOOCs-A White Paper on ID for MOOCs	

COURS	SE TITL	.E	B		OF DYN	C	CREDITS		3							
CO CC	URSE DDE		CEO	C4458		C CA		E RY		DE		Ľ	T-P-S	3	8-0-0-1	
Ve	rsion			1.0		Appr	oval De	etails	24 [:] 30	th ACM ).5.2018	- 3	LEARNI	NG LEVI	EL	BTL-3	
ASSES	SMEN	T SCH	EME													
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1	5%		1	L <b>5%</b>			10%			5%			5%		50%	
Co Desci	urse ription	Th fai dy	This course introduces the phenomena of earthquakes, the process, measurements and the factors that affect the design of structures in seismic areas. Rudiments of theory of vibrations, dynamic forces caused by earthquakes and codal provisions are covered.													
Cours Object	e tive	<ol> <li>Acquire knowledge to analyze structures with single degree of freedom for dynamic loading conditions.</li> <li>Learn about computing natural frequencies and mode shapes of structures under dynamic loading.</li> <li>Understand the causes of earthquake and the damage on the structures caused by earthquake</li> <li>Learn to assess the response of the structure displacement, for earthquake loading</li> </ol>												ynamic		
Course Outco	e me	Ur 1. 2. 3. 4. 5.	Analy Find of Descr Find of Desig	npletion vze the put the ribe the out the mearth	n of thi structu natura causes respor quake	s cours res wit l freque s of ear nse of t resista	e, the s h single encies a thquak he stru nt strue	student e degre and the e and the cture d ctures a	s will b e of fre mode he dam isplace	be able eedom shapes nage on ement, f opt app	to for dyn of stru the str for earl ropriat	iamic lo ictures uctures chquake e vibrat	bading cc under dy caused e loading cion cont	ndition namic by eart	s. Ioading hquake iniques	
Prereq	luisites	s: Desi	gn of C	oncrete	e Struc	tures, L	Jesign	orstee	I Struc	tures						
CO, P(		PSON		NG		<b>DC</b>	<b>D</b> C	<b>DC</b>	<b>DC</b>		56		<b>D</b> CC	<b>D</b> 22	Dice	
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CO-1	1	2	3	3	3	3	-	3	-	1	2	3	2	3	-	
CO-2	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-	
CO-3	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-	
CO-4	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-	
CO-5	1	2	3	3	3	3	-	-	-	1	2	3	2	3	-	

1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: THEORY OF VIBRATIONS (9L+1T)									
Concept of inertia and damping - Types of Damping - Difference between static forces and dynamic excitation - Degrees of freedom - SDOF idealization - Equations of motion of SDOF system for mass as well as base excitation - Free vibration of SDOF system - Response to harmonic excitation - Impulse and response to unit impulse - Duhamel integral.	CO-1 BTL-3								
MODULE 2 : MULTIPLE DEGREE OF FREEDOM SYSTEM (9L+1T)									
Two degree of freedom system - Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems - Decoupling of equations of motion - Concept of mode superposition (No derivations).	CO-2 BTL-3								
MODULE 3: ELEMENTS OF SEISMOLOGY (9L+1T)	1								
Causes of Earthquake - Geological faults - Tectonic plate theory - Elastic rebound - Epicentre Hypocentre - Primary, shear and Raleigh waves - Seismogram - Magnitude and intensity of earthquakes - Magnitude and Intensity scales - Spectral Acceleration - Information on some disastrous earthquakes	CO-3 BTL-3								
MODULE 4: RESPONSE OF STRUCTURES TO EARTHQUAKE (9L+1T)									
Response and design spectra - Design earthquake - concept of peak acceleration - Site specific response spectrum - Effect of soil properties and damping - Liquefaction of soils - Importance of ductility - Methods of introducing ductility into RC structures.	e CO-4 BTL-3								
MODULE 5: DESIGN METHODOLOGY (9L+1T)	1								
IS 1893, IS 13920 and IS 4326 - Codal provisions - Design as per the codes - Base isolation techniques - Vibration control measures - Important points in mitigating effects of earthquake on structures	CO-5 BTL-3								
Self-study Topic: Tectonic plate theory									
TEXT BOOKS									
<b>1</b> Mario Paz, William Leigh. (2012). <i>Structural Dynamics Theory and Computation</i> , Springer.									
2 MadhujitMukhopdhyay. (2006). <i>Structural Dynamics</i> , Vibrations and Systems, Anne Books India.									
3 Pankaj Agarwal. (2007). <i>Earthquake Resistant Design of Structures</i> , Prentice Hall of India.									
REFERENCE BOOKS									
1 S.R. Damodarasamy, S.Kavitha. (2009). <i>Basics of Structural dynamics and Aseismic Design</i> , PHI Private Limited.	Learning								
2 Clough R.W. and Penzien, J. (2006). <i>Dynamics of Structures</i> , McGraw-Hill.									
3 Anil K.Chopra. (2009). <i>Dynamics of Structures Theory and Applications to Earthquake Engineer</i> Pearson Education.	ing.								
E BOOKS									
1 <u>https://link.springer.com/book/10.1007/978-1-4615-7918-2</u>									
2 <u>http://www.uap-</u> bd.edu/ce/anam/Anam_files/Structural%20Dynamics%20and%20Earthquake%20%%2020%20 ing.pdf	)Engineer								
MOOC									

1	https://www.mooc-list.com/tags/dynamics

## **NON-DEPARTMENT ELECTIVES**

COUR	SE TITI	.E		S	olid w	ASTE	CF	REDITS		2					
CO CO	URSE ODE		CE	D251		C CA	OURSI	E RY		NE		L-T-P	-S	2-0-	0-0
Ve	rsion			L.O		Appro	oval De	etails	24t 30.	h ACM 5.2018	- L	LEARNING LEVEL		BTL-3	
ASSES	SMEN	T SCH	ME												
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1	15%		15% 10% 5% 5% 5											50	%
Co Desc	ourse riptior	Tc pro	To make the students learn about the various types of solid waste and hazardous waste produced, the collection, transportation methods, the treatment and disposal methods.												
Cours Object	e tive	1. 2. 3. 4. 5.	<ol> <li>To get familiarize about the sources and types of solid waste, collection, storage, transport and handling methods</li> <li>To know about the sources and types of hazardous waste, collection, storage, transport and handling methods.</li> <li>To become familiar separation and processing techniques.</li> <li>To know about various methods of disposal of solid waste.</li> </ol>												
Cours Outco	<ul> <li>5. To be Aware of solid waste legislations.</li> <li>Upon completion of this course, the students will be able to</li> <li>1. Explain various sources, characterization methods, collection types, storage and handling of municipal solid waste.</li> <li>3. Explain various hazardous wastes, collection, safe transportation, storage and handling.</li> <li>3. Demonstrate the methods of materials and energy recovery from solid wastes.</li> <li>4. Suggest scientific disposal methods for solid waste.</li> </ul>												d		
Prerec	quisite	5:													
СО, Р	O AND	PSO N	/IAPPIN	IG											
со	PO -1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO -10	PO- 11	РО- 12	PSO- 1	PSO- 2	PSO- 3
CO- 1	-	-	3	1	1	3	3	3	2	2	2	-	_	2	2
CO- 2	-	-	3	1	1	3	3	3	2	2	2	-	-	2	2

CO- 3	-	-	3	1	1	3	3	3	2	2	2	-	-	2	2
CO- 4	-	-	3	1	1	3	3	3	2	2	2	-	-	2	2
CO- 5	-	-	3	1	1	3	3	3	2	2	2	-	-	2	2
			1: W	eakly r	elated,	, 2: Mo	derate	ely rela	ted and	d 3: St	rongly	relate	d		
MOD	MODULE 1: MUNICIPAL SOLID WASTE MANAGEMENT (6L)														
Definition of solid waste-source and characteristics-generation of solid waste –collection,											CO-1				
transp	port, st	orage a	and ha	ndling	of solic	d waste	2.							BTL	-2
MODU	JLE 2: I	HAZAR	DOUS	WASTE	E MAN	AGEM	ENT (6	L)							
Defin	ition c	of haza	ardous	waste	-sourc	e and	chara	cterist	cs-type	es and	d class	ificatic	on of	co	-7
hazaro	dous w	/aste –	e-wast	te, auto	omobil	e wast	e, rad	ioactiv	e wast	es–col	lection	, trans	sport,	BTL	-2
storag	ge and	handlir	ng of h	azardo	us was	ste.									
MODU	JLE 3: 9	SOLID \	WASTE	RECO	VERY (	6L)									
Unit d	operati	on for	separa	ation a	nd pro	cessin	g of so	lid was	ste-Ma	terial	recove	ry facil	lities-	<b>CO</b>	2
waste	tran	sforma	tions-p	ohysica	l, che	emical,	biolc	ogical	metho	ds-ene	ergy i	recove	ry –	CU BTL	-3
incine	rators-	recycli	ng cen	ters.										DIL	-2
MODU	JLE 4: [	DISPOS	SAL OF	SOLID	WAST	E (6L)									
Solid	waste	disposa	al metł	nods-la	ndfill v	s open	dump	yards-	landfill	l-site s	electio	n, desi	gn	CO	-4
and o	peratio	on-TCLF	o tests-	Leacha	ate stu	dies – I	ntegra	ted wa	ste ma	nagen	nent fa	cilities	•	BTL	-3
MODU	JLE 5: 9	Solid \	WASTE	MAN	AGEME	ENT LEO	GISLAT	IONS (	6L)						
India	in legis	lations	on So	lid was	te mar	nageme	ent- m	unicipa	I solid	waste	manag	gemen ⁻	t and	CO	-5
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Case	Studies	and Ir	ndustri	al Visit	s.										
TEXT E	BOOKS														
1	Georg	ge Tcho	banog	glous et	al (20:	00). Int	tegrate	ed Solia	Waste	e Mana	ageme	nt, Mc	Graw-H	ill Publis	shers.
2	B.Bilit	ewski,	G.Har	dHe, K.	Marek	, A.We	issbacl	h and F	I.Boed	dicker.	(2006	). Wasi	te Man	agemen	t,
	Spring	ger.													
REFER		amach	andra	(2000)	Man	aaama	nt of M	Aunicin	al Colic	1 Wast	a Com	monu	voalth c	floarni	20
Т	L I.V. Ramachandra. (2009). <i>Wanagement of Wunicipal Solia Waste</i> , Common wealth of learning, Canada.														
2	2 Jabir Singh. (2009). Solid Waste Management: Present and Future Challenges, Wiley.														
E BOO	KS														
1	https:	//www	.digital	bookind	lex.org	/_searc	h/searc	:h010er	vironm	ienwas	terefus	ea.asp			
2	<u>https</u>	:://www	w.kobo	o.com/	us/en/	ebook,	/munic	ipal-so	lid-was	ste-ma	nagem	<u>ient</u>			
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COURS	SE TITL	.E	AIR AND NOISE POLLUTION CONTROL									REDITS		2	
CO CC	URSE DDE		CEL	04291		C CA	OURSE	E RY		NE		L-T-P	-S	2-0-	0-0
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ASSES	SMEN	т ѕсне	EME												
F Peri Asses	irst odical ssment	t S	econd Asse	Period ssment	ical	Se Assi F	eminar gnmen Project	/ its/	Surp /	orise Te Quiz	est A	Attend	ance	ES	SE .
1	.5%		1	.5%			10%			5%		5%	,	50	%
Co Desc	ourse ription	To te	To familiarize the students about characteristics, types, source and treatment technologies of various air pollutants.												
Course Object	e tive	Tł	<ol> <li>The course should enable the students to:         <ol> <li>Understand the various types of Meteorological parameters.</li> <li>Study and understand the various types of air pollutants</li> <li>Study and understand the air models.</li> <li>Know about the various control technologies in air pollution</li> <li>Study about the source and effects of noise pollution</li> </ol> </li> </ol>												
Course Outco	e me	Uţ	2000 COI 1. E 2. S 3. A 4. E 5. S	mpletic Explain Summa Apply a Describ tudies Summa	on of th the va rize th ir mod e the v rize th	nis cour rious ty e vario els in a various e sourc	rse, the ypes of us sour ir qual contro ces and	e stude Meteo rces an ity mar I techr	nts wil prologi d effec nagemo nologie fects o	l be ab cal par cts of A ent s adop f Noise	le to amete ir pollu ted in a pollut	rs utants air poll tion	ution m	anagem	ent
Prereq	uisites	: NIL													
СО, РС	O AND	PSO N	ΛΑΡΡΙΝ	IG											
со	PO	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO	PO-	PO-	PSO-	PSO-	PSO-
	-1	2	3	4	5	6	7	8	9	-10	11	12	1	2	3
CO-1		T		-	-	-		-	1	2	-	-	1	2	-
CO-2		1		-	-	-		-	1	2	-	-	1	2	-
CO-3	1	1		-	2	-		-	1	2	-	-	1	2	-
CO-4	1	1	1	-	-	-	1	-	1	2	-	-	1	2	-
CO-5	1	1	1	-	-	-	1	-	1	2	-	-	1	2	-

1: Weakly related, 2: Moderately related and 3: Strongly related															
MODULE1: BA	ASIC METEOROLOGICAL PROCESSES (6L)														
Elements of a lapse rate – Er Atmospheric (	tmosphere – Meteorological factors – Wind roses – Lapse rate –Adiabatic nvironmental lapse rate- Atmospheric stability and turbulence – General Circulation	CO-1 BTL-2													
WODULE 2. SC															
Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming- ozone layer depletion, Industrial accidents, air pollution index.CO-2BTL-2															
MODULE 3: AI	R QUALITY MODELLING AND MANAGEMENT (6L)														
Types of Plur Air quality sta industries – L	nes, Flow Regimes of a Plume, Plume Rise, Introduction to dispersion models, andards – Air quality monitoring - Zoning – Town planning regulation of new egislation and enforcement	CO-3 BTL-2													
MODULE 4: TE	CHNOLOGY FOR AIR POLLUTION CONTROL (6L)														
Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteriaCO-4for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries case studiesBTL-2															
MODULE 5: NO	DISE POLLUTION (6L)														
Sources of noi Industrial nois	se pollution – Effects – Assessment - Standards – Control methods Prevention, e pollution control, case studies, study experiments	CO-5 BTL-2													
TEXT BOOKS															
1	Anjaneyulu, D. (2002). Air Pollution and Control Technologies, Allied Publishe	ers, Mumbai.													
2	Rao, C.S. (2006). <i>Environmental Pollution Control Engineering</i> , New Age Inter Delhi.	rnational, New													
3	Rao M.N., and Rao H. V. N. (2001). Air Pollution Control, Tata-McGraw-Hill, I	New Delhi.													
REFERENCE BO	DOKS														
1	W.L. Heumann. (2000). Industrial Air Pollution Control Systems, McGraw-Hill	, New York.													
2 Mahajan S.P. (2005). <i>Pollution Control in Process Industries</i> , Tata McGraw-Hill Publishing Company, New Delhi.															
3	Peavy S.W., Rowe D.R. and Tchobanoglous G (2013). <i>Environmental Enginee</i> . Hill, New Delhi.	ring, McGraw													
COURS	E TITLE		SUSTAINABLE ENGINEERING PRACTICES										ITS	2	
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COURS	E COD	E	CS	4401		C CA	OURSI	E RY		NE		L-T-P	9-S	2-0-	0-0
Vers	sion		1	L.O		Appro	oval Do	etails	24t 30	h ACN	l - B	LEARN LEVI	ING EL	BTL	-3
ASSESS	MENT	SCHE	ME												
First Pe Assess	riodica sment	I S	econd Asses	Periodi ssment	ical	Seminar/ Assignments/ Project Surprise Test / Quiz					est	Attend	ance	ES	E
15	5%		15%         10%         5%         50%												
Cou Descri	irse ption	To tra su	To develop knowledge in sustainability in the field of green buildings, transportation, renewable energies, water management and application of sustainable materials in various fields.												
Course Objectiv	/e	1. 2. 3. 4. 5.	To ol To u To ga To ac To ex	btain k nderst ain kno cquire xplore	nowle and at wledg knowl variou	edge about sustainable buildings and transportation bout various renewable energies ge about water management techniques ledge about waste management techniques us sustainable materials									
Course Outcom	ie	1. 2. 3. 4. 5.	Upor Narra Expla Dem Expla Exp	n comp ate the ain var nonstra ain sus lain va	oletion e susta ious re ate var tainab rious s	i of thi inable newal rious w le was sustain	s cours buildi ble ene vater n ste mai nable n	se, the ngs an ergies. nanage nagem nateria	stude d trans ement ent mo ls.	nts will sportat technie ethods	l be at tion. ques.	ole to			
Prerequ	isites:														
CO, PC	) AND	PSO	MAP	PING											
со	PO- 1	РО -2	РО- 3	РО- 4	РО -5	РО- 6	РО- 7	РО- 8	РО -9	РО- 10	PO -11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	-	-	3	2	1	2	3	3	-	-	-	2	-	2	2
CO-2	-	-	3	2	1	2	3	3	-	-	-	2	-	2	2
CO-3	-	-	3	2	1	2	3	3	-	-	-	2	-	2	2
CO-4	-	-	3	2	1	2	3	3	-	-	-	2	-	2	2
CO-5	-	-	3	2	1	2	3	3	-	-	-	2	-	2	2
1: Weakly related, 2: Moderately related and 3: Strongly related         MODULE 1: SUSTAINABLE INFRASTRUCTURE       (6L+6L=12)															

Green buildings - public transport network - smart cities – transportation – planning,										
design and cons	struction.	BTL-2								
MODULE 2: SUS	STAINABLE ENERGY (6L)									
Donowable one	ray, wind color biomass goothermal budre newer eccan energy	CO-2								
BTL-2										
MODULE 3: SUSTAINABLE WATER MANAGEMENT (6L)										
Water resources – water supply – water treatment – agriculture – water privatization –										
recycling of was	ste water – minimizing water use practices in urban areas	BTL-2								
MODULE 4: SUS	TAINABLE WASTE MANAGEMENT (6L)									
Carbon sequest	tration – waste to energy technology – avoidance of marine litter,	CO-4								
electronic wast	e disposal – reuse-recycle-recover concepts.	BTL-2								
MODULE 5: SUS	TAINABLE MATERIALS (6L)									
Carbon sequest	tration – waste to energy technology – avoidance of marine litter,	CO-5								
electronic wast	e disposal – reuse-recycle-recover concepts.	BTL-2								
REFERENCE BO	OKS									
1.	Isabel C Escobar & Andrea Schafer. (2009). <i>Sustainable science and engine sustainable water for future</i> ), Elsevier Publications, 1st Edition.	eering (Vol.2:								
2.	Ni-Bin Chang, Ana Pires. (2015). Sustainable solid waste management: a s	system								
	engineering approach, Wiley Publishers.									
3.	3. Francis D.K. Ching, Lan M Shapiro. (2014). <i>Green Building Illustrated</i> , Wiley Publishers.									
4. Alan McKinnon, Michael Browne, Maja Piecyk, Anthony Whiteing. (2015). <i>Green Logistics</i> , 3 rd edition, KoganPage.										

COURS	SE TITL	.E	EN	VIRON	IMENT ENGII	AL IMF NEERIN	PACT A IG PRC	SSESSN JECTS	/ENT F	OR	CI	REDITS	,	2		
CO CC	URSE DDE		CEI	04382		C CA	OURSE TEGOF	E RY		NE		L-T-P	-S	2-0-	0-0	
Ve	rsion			1.0		Appro	oval De	etails	24t 30.	h ACM 5.2018	-	LEARN LEV	ING EL	BTI	L- <b>2</b>	
ASSES	SMEN	т ѕсне	ME													
F Peri Asses	irst odical ssment	t S	Second Periodical Assessment			Se Assi F	eminar, gnmen Project	/ ts/	Surprise Test / Quiz			Attend	ance	ESE		
1	5%		1	.5%			10%			5%		5%		50	%	
Co Desc	ourse ription	Th m	This course describes the basic concepts off Environmental impact Assessment, methodology, and environmental audit.													
Course Object	e :ive	Tł	1. 2. 3. 4. 5.	rse sho Unders Study a Study t Know a Study a	uld ena stand tl ind EIA he imp ibout t ibout t	able th he vario assess portanc he vari he sou	e stude ous typ ment e of pu ous El/ rce and	ents to bes of E liblic pa A case s d effect	IA. rticipa studies s of nc	tion ar bise po	nd mat Ilution	hemat	ical mod	lelling		
Course Outco	e me	Uţ	2000 COI 1. E 2. A 3. E 4. S 5. E	mpletic Explain Apply tl Describ Summa Explain	on of th the va he EIA e the p rize th the En	nis cour rious ty assessi public p e EIA p vironm	rse, the ypes of ment m particip rocedu nental a	e stude EIA as nethod ation a are for auditin	nts wil sessme ology nd Env various g and E	l be ab ent vironm s Indus EIA stai	le to ental n tries ndards	nodelir	ng in EIA	\ assessn	nent	
Prereq	uisites	: NIL														
СО, РС	) AND	PSO N	/IAPPIN	IG												
со	PO -1	РО- 2	PO- 3	PO- 4	PO- 5	PO- 6	PO- 7	РО- 8	РО- 9	PO -10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3	
CO-1	-	1	1	1	-	-	1	1	1	2	1	2	-	2	2	
CO-2	-	1	1	1	-	-	1	1	1	2	1	2	-	2	2	
CO-3	-	1	1	1	2	-	1	1	1	2	1	2	-	2	2	
CO-4	-	1	1	1	-	-	1	1	1	2	1	2	-	2	2	
CO-5	-	1	1	1	-	-	1	1	1	2	1	2	-	2	2	

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: IN	NTRODUCTION TO ENVIRONMENTAL IMPACT ASSESSMENT (6L)	
Introduction - environmenta and areas of c	definitions and concepts - historical development of EIA - EIA for engineers - l impact statement - environmental appraisal - environmental impact factors onsideration	CO-1 BTL-2
MODULE 2: : E	ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY (6L)	
Measurement Six generic st uniqueness ra	CO-2 BTL-2	
MODULE 3: EN	VIRONMENTAL IMPACT ASSESSMENT IN INDIA (6L)	
Public involvo – Environmer India.	ement techniques - comprehensive environmental impact study - EIA Models ntal and social consideration in International cooperation-EIA Regulations in	CO-3 BTL-2
MODULE 4: : E	INVIRONMENTAL IMPACT ASSESSMENT FOR INDUSTRIES (6L)	
EIA for Hydror hazardous ind	oower Projects and other projects - Case studies from hydropower projects - ustries – mining industries.	CO-4 BTL-2
MODULE 5: EN	VIRONMENTAL AUDIT (6L)	
Environmenta Introduction to government.	l audit: Definitions and concepts -methodologies and regulations - o ISO and ISO 14000 -Environmental management systems in local	CO-5 BTL-2
TEXT BOOKS		
1	R. Therivel, John Glasson, Andrew Chadwick. (2005). Introduction to Environ Assessment (Natural and Built Environment), Routledge.	mental Impact
2	R. Welford. (2005). Corporate Environmental Management - Systems and Str Universities Press.	rategies,
3	G. Burke, B. R. Singh and L. Theodore. (2000). <i>Handbook of Environmental M. Technology</i> , 2nd Ed., John Wiley & Sons.	lanagement and
REFERENCE BO	DOKS	
1	C. H. Eccleston. (2000). Environment Impact Statements: A Comprehensive G and Strategic Planning, John Wiley & Sons.	uide to Project
2	L. W. Canter. (2000). Environmental Impact Assessment, 2nd Ed., McGraw-H	ill.
3	R. Welford. (2005). Corporate Environmental Management - Systems and Str Universities Press.	rategies,

COURS	SE TITL	E		PRO	DJECT	C		S	2						
CO CC	URSE DDE		CED	04391		C CA	OURSI TEGOF	E RY		NE		L-T-P	-S	2-0-	0-1
Vei	rsion		-	1.0		Appro	oval De	etails	24t 30	h ACM	l - B	LEARN LEVI	ING EL	BTI	3
ASSES	SMEN	r sche	ME												
First Po Asses	eriodica ssment	al S	econd Asse	Periodi ssment	ical	Se Assi I	eminar, gnmen Project	/ its/	Surp	orise Tes Quiz	st /	Attend	ance	ES	E
1	5%		1	.5%			10%			5%		5%		50	%
Co Desci	urse ription	Ir sy as sa	Introduce the foundations on which appropriate health and safety management systems may be built. Occupational health and safety affect all aspects of work, to assist the professional health and safety practitioner in ensuring that there are satisfactory health and safety standards within the organization.												
Course Object	e .ive	Tł	<ol> <li>The course should enable the students to</li> <li>Understand the accident occurrences and prevention</li> <li>Know the education and training of safety programme</li> <li>make familiar in parameters governing safety in construction</li> <li>Familiar with the safety measures in construction</li> <li>Understand the concept of safety act and regulation based on case study</li> </ol>												
Course Outcoi	e me	Ur 1. 2. 3. 4. 5.	oon co Iden Conc Mair Desi Ador	mpleti tify the duct va ntain co gn vari ot and	on of t cause rious ontrac ous as quote	this cou es of co safety t recor spects f acts a	urse, th onstruc progra ds on for safe nd reg	ne stuc ction a ms. constru ety in C ulation	lents v cciden uction Constru	vill be a its. safety. uction. onstruc	able to	afety.			
Prereq	uisites	: Nil													
СО, РС	D AND	PSO N	APPI	NG		1						1			
со	PO- 1	РО- 2	РО- 3	PO- 4	РО- 5	PO- 6	РО- 7	РО- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3
CO-1	-	3	-	2	-	2	1	2	-	2	3		-	2	2
CO-2	-	3	-	2	2	2	1	2	-	2	3	-	-	2	2
CO-3	-	3	-	2	-	2	1	2	-	2	3	-	-	2	2
CO-4	-	3	-	2	-	2	1	2	-	2	3	-	-	2	2
CO-5	-	3	-	2	-	2	1	2	-	2	3	-	-	2	2
			1: We	akly re	lated	, 2: Mo	derate	ely rela	nted ar	nd 3: St	rongly	y relate	ed		

MODULE 1: C	ONSTRUCTION ACCIDENTS(9 L)	
Accidents and	d their Causes – Human Factors in Construction Safety - Costs of	CO-1
Construction I	njuries – Occupational and Safety Hazard Assessment – Legal Implications	BTL-2
MODULE 2: SA	FETY PROGRAMMES (9 L)	
Problem Area	as in Construction Safety – Elements of an Effective Safety Programme –	CO-2
Job- Site Safe	ty Assessment – Safety Meetings – Safety Incentives	BTL-2
MODULE 3: CO	ONTRACTUAL OBLIGATIONS (9 L)	
		CO-3
Safety in Const	ruction Contracts – Substance Abuse – Safety Record Keeping.	BTL-3
MODULE 4: DE	SIGNING FOR SAFETY (9 L)	
Safety Cultur	e – Safe Workers – Safety and First Line Supervisors – Safety and Middle	
managers –	Top Management Practices, Company Activities and Safety – Safety	CO-4
Personnel –Su	ub contractual Obligation – Project Coordination and Safety Procedures	BTL-3
– Workers Co	mpensation	
MODULE 5: SA	FETY IN CONSTRUCTION (9 L)	
Case studies o	f recent accidents in construction sites, its reasons and implications. Study	
of various Act	s and rules like Workman compensation act and rules, The Building and	CO-5
other construc	ction workers (Regulation of employment and conditions of service) 1996,	BTL-3
1998 <i>,</i> The bui	lding and other construction workers welfare Cess Act, 1986 and rules,	512 0
health measur	es and welfare schemes.	
SELF STUDY: T	he building and other construction workers welfare Cess Act, 1986 and rule	s, health
measures and	welfare schemes.	
TEXT BOOKS		
1.	David L. Goetsch. (2017). Construction Safety and the OSHA Standards (W Trades & Technology), McGraw-Hill Education	'hat's New in
2.	John Schaufelberger and Ken-Yu Lin. (2013). Construction Project Safety.	RS Means.
REFERENCE BC	ООКЅ	
1	Richard J. Coble, Jimmie Hinze and Theo C.Haupt. (2000). Construction Sa	fety and Health
1.	Management, Prentice Hall Inc.	
2	Dan Petersen. (2001). Safety Management: A Human Approach, America	n Society of
۷.	Safety Engineers.	
3.	John Ridley. (2003). Safety at Work, Elsevier Ltd.	
4.	Charles D. Reese and James Vernon Eidson. (2006). Handbook of OSHA Co Safety and Health, Second Edition, CRC Press.	onstruction
	David V. MacCollum. (2007). Construction Safety Engineering Principles (N	ЛcGraw-Hill
5.	Construction Series): Designing and Managing Safer Job Sites, McGraw Hi	ll Education.
6.	Employee's Compensation (Amendment) Act, 2017	
E BOOKS		

1.	https://manyebooks.org/download/aramco construction safety manual.pdf
2	https://www.oshatrain.org/pdf/constructionplan.pdf
MOOC	
1.	https://alison.com/course/HSA-5
2	https://www.coursera.org/learn/construction-project- %20management/lecture/Yn8K8/safety-%20health-and-environment-management-
	<u>systems</u>

COURS	SE TITL	E	I	NTRO	DUCT	ION TO	C	CREDI	TS		2								
CO CC	URSE DDE		CEI	D4392		C CA	OURS TEGO	E RY		NE		L-	Г-Р-S	2	-0-0-1				
Ve	rsion			1.0		Appr	oval De	etails	241 30	th ACM .5.2018	-	LEARN	ING LEVI	EL	BTL-3				
ASSE	ESSMI	ENT S	CHEN	1E															
First P Asses	eriodic ssment	al	Second Asse	Periodi ssment	cal	S Assignn	eminar, nents/ F	/ Project	Surp	orise Tes Quiz	t /	At	tendance	2	ESE				
1	.5%		1	.5%			10%			5%			5%		50%				
Co Desci	urse ription	Tł to stı	This course investigates the broad-scale features and dynamics of the Earth's oceans. Specific topics include seafloor spreading, marine sediments, salinity, biogeochemical cycles, ocean structure, currents, waves, tides, primary production, marine ecology, global warming,																
Cours Object	e tive	1. 2. 3. 4. 5.	<ol> <li>Learn to Identify the major features of ocean basins and chemical and physical characteristics of sea water.</li> <li>Acquire information on oceans circulation and influence, formation and behavior of waves</li> <li>Learn the formation of tides and identify factors that affect the tidal cycle</li> <li>Learn about the general characteristics of life in water</li> <li>Learn about possible solutions to the environmental issues of the Oceans</li> </ol>																
Cours Outco	e me	Up 1. 2. 3. 4. 5.	oon con Ident chara Expla wave Expla Descr Ident	npletion ify the cteristi in how s in the f ibe the ify and	n of th major cs of so ocean ormati gener consid	is cours feature ea wate s circula ion of ti ral chara ler poss	e, the s s of oce er. ate and des an acterist ible so	student ean bas influer d ident ics of li lutions	ins and ins and ify fact fe in th to the	be able d identi ch other ors that ne wate enviror	to fy the o r and t t affect r imenta	chemic he forn t the tio	al and pl nation ar dal cycle	nysical nd beha Dceans	vior of				
Prereq	uisites	: Nil																	
CO, P	O ANI	O PSO	MAP	PING															
co	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PSO-	PSO-	PSO-				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3				
CO-1	1	2	1	1	2	2	1	2	1	1	2	2	2	3	-				
CO-2	1	2	2	1	2	1	1	2	2	1	2	1	2	3	-				
CO-3	1	2	2	1	1	2	1	3	3	1	1	2	2	3	-				
CO-4	1	2	1	1	1	2	1	2	2	1	2	1	2	3 -					
CO-5	1	2	1	2	2	1	1	2	2	1	2	2	2	3	-				

1: Weakly related, 2: Moderately related and 3: Strongly related	
MODULE 1: PHYSICAL OCEANOGRAPHY	(6L)
Marine Provinces - Plate Tectonics - Marine Sediments - Physical Properties of Water - Chemistry	of <b>CO-1</b>
seawater	BTL-3
MODULE 2 : SURFACE OF THE OCEAN	(6L)
Types and generation of Wayes - generation of tides - surrents, storm surge - Tsunami propagation	CO-2
Types and generation of waves - generation of tides - currents, storm surge - rsunam propagation	BTL-3
MODULE 3: OCEAN CIRCULATION	(6L)
Horizontal and vertical circulation - Earth heat budget - Air-sea interaction - temperature changes	- sea <b>CO-3</b>
level rise	BTL-3
MODULE 4: LIFE IN THE OCEAN (8)	_+1T)
Biogeochemistry of Life - various species available in the ocean - Fish catch in India - problems due	e to <b>CO-4</b>
marine litter and oil spill	BTL-3
MODULE 5: TRANSPORT IN THE OCEAN	(6L)
Various surface and subsurface transports, types of vehicles, ocean boundaries, Exclusive economi	c <b>CO-5</b>
zone	BTL-3
Self-study Topic: Fish catch in India.	
TEXT BOOKS	
1 Trujillo A. P., Thurman H. V. (2015). <i>Essential of Oceanography</i> , Pearson Education India.	
2 Stewart R. H. (2009). <i>Introduction to Physical Oceanography</i> , Orange Grove Books.	
REFERENCE BOOKS	
1 Knaus J.A. (2005). <i>Introduction to Physical Oceanography</i> , Waveland Pr. Inc.	
E BOOKS	
1 <u>https://open.umn.edu/opentextbooks/textbooks/732</u>	
2 <u>https://www.scribd.com/document/95291539/eBook-Introduction-to-Physical-oceanogr</u>	aphy-Robert-
H-stewart-2005-Book	_
MOOC	
1 <u>https://www.edx.org/course/our-global-ocean-an-introduction-course</u>	

COURS	SE TITL	.E	11	NTELLI	GENT	TRANS	PORTA		YSTEN	REDITS	;	2				
CO CC	URSE DDE		CEC	24481		C CA	OURS TEGOI	E RY		NE		L-T-P	9-S	2-0-	·0-0	
Ve	rsion		-	1.0		Appro	oval D	etails	24t 30	h ACM	l - B	LEARN LEVI	ING El	BTI	L- <b>3</b>	
ASSES	SMEN	т ѕсні	EME													
First P Asses	eriodic ssment	al	Second Asse	Period ssment	ical :	Se Assi I	eminar gnmer Project	/ nts/	Surprise Test / Quiz			Attend	ance	ESE		
1	5%		1	.5%			10%			5%		5%	,	50	%	
Co Desci	urse ription	Th ar tr va	This elective course introduces on how to apply information technology to solve transport and traffic problems. The course includes multidisciplinary approach in dealing with traffic congestion and traffic incidents. It is a multi-branch course, where students from various branches of engineering and technology can join, interact and learn better.													
Co Obje	urse ective	1. 2. 3. 4. 5.	<ol> <li>To introduce the fundamentals of intelligent transportation systems.</li> <li>To apply basic theories involved in traffic flow descriptions to solve traffic issues.</li> <li>To introduce a variety of user services such as electronic toll collection, railway crossing warning etc.</li> <li>To explain how important is ITS applications, especially the standards involved.</li> <li>To understand devising of new ITS systems based on systems approach.</li> </ol>													
Co Out	urse come	Ur 1. 2. 3. 4. 5.	oon cor Expla Apply Expla Expla Apply	mpletio ain the y traffi ain vari ain the y the c	on of t basics c theo ious ty impor oncep	his cour of inte ries to s pes of u tance o ts of ITS	rse, the lligent solve t user se of ITS a Sarchit	e stude transp raffic fl rvices. pplicat tecture	ents wi ortatic ow pro ions ar and p	ll be ab on syste oblems nd stan lanning	ole to ems. dards. g in de	vising r	new ITS	system	5.	
Prereq	uisites	: Nil														
CO, PO	) AND	PSO N	ΛΑΡΡΙΝ	IG												
со	PO- 1	РО- 2	РО- 3	РО- 4	РО- 5	РО- 6	РО- 7	РО- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3	
CO-1	2	1	1	1	1	2	2	2	1	1	1	1	2	3	-	
CO-2	3	3	1	1	2	2	2	2	1	1	2	1	2	3	-	
CO-3	2	1	1	2	3	3	2	3	3	2	2	2	2	3	-	
CO-4	2	1	2 1 3 3 2 2 1 1 2 3 -													
CO-5	2	1	2	1	2	1	2	2	1	1	1	1	2	3	-	
			1: We	eakly r	elated	, 2: Mo	derate	ly rela	ted an	d 3: Stı	rongly	relate	d			

MODULE 1: INTRODUCTION TO INTELLIGENT TRANSPORATION SYSTEMS (9L)

A short history Transportatior	and perspectives on the future – ITS Organizational issues – Regionalism – Information Infrastructure – Transportation operations – Deployment –	CO-1
Competitive R	egion.	DIL-3
MODULE 2: FU	INDAMENTALS OF TRAFFIC FLOW AND CONTROL (9L)	
Traffic Flow El – Traffic Mode Principles – Sig	ements - Flow-Density Relationships - Fundamental Diagram of Traffic Flow els - Alternative Traffic Flow Models – Shock waves – Traffic Signalization gnal Co-ordination – Traffic Simulation Models	CO-2 BTL-3
MODULE 3: US	SER SERVICES (9L)	
Travel and Tra Ride matching Highway rail management - operations – E	ffic Management – Pre-trip/Enroute travel Information – Route Guidance – g and Reservation – Traffic control – Emissions testing and mitigation - intersection. Public transportation operations – Public transportation - personalized public transit – Electronic payment – Commercial vehicles mergency management.	CO-3 BTL-3
MODULE 4: AF	PPLICATION AND STANDARDS (9L)	
Freeway and Control – Infor traffic control Standards app	Incident Management Systems (FIMS) – Objectives – Functions – Ramp mation Dissemination – Advanced Arterial Traffic Control Systems – Adaptive algorithms – Transit Operation Software – Transit Information Systems. ITS lication areas – NTCIP – Standards Testing.	CO-4 BTL-3
MODULE 5: AF	CHITECTURE AND PLANNING (9L)	
Regional and F User Services a – Architecture Planning proce Transportatior	Project ITS Architecture – Operation Concepts – National ITS Architecture – and User Service Requirements – Logical Architecture – Physical Architecture development tool. Transportation planning and ITS – Market Package based ess – Traceability based ITS planning process – Integration of ITS into n Planning.	CO-5 BTL-3
TEXT BOOKS		
1.	Mashrur A. Chowdhury, and Adel Sadek. (2003). <i>Fundamentals of Intelligent Transportation Systems Planning</i> , Artech House, Inc.	
2.	Sussman, Joseph. (2010). Perspectives on Intelligent Transportation Systems	(ITS), Springer.
REFERENCE BC	DOKS	
1.	Ipolito Meneguette, Rodolfo, Eduardo De Grande, Robson, Ferreira Loureiro Alfredo. (2001). <i>Intelligent Transport System in Smart Cities</i> , Springer.	, and Antonio
E BOOKS		
1.	Transactions on Intelligent Transportation Systems, IEEE.	
моос		
1.	https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-212j-a introduction-to-intelligent-transportation-systems-spring-2005/	<u>n-</u>

COURS	SE TITL	.E	INTROD	UCTIC	N TO	ROAD S	SAFETY	AND I	MANA	GEMEN	ит С	REDITS	6	2		
CO CC	URSE DDE		CEI	04482		C CA	OURS	E RY		NE		L-T-P	P-S	2-0-	0-0	
Ve	rsion			1.0		Appro	oval D	etails	24t 30	h ACM	-	LEARN LEV	ING EL	BT	-3	
ASSES	SMEN	T SCH	IEME													
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Course DescriptionThis elective course covers important elements of road safety. It provides a understanding of fundamental factors that leads to traffic incidents. It also cover to prevent it via policies and regulations.													vides a	basic ways		
Course Objective1. To explain how important is road safety from different perspectives.Course Objective2. To introduce the ways of improving road safety.3. To explain the rules and challenges involved in implementing aspects.4. To introduce about health safety and environment management systems.5. To explain macroscopic elements like policy and regulations.												IS.				
Co Out	ourse come		Ipon cor Expla 2. Expla 3. Appl 4. Expla 5. Expla	mpletion in the in the y the r in the in the	on of t impor way o ules in entitie policy	his cour tance c f achiev volved es involv and re	rse, the of road ving ro in imp ved in gulatic	e stude safety ad safe lement health ons rela	nts wi ty. ing roa safety ted to	ll be ab ad safe and en road sa	le to ty. vironn afety.	nent m	anagen	nent sys	tems.	
Prereq	uisites	: Nil														
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со	PO- 1	РО- 2	PO- 3	РО- 4	РО- 5	PO- 6	РО- 7	РО- 8	РО- 9	PO- 10	PO- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3	
CO-1	2	1	1	1	1	2	2	2	1	1	1	1	2	3	-	
CO-2	3	2	1	1	2	2	2	2	1	1	2	1	2	3	-	
CO-3	2	1	1	2	2	2	2	2	1	1	1	2	2	3	-	
CO-4	2	1	2 1 2 2 2 1 1 2 3 -											-		
CO-5	3	1	2	1	2	1	2	2	1	1	1	1	2	3	-	
1: Weakly related, 2: Moderately related and 3: Strongly related																
MODU	ILE 1: I	NTRO	DUCTIC	<b>)N</b> (6L	.)											

How roads evolved, materials used, divisional control, Problems faced by the drivers in the past/present road and driving environment, Driving License and its requirements, Causes of Road Traffic Crashes and Violations, IRC, National Highways.	CO-1 BTL-3		
MODULE 2: ROAD SAFETY (6L)			
Traffic regulation systems and Road signal safety systems, Introduction to Defensive Driving, Safe vehicle driving, Basics of Accident statistics and analysis, Intelligent Transport systems, Traffic Control Devices.			
Lane Discipline Overtaking sight distance Speeds Acceleration/Deceleration U-Turns			
Stopping/ Parking, Driver Signals, Night Driving, Mirrors, Moving Off, Tailgating, Fastag, Vehicle breakdown, Role of IRTE, Noise levels.			
MODULE 4: HEALTH SAFETY AND ENVIRONMENT MANAGEMENT SYSTEMS (6L)			
Employee Health Care Plan, Safety Management Structure, Safety Analysis and Risk Assessment, Factors Affecting Driver Behaviour: Health, Hygiene, Stress, Fatigue, Hours of Driving, Drunken Driving, Drugs and Medicines, Emergency Contact on Highways.			
MODULE 5: POLICY AND LEGISLATIONS IN ROAD SAFETY AND MANAGEMENT (6L)			
The Rules of the Road Regulations & the Right of Way, Futuristic Roads, Policies related to road violations and management, Awareness campaigns – Public and Private, road safety week.			
TEXT BOOKS			
1.Prabha Shastri Ranade. (2009). Road Safety Management: Issues and PerspectPublishers.	ctives, SBS		
2. Geetam Tiwari, Dinesh Mohan. (2016). <i>Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer,</i> CRC Press.			
REFERENCE BOOKS			
1. B.S. Dhillon. (2011). <i>Transportation Systems Reliability and Safety</i> , CRC Press.			

COURS	SE TITL	E	STANDARDS AND PRACTICES IN CIVIL ENGINEERING			G C		S	2											
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ASSES	SMEN ⁻	T SCHE	ME																	
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Course Object	e .ive	Tł	<ol> <li>The course should enable the students to</li> <li>Understand the basic concepts of building construction.</li> <li>Attains adequate knowledge in construction material.</li> <li>Understand the methods of estimation and rate analysis.</li> <li>Familiar with the specification of item of works.</li> <li>Impart knowledge of maintenance of buildings.</li> </ol>																	
Course Outcoi	e me	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Illustrate the Building Construction norms and plan approval formalities.</li> <li>2. Choose building materials based on the requirements</li> <li>3. Estimate the material quantities and cost in building construction.</li> <li>4. Adopt various construction specifications appropriately.</li> <li>5. Suggest maintenance measures for various structures.</li> </ul>																		
Prereq	uisites	: Nil																		
СО, РС	D AND	PSO N	/IAPPII	NG		- ·														
со	PO- 1	РО- 2	РО- 3	РО- 4	РО- 5	PO- 6	PO- 7	РО- 8	РО- 9	РО- 10	РО- 11	PO- 12	PSO- 1	PSO- 2	PSO- 3					
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CO-3	2	-	-	-	-	2	1	2	-	1	3	2	-	3	-					
CO-4	-	-	-	-	-	2	-	2	-	1	2	2	-	3	-					
CO-5	-	-	-	-	-	2	-	2	-	1	2	2	-	3	-					
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MODULE 1: BU	JILDING CONSTRUCTION (	6L)			
Introduction – – Load bearing Undivided shar	History of Civil Engineering – Units of measurements – Types of buildings g – Framed – Area Calculation – Conversion of units – Floor Space index – re of land – Plan approval – Authority – Procedure.	CO-1 BTL-2			
MODULE 2: CO	INSTRUCTION MATERIALS	6L)			
Construction other building	Construction materials – Stones – Bricks – Lime – Cement – Aggregates – Timber andCO-2other building materials – Standards and testing of materials.BTL-2				
MODULE 3: ES	TIMATION (6L	)			
Estimation – Ty rates – Analysis	ppes of estimate – Methods of estimate – Detailed estimate – Schedule of s of rates – Plinth area rates – Cost index	CO-3 BTL-3			
MODULE 4: CO	NSTRUCTION SPECIFICATION (6L	)			
Construction specification – Earth work – Brick work – Plain cement concrete –CO-4Reinforced cement concrete – Plastering – Flooring.BTL-3					
MODULE 5: M	AINTENANCE OF BUILDINGS (	6L)			
Maintenance of buildings – Types of maintenance – Yard stick of maintenance - RepairsCO-5and Rehabilitation of structures.BTL-3					
SELF STUDY: Co	onstruction materials, specification.				
TEXT BOOKS					
1.	Rangwala. (2016). Engineering Materials, Charotar Publishing house Pvt.	Ltd.			
2	Dutta. B.N. (2016). <i>Estimating and Costing in Civil Engineering</i> , UBS Publis Distributors Pvt. Ltd.	hers &			
3	P. C. Varghese. (2015). Building materials, prentice hall of India.				
REFERENCE BO	OKS				
1.	M. S. Shetty. (2006). <i>Concrete Technology</i> , S. Chand& Company.				
2.	CPWD, "CPWD Specification", Government of India, New Delhi, 2016.				
3.	CPWD, "Delhi Schedule of rates", Government of India, New Delhi, 2016				
4.	CPWD, "CPWD Analysis of Rates", Government of India, New Delhi, 2016.				
E BOOKS					
1.	http://www.uou.ac.in/sites/default/files/slm/Introduction-cyber-security	<u>/.pdf</u>			
MOOC					
1.	https://alison.com/course/HSA-5				
2	https://www.coursera.org/learn/construction-cost-estimating				
3	nttp://www.blillingengineer.com/quantity-surveying-blog.ntml				
4	https://ww2.rics.org/en-in/events/e-learning/distance-learning/quantit foundation-programme/	<u>y-surveying-</u>			

# **CURRICULUM**

## HONOURS

# **Construction Project Management & Cost Estimation**

## Course-1: CEH4361 Construction Planning & Cost Estimation

SL. NO	COURSE CODE	NAME OF THE COURSE	TOTAL LEARNING HOURS	CREDIT
1	CEH4361	Construction Planning & Cost Estimation	45	3
2	CEH4376	Project Management & Scheduling	45	3
3	CEH4377	Infrastructure Project Management	45	3
4	CEH4462	Project management for managers	45	3
		Total Credits	180	12

### Course-2: CEH4376 Project Management & Scheduling

Modules	Module Name	Offering University	Learning Hours	Credit
Ι	Initiating and Planning Projects	University of California, Irvine	7	
II	Construction Cost Estimating	Columbia University	9	
III	Procurement, Project Cash Flow &Cost Control	Columbia University	12	3
IV	Construction Finance & Financial Plans for Development Projects	Columbia University	11	
V	Project Finance and PPP		6	
	Total		45	3

### Course-3: CEH4377 Infrastructure Project Management

Modules	Module Name	Offering University	Learning Hours	Credit
I	Scope & WBS	Dies University	9	
I	Project Time Management	Rice University	12	
=		École Polytechnique		
	Urban Infrastructure Management	Fédérale	9	2
		de Lausanne		5
IV	Project Risk & Quality Management		9	
V	Human Resources & Procurement	Rice University	G	
	Management		0	
Total				3

## Course-4: CEH4462 Project management for Managers

Modules	Module Name	Offering University	Learning Hours	Credit
I	Project Management & Selection		9	
II	Capital Budgeting& Risk Management		9	
III	Project Team Building & Time Management	IIT Roorkee	9	3.0
IV	Probability Model in Networks &Crashing of Networks		9	
V	Project Cost Management & Quality Management		9	
Total				3.0

### MINORS

# **Geographical Information System**

SL. NO	COURSE CODE	NAME OF THE COURSE	TOTAL LEARNING HOURS	CREDIT
1	CEM4276	Fundamentals of GIS(CEM4276)	60	4
2	CEM4361	GIS Data Acquisition, Automation, and	45	3
		Applications (CEM4361)		
3	CEM4376	Remote Sensing and GIS (CEM4376)	30	2
		Total	135	9

## Course-1: CEM4276 Fundamentals of GIS

Modules	Module Name	Offering University	Learning Hours	Credit
Ι	Introduction to Geographic Information Systems	Coursera	9	
Ξ	ArcGIS Basics & Making Maps	Dovic	14	
Ξ	Retrieving and Sharing Data	Davis	9	
IV	Data Models & Vector Data		14	

Modules	Module Name	Offering University	Learning Hours	Credit
I	Construction Industry Project Delivery		8	
11	Health, Safety & Technology Trends in Construction	Columbia University	8	2
	Project Planning		8	3
IV	Construction Scheduling	Columbia University	11	
V	Technology Applications for Scheduling	columbia oniversity	10	
	Total		45	3
V	Storage Formats& Creating Web Maps		14	
	Total	60	4	

## Course-2: CEM4361 GIS Data Acquisition, Automation, and Applications

Modules	Module Name	Offering University	Learning Hours	Credit
I	Overview, Imagery and Raster Calculator	Coursera University of California.	7	
Ш	Model Builder and digital Elevation Models	Davis	11	
	Spatial Analyst		9	3
IV	GIS File, Geocoding & Map Design Principles	Coursera University of Toronto	8	
V	Mapping Quantitative & Project		10	
	Total	45	3	

# Course-3: CEM4376 Remote Sensing and GIS

Modules	Module Name	Offering University	Learning Hours	Credit
I	Remote Sensing & Satellite Image Corrections		8	
II	Digital Image Processing, Thermal and Microwave	SWAYAM IIT Guwahati	11	2
	Imaging Spectroscopy & Application		11	
	Total	30	2	

### HONOURS

COU	RSE		Course	e I - COI	NSTRUC		LANNI	NG & C	OST ES	ΓΙΜΑΤΙΟΙ	N		CREDITS			3
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Cour	rse ption	The Construction Management specialization is curated for professionals in the construction and civil engineering industry looking to advance their careers. Through this specialization, students will gain comprehensive industry knowledge along with the latest trends and development within the industry. This 5-coursespecialization will cover the major facets of construction management including project initiation and planning, scheduling techniques and procedures, cost estimating and control, and construction project financials. After students complete this specialization, they will have gained significant skills and tools to stay relevant and ahead of the curve in the world of construction management.														
Cou Objec	rse ctive	<ul> <li>The course should enable the students to</li> <li>1. Know the role and responsibilities of a project manager</li> <li>2. Gain knowledge about quantity measurement and cost estimation of a construction project.</li> <li>3. Know about the importance of cost controlling and how to monitor project cash flow in a construction project</li> <li>4. Know about the financial plans to be considered in a construction project</li> <li>5. Learn about real estate finance and real estate project lifecycle.</li> </ul>														
Cour Outco	rse ome	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Perform a project assessment based on the business requirements.</li> <li>2. Estimate the quantity of materials required for a construction project and execute cost estimation.</li> <li>3. Apply cost control measures in a construction project.</li> <li>4. Develop financial plans for a construction project.</li> <li>5. Analyse the risks in the public private partnership projects.</li> </ul>														
Prereq	uisites	: Nil														
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со	PO 1	PO2	PO3	PO 4	PO5	PO6	PO 7	PO 8	PO9	PO 10	PO 11	PO12	PSO1	PSO	2	PSO 3
CO-1	-	-	-	-	-	2	-	2	2	-	3	3	-	1		3
CO-2	2	1	-	2	1	2	1	2	-	-	3	3	3	2		3

CO-3	2	1	-	2	1	2	1	2	-	-	3	3	3	2		3
CO-4	2	1	-	2	1	2	1	2	-	-	3	3	3	2		3
CO-5	2	1	-	2	1	2	1	2	-	-	3	3	3	2	2	
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MODU	ILE 1: II	NITIATII	NG AND	PLANN	IING PR	OJECTS	(7)									
Projec	t Mana	igemen	t Overvi	iew											C	0-1
Project	t Mana	gement	: Project	: Plannii	ng - W	/hat is a	Proje	ct? - St	akeholo	lers- Scop	e Matters	- Authori	ity vs. Influ	ence	B	۲L-2
MODU	ILE 2 CO	ONSTRU	JCTION	COST E	STIMAT	ING		(9)								
Quantity Estimate         Construction Cost Estimating and Cost Control Overview-Understanding Design in the Construction Industry- Introduction to the         Types of Cost Estimates         Overview of the Types of Cost Estimates, Cost Indices, Cost, Capacity Factor, Cost Estimates Quiz, Cost Estimates Work Problem.         Quantity Take-Off and Measurement         Measurement, Masonry, Glass Curtain Wall, Facade / Wall Finishes / Measurement Overview, Cut and Fill Process and Equipment, Cut and Fill Takeoff, Cut and Fill Software, Introduction to Deep Foundations, Concrete Foundation and Concrete Properties, Concrete Formwork, Concrete Takeoff: Parking Lot Example, Concrete Takeoff: Skyscraper Example, Quantifying rebar Walkthrough, History of Structural Steel, Steel Sections in Design, Structural Steel Takeoff Example         Pricing         Cost of Materials and Formwork- Concrete Material: Reinforcing Steel and Concrete Money Component- Productivity Component and Examples- Estimating Equipment Costs - 1 practice Exercise-Pricing         Building the Estimate         Estimate Classification, Methods and Formats - Design Estimate project -Schematic Design Estimate Demo - Schematic Design: A Deeper Dive -Building and Finalizing the Estimate -Checks and Due Diligence -1 practice exercise -Building the Estimate.         Cost Estimation in Practice         Cost Estimation in General Practice -Tips in Cost Estimating and Cost Management-Roles and Responsibilities of								C( B1	0-2 ГL-3							
Cost	Manag	ers -1 p	ractice e	exercise	e -Cost E	stimatio	on.									
MODU	ILE 3: P	ROCUR	EMENT	, PROJE	ECT CAS	H FLOW	/ &COS	ST COM	NTROL		(1	.2)				
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exercis	e Proc	uremen	it. Fie-E	nu EStil	nate dil	u diu L	June	entatio	II "DIU	Jiage, DI			ennig -t bi	actice		
exercise Procurement         Post Contract and Cost Estimation within a Project         Cost Reporting Overview -Cost Reporting Examples-Change Orders and Communication         Construction Cost Control Methods         What is Cost Control -Defining Methods of Cost Control -1 practice exercise Cost Control         Earned Value Method (EVM)																
Defining EVM- EVM Parameters -Performance Examples - EVM Favourable Performance -Calculating EVM -2 practice exercises Earned Value Method- Work Problem EVM.								C	0-3							
Close Out Period \								B	FL-3							
	Jut Pur t Cach		Keview	- CIOSE	Out Act	ivities -	1 prac	tice ex	ercise -(	Liose Out	Period					
Cash Flow Method -Accrual Method -Contractor Cash Flow- Charting Cash Flow -Calculating Billing -Payment Cycle - Payment Cycle Drivers -Payment Cycle Delays -Schedule of Value -Accelerating Revenue -Front Loading -Delaying Expenses -1 practice Exercise-Project Cash Flow.																
Techno	ology T	rends iı	n Cost E	stimati	ng and (	Cost Co	ntrol	١								
5D Est	imating	g Systen	ns (BIM)	-Estima	ating So	ftware i	n Actio	on -Wo	rkflows	-Implem	entation P	erspectiv	/e -Next St	eps.		
Progra	m Cost	t Estima	ting Pe	riod (1)	) Cost of <i>i</i>	a Canita	Drog	am II	coful To	ols for Co	ost Control	- 1 0100				
Program Cost Control -Defining the Cost of a Capital Program -Useful Tools for Cost Control- <b>1 practice exercise -</b> Cost Control for Large Programs.																

Lean	n Cost Control (2)	
Money	and Estimate in Capital Project Delivery - Benchmarking and Normalization Process - Lean Design: Value -	
Lean ir	Cost Control - Lean Set Based Design - 1 practice exercise- Lean in Cost Control.	
MODU	LE 4 : CONSTRUCTION FINANCE & FINANCIAL PLANS FOR DEVELOPMENT PROJECTS (11)	
Introd	uction	
Constr	uction Finance Course Introduction	
The M	athematics of Money	
Mathe	matics of Money - Project Evaluation -Computing Interest / Simple Interest Calculations -Compound Interest	
Calcula	itions -Simple vs. Compound Interest Rate Example / Nominal and Effective Rate -Nominal Interest Rate	
Fxamp	le and Minimum Attractive Rate of Return -Present and Future Value of Money -Future Value of a Uniform	
Series	-Uniform Series -Uniform Series: A deeper dive -Equations for Uniform Series -Net Present Value (NPV)	
Examp	le -Internal Rate of Return (IRR) Example -Mathematics Of Money -Case Study: Mathematics of Money	
Real F	state Finance for Develonment Projects	
Introdu Costs - "Disco Presen (IRR) M Period	uction to Financing Development Projects -Feasibility Study Example Project Parameters -Development "Comps" based Property Sale, Tax, Gain and Return -"Cap Rate" based Sale, Tax Gain and Return -Preview of unted Cash Flow" Methods for Gain and Return-Framework for "Discounted Cash Flow" (DCF) Analysis "Net t Value" DCF Method for Project Evaluation -Net Present Value (NPV) Examples -"Internal Rate of Return" <i>A</i> ethod for Project Evaluation -NPV and IRR Analysis with Excel -Changing and Comparing Compounding s.	CO-4 BTL-3
2 prac	tice exercises	
Real Es	tate Finance Development Projects - Feasibility Study: Estimating The Sales Price	
Financ	ial Plans for Development Projects	
Examp Introd	le -Net Comprehensive Cash Flows for Sponsor and Lender -DCF Project Evaluation for Sponsor and Lender Juction to Decision Tree Analysis -Decision Tree Example - Overview -Solving the Example in Excel -Analysis of	
the Tr	ee Results -Decision Tree Example with Time Value of Cash-Analysis of the Tree Results with Time Value	
Consid	ered	
I prac	ice exercise Designing and Building Commercial Real Estate	
MODU	I E 5: PROJECT FINANCE AND PPP (6)	
MODU	LE 5: PROJECT FINANCE AND PPP (6)	
MODU Projec Global Projec	LE 5: PROJECT FINANCE AND PPP (6) t Finance Project Finance Overview and by Sector -Stakeholders in Project Finance -Stakeholder Roles -Principles of : Financing -Risk and Risk Allocation -Categories of Risk Allocation -Sponsor Perspectives - Structuring and	
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MODU Projec Global Projec Docum practic Risk In Projec Develc Public	LE 5: PROJECT FINANCE AND PPP       (6)         t Finance       Project Finance Overview and by Sector -Stakeholders in Project Finance -Stakeholder Roles -Principles of completion Risk Allocation -Categories of Risk Allocation -Sponsor Perspectives - Structuring and tentation -Completion Risks / Government Perspectives-Contract Parties -Contracts and Agreements 1         re exercise Project Finance       Project Finance         Project Finance       Project Finance         Project Finance       -Project Finance         - Parties, Timeline, and Finance -Borrowing Vs Partnering Case Study: Revenue generating case -Case Study: per land swap case / Identifying and Allocating Risk 1 practice exercise- Risk in Project Finance         - Private Partnerships       -Private Partnerships	CO-5 BTL-4
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REFERI	ENCE BOOKS							
1.	Kumar NeerajJha. (2016) Construction Project Management -Theory and Practice, Pearson Publications, 2 nd edition.							
2.	Jimmie Hinze. (2015). Construction Contracts, McGraw hill education							
3.	Martin Brook. (2004). Estimating and Tendering for Construction Work, Elsevier.							
4.	Lukas Klee. (2015). International Construction Contract Law, Wiley.							
5.	The Construction Specifications Institute - Construction Contract Administration Practice Guidem, John Wiley & Sons, 2011							
E BOOK	S							
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management							
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20management							
MOOC	_ 1							
1.	https://www.coursera.org/learn/initiating-planning							
2.	https://www.coursera.org/learn/construction-cost-estimating							
3.	https://www.coursera.org/learn/construction-finance							

COURSE TITLE	Course II - CON	ISTRUCTION PROJECT MA	NAGEMENT & SCHEDULING	CREDITS	3							
COURSE CODE	CEH4376	376 COURSE CATEGORY HONOURS L-T-P-S 3-0-0-										
Version	1.0	Approval Details 33 ACM, 15.12.2021 LEARNING LEVEL										
ASSESSMENT SCHEME												
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project     Surprise Test / Quiz     Attendance       10%     E%     E%										
15%	15%	10%	5%	5%	50%							
Map with multiple courses for conducted per course.	r 45 Hours per cc	ourse. CIA calculated from	Coursera platform. End Sem	nester Examination	should be							
Course Description The Construction Management specialization is curated for professionals in the construction and engineering industry looking to advance their careers. Through this specialization, students will comprehensive industry knowledge along with the latest trends and development within the indu This 5-coursespecialization will cover the major facets of construction management including prinitiation and planning, scheduling techniques and procedures, cost estimating and control, construction project financials. After students complete this specialization, they will have gat significant skills and tools to stay relevant and ahead of the curve in the world of construction management. Discover the key project scheduling techniques and procedures including; how to crist a network diagram, how to define the importance of the critical path in a project network, defining project activities float- discover the relationships connecting construction activities-des the differences between calendar dates and work dates and teach how to deal with uncertain construction projects.												
Course Objective	<ol> <li>The course shout methods.</li> <li>Gain knowle Processes an</li> <li>Learn how t</li> <li>Know about Review tech</li> <li>Gain knowle software.</li> </ol>	uld enable the students to the Project Management edge on Sustainable Develond the application of Buildi o build a project organization the Scheduling techniquinique. edge on Linear Construction	, Construction Management a opment in construction, Healt ng Information Management i ion and the importance of proj es such as Critical Path Meth on Operations, Line of Balance	ind the various Pro h and Safety in Cor in the construction ject planning and so hod and Program E e, MS project and I	ject Delivery nstruction projects. cheduling Evaluation Primavera							
Course Outcome       Upon completion of this course, the students will be able to         1. Apply the various Project Delivery methods in the construction projects.         2. Introduce the Health and Safety Processes in Construction and apply Building Information Management in the construction projects.         3. Apply project planning and scheduling concepts in the construction projects.         4. Apply the Scheduling techniques such as Critical Path Method and Program Evaluation Review technique in the construction projects.         5. Compute the latest dates by which each construction activities can be performed with increasing the cost of the projects.												
Prerequisites: Nil												

**CO, PO AND PSO MAPPING** 

со	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
C01	-	-	-	-	-	2	-	2	2	-	3	3	2	-	3
CO2	-	-	2	2	1	2	1	2	-		3	3	2	-	3
CO3	2	3	1	2	2	-	-	-	-	-	2	3	3	1	3
CO4	2	3	1	2	2	-	-	_			2	3	3	1	3
CO5	2	3	1	2	2	-	-	-	-		2	3	3	1	3
		-	1: \	Weakly	related,	2: Mo	derate	ly relat	ed and	3: Stror	ngly rel	ated			
MODULE 1: CONS	TRUCT		DUSTR	XY &			/ERY	,	(8)		07 -				
Course Overview									(-)						
Introduction to Th	e Cours	se Part	1 -Intr	oductio	on to The	Course	e Part 2	2							
Construction Indu	istry O	verviev	N												
Introduction to th	ne Engi	neerin	g and (	Constru	iction Inc	lustry-(	Constru	uction	Project	s and In	dustry	Characte	ristics- Cha	llenges	
and Opportunities	in the	Constr	uction	Indust	ry- Progra	am Pro	ject ar	nd Cons	structio	n Mana	gement	t Introduc	tion-Consti	ruction	
Management and	Projec	t Man	ageme	ent- Pro	ogram M	anager	ment a	nd Sur	nmary-	Constru	uction	vs Manuf	facturing Ir	dustry	
Basics- Compare a	and Co	ntrast	the Co	onstruc	tion and	Manu	facturi	ng Indi	ustries-	The Fut	ure of	the Cons	truction In	dustry-	
Introduction to th	ne EAC	Life C	ycle- T	The Co	st of Cha	ange ir	n the E	EAC Lif	ecycle-	Key EA	C Lifec	ycle Que	stions -1 p	ractice	CO-1
exercise-Quiz on C	onstru	ction Ir	ndustry	/ Overv	iew.										BTL-2
Project Delivery															
Project Developm	ent Cy	cle Par	t 1-Pro	ject De	velopme	nt Cycl	le Part	2-Cont	ract Ty	pes-Proj	ect De	livery Met	thods-Cont	racting	
Strategy Assessme	ent-CM	at Ris	k and	CM as	Agency-A	Alliance	e Conti	racting	and Pu	ublic Priv	vate Pa	rtnership	s-Types of	Surety	
Bonds-Purchasing	a Suret	ty Bond	d-Term	inating	a Surety	Bond-	Surety	Loss Da	ata-1 pr	actice E	xercise	-Quiz on p	project deli	very.	
Lean Project Deliv	very														
Project Delivery a	nd the	Theory	of Lea	in-Lean	Design a	nd Del	ivery-L	ean De	sign: Fl	ow-1 pra	actice e	exercise-L	ean constru	uction.	
MODULE 2: HEAL	TH, SAI	FETY &	TECHN	NOLOG	Y TRENDS	S IN CC	ONSTRU	JCTION	1 (8)						
Sustainability in t	he Con	structi	on Ind	ustry											
Sustainability in C	onstru	ction Ir	ndustry	/-Safety	in Const	tructio	n Indus	stry -Co	ommun	ity Invol	vemen	t in a Con	struction P	roject-	
Rating Systems for	Const	ruction	n Projec	cts-The	Envision	Rating	Syster	n-1 pra	ctice E>	kercise-S	ustaina	ability in c	onstruction	n.	
Environment, Hea	alth and	d Safet	y of Co	onstruc	tion Proc	esses									
Environmental, H	ealth a	ind Saf	fety Pr	actices-	Barriers	to Lea	rning a	and Ch	ange-Sa	afety Pe	rforma	nce Mod	els-Safety,	Health	
and Environment I	Manage	ement	System	ns-Maki	ing EHS V	Vork fo	or You-	1 pract	ice exe	rcise-EH	S.				
Building Information Modelling and Technology Trends in Construction								CO-2 BTL-3							
Technology Trends: Defining BIM-The Role of CM and Design Management-Technology and The Role of CM-Technology								DIES							
and The Role of Fa	acility N	/lanage	ement-	Virtual	Reality ir	n Const	ructio	n Mana	igemen	t-1 prac	tice Exe	ercise-Tec	hnology tre	ends in	
construction.															
International View of Construction Projects															
International Dev	velopm	ent a	nd Pro	oject R	lisk-Cost	Risks:	Cons	tructio	n Proje	ects-Cos	t Risks	: Operat	ions- ESPI	RIT: A	
Framework for Un	derstar	nding F	Risk-1 p	ractice	exercise	-Intern	ationa	l develo	opment						
MODULE 3: PROJ	ECT PL/	ANNIN	G				(8)							I	

CO-3 BTL-3

#### **Role of a Construction Manager**

Being an Effective Project Manager-The Project Organizational Chart-Methods of Contracting-Potential Project Risks-Logistics and Planning-Bidding and Levelling Sheets-Change Order and Claim Management-1 practice exercise-Role of a project manager.

#### **Introduction to Project Planning**

Project Planning and Scheduling-The Project Planning Process-Work Breakdown Structure-Standard and Project Coding Part-Project Coding- Estimating Activity Duration Part 1-Estimating Activity Duration Part 2- Determining Job Logic-Activity Relationships- 2 practice exercises-Estimating Duration Work Problem- Quiz on Introduction to Project Planning.

#### **MODULE 4 : CONSTRUCTION SCHEDULING**

#### Introduction to Construction Scheduling

Construction Scheduling Course Overview.

#### Bar (Gantt) Charts

Introducing Bar (Gantt) Charts-Using Bar (Gantt) Charts-Advantages and Disadvantages of Using Bar (Gantt) Charts-1 practice Exercise-Quiz on Gantt Chart.

#### **Activity Precedence Diagrams**

Introduction to Activity Precedence Diagrams-Recommendations for Building AON Diagrams-Examples of Activity Precedence (AON) Diagrams.

#### **Types of Construction Activity Relationships**

Activities in a Construction Project-Types of Relationships between Construction Activities-Start to Start Relationships-Finish to Finish Relationships-Multiple Relationships-1 practice Exercise-Quiz on Activity Relationships.

#### Forward and Backward Pass Calculations

Forward Pass Calculations- Backward Pass Calculations-Example 1: Activity on Node Diagram- Example 2: A ON and Forward/Backward Pass Calculations- 1 practice Exercise-Quiz on Activity Precedence Diagrams, Activity Relationships and Forward/Backward Passes.

#### **Critical Path**

Introduction to Critical Path-Critical Path in a Project Schedule-Determining the Number of Critical Paths in a Project-Imposing Lag Durations in Critical Path-Determining Critical Path in a Start to Start Relationship-Determining Critical Path in a Finish to Finish Relationship-1 practice Exercise-Critical Path Method.

#### **Activity Floats**

Types of Floats in a Construction Project-Activity Floats-Determining Total Float and Free Float-Introduction to the Interfering Float-Independent Float.

#### **Understanding Work Dates and Calendar Dates**

Understanding Work Days and Calendar Days-The Relationship between Calendar Days and Work Days-Charting Work Dates and Calendar Dates-1 practice Exercise-Quiz on Floats and Work Calendar days.

#### Activity on Arrow

Introduction to Activity on Arrow-Drawing an Activity on Arrow Diagram-Numbering Nodes on a Diagram-Practice Drawing Activity on Arrow Diagrams-Advanced Activity Diagrams-Adding a Key to an Activity on Arrow Diagram-Backward Pass Calculations-Determining the Duration of a Project-2 practice Exercises-Quiz on Activity on Arrow-Activity Diagram and Critical Path.

CO-4 BTL-3

Program Evaluation & R	eview Technique (PERT) and Range Estimating								
Program Evaluation and Review Technique-Probability of Completing a Project: Normal Distribution-PERT Probability									
Example-PERT Example o	n Completing a Project-PERT Calculations: Critical Activities-Applying PERT: Range Estimating.								
MODULE 5: TECHNOLOG	GY APPLICATIONS FOR SCHEDULING (10)								
The Role of the Schedule	er in Construction Management								
The Role of the Scheduler in Construction Projects-Ensuring a Project Stays on Track-Keeping Accurate Records of Project									
Progress-1 practice Exerc	ise-Quiz on PERT and Role of Scheduler-								
Linear Construction Operations and Line of Balance									
Linear Construction Overview and Examples-Line of Balance (LOB)-LOB Diagram-LOB Example: Develop a Schedule-									
Visualizing LOB-2 practice Exercises-Quiz on Line of Balance-Line of Balance Diagram.									
Technology Applications	s for Scheduling								
Technology Applications	: Getting Started-Software Applications Overview-MS Project Scheduling Overview-MS Project: A								
Deeper Dive-Primavera P	6 Overview-Primavera P6Critical Path-Primavera P6: Gantt Chart-Primavera P6 Importing Activities								
and Running		CO-5							
Schedule-Schedule Analysis and Applications-Schedule Application: CustomToolsBuilding Information Management (BIM)									
Tools-Integration of the Model and ScheduleTools-1 practice Exercise-Quiz on Technology Applications.									
Scheduling for Large Programs									
Scheduling for Large Programs									
Risk Allocation and Plan	ning								
Risk Allocation and Planr	ning for Scheduling Overview-Risk Allocation: Defining Success-Risk Allocation Analysis-Sample Risk								
Profiles-Risk Assessment	Risk Allocation: Schedule and Concluding Remarks.								
Lean Design in Construc	tion Scheduling								
Lean: Time and Schedul	e-Lean: Flow-Lean Design and Lean Scheduling-Lean Scheduling and Planning-1 practice exercise-								
Quiz on Large programs,	Risk and Lean.								
TEXT BOOKS									
1.	Hans Ottosson. (2012). Practical project management for building and construction, CRC Press.								
2.	Hans Sommer. (2010). Project Management for Building Construction_, Springer-Verlag Berlin Heid	lelberg.							
3.	Sengupta. (2002). Construction Management, Tata McGraw Hill								
4.	Andrew Baldwin, David Bordoli. (2014). Handbook for Construction Planning and Scheduling, Wiley	<i>'</i> .							
5.	B C Punmia and K K Khandelwal . (2015). Project Planning and Control, Lakshmi Publications pvt Lte	d.							
REFERENCE BOOKS									
1.	Code of Practice for Project Management for Construction and Development, Third edition-The Institute of Building (2002)	Chartered							
2.	Gary R. Heerkens. (2001). Project Management, McGraw-Hill.								
3.	Paul E Harris. (2006). <i>Planning &amp; Scheduling Using Primavera Version 5.0 for Engineering &amp; Co</i> Eastwood Harris Pty Ltd.	nstruction,							
<ul> <li>Prof. Dr. Klaus Neumann, Dr. Christoph Schwindt, Dr. Jürgen Zimmermann (auth.). (2012). Project Scheduling</li> <li>4. with Time Windows and Scarce Resources_ Temporal and Res, Lecture Notes in Economics and Mathematical Systems.</li> </ul>									
E BOOKS									

1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20manageme
Ζ.	<u>nt</u>
MOOC	
1.	https://www.coursera.org/learn/construction-project-management
2.	https://www.coursera.org/learn/construction-scheduling

**CO1** 

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cou	RSE TITLE		Course III- INFRASTRUCTURE PROJECT MANAGEMENT CREDITS 3													
COU	RSE CODE		CEH43	377	CA	COURS	SE RY		HON	OURS		L-	Г-Р-S	3-0-0-1		
v	ersion		1.0	I	4	Approv Details	al s	3:	3 ACM, 1	5.12.20	21	LEA	RNING EVEL	BTL-3		
ASSESS	MENT SCHE	ME										•		_		
First Ass	Periodical essment	Sec /	ond Pe Assessn	riodical nent	S As:	Semina signme Project	r/ nt/ t		Gurprise T	est / Qu	iz	Atte	ndance	ESE		
	15%		15% 10% 5% 5% 50%													
Map wi	th multiple	courses f se.	urses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should be											ation should be		
Course	Description	Scop give y perfo This funda Many requi the d	Scope, time, and cost management are at the heart of successful project management. This course will give you the tools to develop a project scope, schedule and budget and then status them to predict project performance. This course will provide you with the basic principles of urban infrastructure management that are fundamental for building prosperous cities that are sustainable, resilient and efficient. Many Project Managers focus only on the scope, schedule and budget. However, a successful project requires that you. This course will focus on the key support functions-manage risk, control the quality of the deliverables, engage and manage people and procure goods and services.													
Course	Objective	The c 1 2 3 4 5	course . Cre . Dev . Foc . Kno . Kno	should er ate a Proj velop Criti cus on sus ow about ow about	nable th ject Sco ical Pati tainabi the risk Risk Ma	ne stud ope Sta h Sche lity, re s invo anager	lents to temer dule a silienco lved in nent P	o It and to nd reviev e and eff a constr lan and F	identify v types o ciency o uction pi Project Ri	ways to If cost e f urban roject esource	control stimate infrastr Manag	the scop s and rev uctures. ement pl	e of the p ew budge an.	roject. ₂ts.		
Course	<ul> <li>Upon the completion of the course, the students will be able to         <ol> <li>Create a Project Scope Statement and to identify the ways to control the scope of the project.</li> <li>Perform a cost and schedule analysis.</li> </ol> </li> <li>Course Outcome         <ol> <li>Manage urban infrastructure system, Manage Urban Energy Systems and Manage urbat transportation system</li> <li>Perform a Qualitative Risk Analysis</li> <li>Execute Risk Management Plan and Project Resource Management plan.</li> </ol> </li> </ul>											ne project. Manage urban				
6.	Prerequisit	es: Nil														
7.	CO, PO AN	D PSO M	APPIN	G		I	[	I	1		1					
со	PO PO	PO	PO	PO	PO	PO 7	PO o	PO o	PO	PO	PO	PSO 1	PSO	PSO 2		

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CO2	2	3	1	2	2	-	-	-	-	-	2	3	3	1	-				
CO3	-	-	-	2	2	2	-	2	1	2	2	3	1	1	-				
CO4	-	-	-	2	2	2	-	2	1	2	2	3	2	1	-				
CO5	-	-	-	2	2	2	-	2	1	2	2	3	2	1	-				
				1:	Weakly r	elated,	2: Mo	derate	ly relate	d and 3: 9	Strong	y related	1						
MODU	E 1: SC	COPE &	WBS		•			(9	)										
Course	Introd	uction						(5	,										
Introdu	ction t	o Speci	alizatio	n- 8 re	adings-Co	urse lo	onleg	rend- P	re-Course	- Survev-	Specia	lization							
Assignm	nents	-Peer	Review	Gui	delines -	Discuss	ion F	orum	Guidelin	ies -Acc	essibili	tv and							
Accomn	ccommodations Statement- General Course Information- Using, Editing, and Submitti										mitting								
Docume	Documents in this Course.										0								
Project	Scope	Manag	gement																
Introdu	ction a	and Ol	bjective	s- Sco	pe Devel	opmen	t - Pa	art 1-S	cope De	velopme	nt - P	art 2 -		СС	)-1				
Require	ments	Devel	opment	t- Sco	ope Cont	rol Pro	ocess-	Kaz	and Tor	n Week	ly Cor	nclusion		BT	L-2				
Assignm	nent Ov	verview	/- <b>2 Rea</b>	dings-	Recomme	ended F	Readin	gs -Exa	mple Pro	ject Scop	De State	ement -							
Electric	Car Ca	se.		-				-											
Project	Sched	ule Ma	nageme	ent															
Introdu	ction a	nd Ob	jectives	- Wha	t is a WBS	5?- Wo	rk Pac	kages-	Steps for	^r Creating	g a WB	S- Case							
WBS- Ka	az and ⁻	Tom's \	Weekly	Conclu	usions -As	signme	nt Ove	erview-	2 readin	gs-									
Recom	nende	d Read	ings -Ex	ample	WBS and	Dictior	ary - I	Electric	Car Case										
MODU	MODULE 2 : PROJECT TIME MANAGEMENT (12)																		
Project Time Management																			
Introduction and Objectives- Time Management- Critical Path Method Overview- Types of																			
Diagram	ns- Act	ivity or	n Node	Exam	ple- Findi	ng Criti	cal Pa	ath- Fo	rward Pa	iss Diagra	am -Ba	ickward							
Pass Dia	agram	-Total	Slack- F	ree Sl	ack -Thing	s that	can g	o wron	g- Strate	gies for	Dealing	g -Tools							
and Co	onclusio	on Ka	z and	Tom	Weekly	Conclu	ision	Assign	ment O	verview-	2 re	adings-							
Recomm	nendeo	d Readi	ngs Exa	mple I	Project Sch	nedule	- Elect	ric Car	Case										
Cost Es	timatio	on																	
Introdu	ction a	and Ob	jectives	- Prep	paring an	Estimat	te- Est	timate	Bases- T	ype of E	stimate	es- Cost		CC	)-2				
Baseline	e -Kaz	and To	om Wee	ekly Co	onclusion-	Assigr	nment	Overv	iew- 2 re	eadings-F	Recomr	nended		BT	L-3				
Reading	s 1- Ex	ample	Project	Cost E	stimate -	Electric	Car C	ase.											
Earned	Value	Manag	gement																
Introdu	ction a	and Ob	jectives	- Mor	nitoring O	ur Proj	ect- C	alculat	ing Earne	ed Value	1- Cal	culating							
Earned	Value	2- Crea	iting a F	oreca	ist- Kaz an	id Tom	Weeł	dy Ove	rview- A	ssignmen	it Over	view- 2							
Reading	s-Reco	mmen	ded Rea	dings	- Example	Calcula	tions	for Ear	ned Valu	e - Electri	c Car C	Case							
MODU	F 2 · I	IRRAN	INEDAG	TPUC				2)											
Plack 4	L 3 : (		n to List				12141(3												
Introdu	- muro	to the				llongor	to U	rhan I	nfractruc	tures. The	a main	urhan							
infrastru		system	s-Thom	ourse ain di	mensions	ofurb	n infr	astruct		luies-ine	e man	i uibali							
Block 2	- Intro	ductio	n to Dri		s of Urban	Infras	tructu	ro Mar	nagemen	+									
Introduction: What do urban infrastructure managers do? Managing stakeholders and related																			
perform	ance o	objectiv	/es- The	e mair	n dimensi	ons for	urha	n infra	structure	manage	rs- Sch	nools of							
thought	in mai	naging	urban ir	nfrastr	ucture sv	stems								CC	)-3				
Block 3	- Intro	ductio	n to Urk	ban En	ergy Man	ageme	nt							BT	L-3				
Introdu	uction	to ur	ban en	ergv	infrastruc	tures-	Unde	rstandi	ng urba	n electri	icitv s	vstems-							
Managi	ng the	urban	electric	ity svs	tem- Chal	lenges	and o	pportu	nities in	urban er	nergy s	vstems-							
Managi	ng Urba	an Enei	rgy Svst	ems -	Interview	with ar	n Expe	rt from	the Veo	ia group	- 07 9	,							
Block 4	- Intro	ductio	n to Urk	oan Tr	ansport M	lanage	ment			- 8. 549.									
Introdu	uction	to urb	an trar	nsport	ation syst	ems-M	anagi	ng the	urban t	ransport	ation	system-	em-						

CarPostal- Broader challenges and new op	portunities- Conclusion of the MUI MOOC-2 practice								
exercises - What did I learn in Block - Short answer assignment									
MODULE 4 : PROJECT RISK & QUALITY M	IANAGEMENT (9)								
Introduction (1)									
Course Icon Legend- Pre-Course Survey -	Specialization Assignments -Peer Review Guidelines -								
Discussion Forum Guidelines -Accessibilit	y and Accommodations Statement -General Course								
Information- Using, Editing, and Submitting Documents in this Course									
Project Risk Management(4) CO-4									
Introduction and Objectives- Risk Management Processes -Identifying Risks- Developing a Risk BTL-3									
Management Plan- Analyze and Prioritize F	lisks -Develop Risk Responses								
Quality Assurance Plan	(4)								
Introduction and Objectives -What is Qual	ity Management? -Quality Management Plan -Cost of								
Quality- Tools for Assessing Quality- Contro	ol Quality.								
MODULE 5 HUMAN RESOURCES & PRO	CUREMENT MANAGEMENT (6)								
Human Resources ManagementPlan	(3)								
Introduction and Objectives -Project Re	source Management-Plan Resource Management -								
Estimate Activity Resources- Acquire R	esources- Develop Team -Manage Team- Control								
Resources		CO-5							
Project Procurement Management	(2)	BTL-4							
Introduction and Objectives- Project Pro	curement Management -Project Procurement Plan -								
Contract Types- Executing Procurement									
Final Exam	(1)								
TEXT BOOKS									
A Guide to the Project	Management Body of Knowledge (PMBOK® Guide	e) – Sixth Edition,2017 Project							
I. Management Institute									
2. Project Management Gary	R. Heerkens, PMP, McGraw-Hill, 2002								
Policy Guidance for Investment in Clean Energy Infrastructure Expanding Access to Clean Energy for Green									
Growth and Development	3. Growth and Development								
4. El-Reedy, Mohamed Abda	El-Reedy, Mohamed Abdallah - Concrete and steel construction _ quality control and assurance (2013, CRC Press)								

REFERENCE BO	OKS
1.	Kumar NeerajJha. (2016). Construction Project Management -Theory and Practice, Pearson publications, 2 nd edition.
2.	Anthony G. Bigio and Bharat Dahiya . (2004). Urban Environment and Infrastructure Toward Livable Cities, The International Bank for Reconstruction and Development/THE WORLD BANK
3.	Urizar M., Halim ES.A (2015). <i>Construction Supervision QC + HSE Management in Practice_ Quality Control,</i> OHS, and Environmental Performance Reference Guide.
4.	Ariaratnam, Samuel T. Rojas, Eddy M. (2009). <i>Building a Sustainable Future,</i> Construction Research Congress 2009 American Society of Civil Engineers.
E BOOKS	
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20 management
MOOC	
1.	https://www.coursera.org/learn/scope-time-management-cost
2.	https://www.coursera.org/learn/managing-urban-infrastructures-1
3.	https://www.coursera.org/learn/project-risk-quality-management

CO1

CO2

CO3

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COURSE T	0	Course	e IV- P	ROJEC	t fof	RMUL	ATION (Batcl	N ANI h I)	D CON	TRA	CT REGU	JLATIO	NS		CREDITS			3		
COURSE C	ODE			CEH4461 COURSE CATEGORY HONOURS								L-T-F	P-S	3-	·0-0-0					
Version				1.0 Approval Details 33 ACM, 15.12.2021						LEA	RNIN	G LEVEL	В	STL-3						
ASSESSMENT	SCH	EME																	•	
First Perio Assessme	dical ent		S	Second Periodical AssessmentSeminar/ Assignments/ ProjectSurprise Test / Quiz							Attendance			ESE						
15%				15% 10% 5%								5%	Ś	5	50%					
Map with multiple courses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should conducted per course.												ıld be								
Course Desc	cripti	on	Project formulation and cost is an essential skill-set for many projects and in many contexts in our lives. Project investment appraisal Management is an ideal starting point if you need to manage projects. Contract laws the standard contract document and bidding process is the essential tool to execute project without any dispute and the processes of arbitration is also need for the project managers. It is essential to know more about the EPC PPP Infrastructure projects																	
Course Objec	Course Objective					<ol> <li>The course should enable the students to</li> <li>Introduce Project Identification and financing of project.</li> <li>Know about project investment appraisal.</li> <li>Know about the standard contract document and the bidding process</li> <li>Provides details about dispute, claim and arbitration.</li> <li>Discusses the EPC PPP and concession agreement</li> </ol>														
Course Outco Prerequisites CO, PO AND F	ome : Nil PSO I	MAPP	<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Identify project financing and costing and apply the principles of cash flow, time value of money and cost of capital in project</li> <li>2. Identify the different aspects of project appraisal and examine the various methods of investment appraisal.</li> <li>3. Distinguish the different elements and procedures in the preparation of contracts and NCB document.</li> <li>4. Analyse the Potential contractual problems and the arbitration procedure</li> <li>5. Compare the characteristics of various infrastructure projects, models and regulatory bodies.</li> </ul>																	
со	Р О 1	Р О 2	Р О З	Р О 4	Р О 5	Р О 6	Р О 7	Р О 8	Р О9		Р О 10		Р О 11	F   C   1	> ) 2	PSC	01	PSO2		PS O3

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CO4	-	-	-	2	2	2	-	2	1	2	2	3	2	2	3
CO5	-	-	-	2	2	2	-	2	1	2	2	3	2	2	3
1: Weakly related, 2: Moderately related and 3: Strongly related															
MODULE 1	: PRO	JECT F	ORM	ULATI	ON A	ND CC	STING	3			(9)				
Generation	and	Scree	ening	of Pr	oject	Ideas	-Proje	ct Ide	entific	ation-Prelim	inary Anal	ysis, Marke	et, Technical,	Financial,	
Economic a	nd Ec	ologic	al-Pre	e-Feasi	bility	Repor	t, var	ious le	ocal a	pprovals an	d clearance	s for land a	and building -	Statutory	CO 1
Regulations	for to	wn ar	nd cou	intry p	lanni	ng, de	velopr	ment o	contro	l rules - Det	ailed Projec	t report.			
Means of F	inanc	e -Ke	y Fina	ncial	Indica	itors,	Projec	t casl	n flow	s- compone	ents, basic	principles c	f cash flow es	timation,	DIL-2
concept of t	ime v	alue o	f mor	ney.											
MODULE 2	: PRO	JECT /	APPR/	AISAL						(9	Ð)				
Market, Teo	chnica	ıl, and	Envi	ronme	nt app	oraisal	, Finaı	ncial,	Econo	mic apprais	al - Cost of	Capital-cos	t of production	, working	
capital requ	ireme	nt -Ne	et Pre	sent V	alue-	Benefi	t Cos	t Ratio	o–Inte	rnal Rate of	Return-Ac	counting R	ate of Return-	Urgency-	CO-2
payback per	iod-A	ssessi	nent c	of Vari	ous N	lethod	ls-Indi	ian an	d inter	national Pra	ctice of Inv	estment Ap	praisals.		BIL-3
MODULE 3:	CON	TRAC	LAW	AND	BIDDI	NG PF	ROCES	S		(	9)				
Introductior	n to co	onstru	ction	law - d	civil ar	nd con	nmon	law-c	ommo	n delivery n	nethods- Co	omparison o	f Actions and L	aws- Law	
Governing	Contra	acts,	Indi	an co	ntract	act	Elen	nents	of Co	ontracts- Wo	orld bank p	procedure a	and guideline,	National	
competitive	bidd	ing (N	ICB) (	docum	ent -	- vario	ous cl	auses,	Preq	ualification-	Bidding-Acc	cepting-Eval	uation of Ten	der from	CO-3 BTL-3
Technical, C	ontra	ctual	and co	omme	rcial p	oints	of vie	w – In	ternat	ional standa	ard contract	t document	- FIDIC –Other	standard	512 5
forms of cor	nstruc	tion c	ontra	cts.											
MODULE 4:	DISP	UTE, C	LAIM	AND	ARBI	RATIO	DN					(9)			
Contract an	d Rela	ated Is	ssues-	Conse	quenc	ces of	Breac	h of C	Contrac	ct- Potential	contractual	problems,	variations, clai	ms, claim	
managemen	t, con	struct	ion d	ispute	boar	ds La	w of	dama	ges ar	nd extension	n of Time-	Constructio	n claims and	Disputes-	
Mechanism	of d	ispute	Reso	olutior	n-Agre	eemen	ts, su	bject	Matte	r-Violations	a. Arbitratio	on: Laws F	Related to Con	nstruction	CO-4
Arbitration	in Ir	ndia-P	resent	t Stati	is, oj	portu	nities	and	Chall	enges-Institu	itional Arb	oitration-Pro	motion of Ai	bitration-	BTL-3
Internationa	l Arbi	itratio	n-Trai	ining (	of Art	oitrato	rs on	Ethics	-Appo	ointment of	Arbitrators-	- Conditions	s of Arbitration	is-Powers	
and duties of	of Art	oitrato	r-Rule	es of I	Evidei	nce-Er	ntorce	ment	of Aw	ard Costs-A	Arbitration a	and concilia	tion(Amendme	ent) Act -	
Insurance ar	nd Boi	nds.									(0)				
MODULE 5:	CON	CEPT	OF INI	FRAST	RUCT	URE P	ROJEC	.TS		· · ·	(9)	•			
Types of pr	ojects	- EP(	C, Des	ign/Bı	uild co	ontrac	ts- Inf	rastru	cture	developmer	nt potential	as per five	year plans, cer	ntral level	
and state le	evel d	levelo	pmen	t, def	initior	n and	chara	cteris	tics of	^f infrastruct	ure project	s and proje	ect stakeholde	rs, Public	CO-5
Private Part	nershi	ip – B	OT mo	odels,	mode	l conc	essior	agree	ement	, benefits -T	echnology	Transfer an	d Foreign Colla	boration-	BTL-4
Scope of Tee	chnolo	ogy Tr	ansfe	r.											
Case studie	s on E	Design	-Build	d proje	ect co	ntract	ing.								
TEXT BOOKS	5														
1.		Pras Publ	sanna ishing	Chan g Co., l	dra.( .td., N	2006) ew De	. <i>Proj</i> e elhi.	ects-P	lannin	g Analysis .	Selection Ir	nplementat	ion & Review,	Tata Mc G	raw Hill
2.		Jimi	nie Hi	inze. (	2001)	. Cons	tructio	on Cor	Jimmie Hinze. (2001). Construction Contracts, 2nd Edition, McGraw Hill.						
3. Gransberg, D.D., Koch, J.A., Molenaar, K.R. (2006). <i>Preparing for design-build projects</i> . ASCE Press.															
3. Gransberg, D.D., Koch, J.A., Morenaar, K.K. (2000). Frepuring for design-build projects. Asce Press.										.006). Prepa	ring for des	ign-build pr	ojects. ASCE Pr	ess.	
REFERENCE	BOOK	Gra S	nsber	g, D.D	., Kocł	n, J.A.,	Mole	naar,	K.R. (2	006). Prepa	ring for des	ign-build pr	<i>ojects</i> . ASCE Pr	ess.	

## Curriculum and Syllabus

2.	Lukas Klee. (2015). International Construction Contract Law, Wiley & Sons.
3.	Arbitration and Conciliation Code, 1996.
4.	Joseph T. Bockrath, "Contracts and the Legal Environment for Engineers and Architects", 6th Edition, McGraw Hill, 2000.
E BOOKS	
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20management
MOOC	
1.	https://nptel.ac.in/courses/110/107/110107081/#

COUR	RSE TI	<b>FLE</b>			Cours	se IV -	V - PROJECT MANAGEMENT FOR MANAGERS								3
COUR	SE CO	DE		CEI	14462	2 COURSE CATEGORY			HOM	IOURS	L-T-F	P-S	3-0-0-0		
Ve	/ersion 1.0			Appr	oval D	etails	33 ACM,	15.12.2021	LEARNING	G LEVEL	BTL-3				
ASSESSMENT SCHEME															
First F Asse	Periodi essmen	cal It	S	econd Asse	Perioo ssmen	dical t		Semin	ar/ Ass Proje	signments/ ect	Surpris	e Test / Quiz	Attend	ance	ESE
-	15%			1	15%				109	%		5%	5%		50%
Map w	ith m	ultiple	e cour	ses fo	or 45	Hours	per o	ourse	. CIA	calculated	from Cours	era platform.	End Semest	er Examina	ation should be
conducted per course.         Course         Description         Project management is an essential skill-set for many careers and in many contexts in our lives.         Management is an ideal starting point if you need to manage projects at work or at home, while not need being a formally trained project manager. It is also suitable if you are considering undertaking a project in t future and are seeking to learn and apply essential project management knowledge and skills.												r lives. Project not necessarily oject in the near			
Course	Obje	The course should enable the students to         1. Introduce Project Management, ConstructionManagement and types of organisations.         2. Know about capital budgeting, risk management and technical analysis of projects.         3. Know about the project team and time management         4. Provides details about probability models in network and crashing of network.         5. Discusses the project cost management													
Course	ome	Upo	<ol> <li>Upon completion of this course, the students will be able to</li> <li>Perform a project assessment market demand analysis, financial analysis and project appraisal.</li> <li>Execute capital budgeting and potential risk analysis.</li> <li>Develop project time management scheme using CPM and PERT.</li> <li>Create probability models in network and crashing of net work</li> <li>Estimate the project cost and apply quality control measures with respective to procurement process.</li> </ol>									aisal. ent process.			
Prereq	uisites	s: Nil													
CO, PO	AND	PSO N	/IAPPI	NG	1						T	1 1		I	
со	Р О 1	Р О 2	Р О З	Р О 4	Р О 5	Р О 6	Р О 7	Р О 8	Р О 9	Р О 10	Р О 11	Р О 12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	2	2	-	3	3	2	2	3
CO2	-	-	2	2	1	2	1	2	-	-	3	3	2	2	3
CO3	2	3	1	2	2	-	-	-	-	-	2	3	3	2	3
CO4	2	3	1	2	2	-	-	-	-	-	2	3	3	2	3
CO5	2	3	1	2	2	-	-	-	-	-	2	3	3	2	3
					1	: Wea	kly re	lated,	2: Mc	derately re	elated and a	B: Strongly rel	ated		
MODU	LE 1: F	PROJE	ст М	ANAG	EMEN	IT & SI	ELECT	ION		(9	)				
Introduction of Project Management-Project Success-Types of Structure Organizations-Project Management Office- Stakeholders Management-Types of Projects and Project Life Cycle-Project Life Cycle Phases & Project Appraisal- Methods of Project Selection- I-Methods of Project Selection- II-Methods of Project Selection (MCDM -I)-Methods ofCO BTI										CO-1 BTL-2					

Project Selec	ction (MCDM-II)-Methods of Project Selection (MCDM-III)-Market and Demand Analysis - I-Market and									
Demand Ana	lysis - II-Financial Analysis									
MODULE 2:	CAPITAL BUDGETING& RISK MANAGEMENT (9)									
Capital Budg	geting Techniques - I-Capital Budgeting Techniques - II-Financing of Projects-Risk Management - I-Risk									
Management - II-Risk Management (Control & Documentation)-Stand Alone Risk Analysis- I-Stand Alone Risk Analysis-										
II-Hillier Mo	del-Simulation Analysis-Decision Tree Analysis- I-Decision Tree Analysis- II-Abandonment Analysis-	BTL-3								
Technical An	alysis-Product Mix and Plant Capacity Analysis.									
MODULE 3:F	PROJECT TEAM BUILDING & TIME MANAGEMENT (9)									
Project Too	m Ruilding Conflict and Negotiation HPM Issues and time Management Project Time Management									
Introduction	Project Time Management (Project Scheduling) Project time Management, Numbering of Nodes Project									
	-Project Time Management (Project Scheduling)-Project time Management- Numbering of Nodes-Project	CO-3								
Time Manag	gement- PERT Networks-Project Time Management- CPM-Project Time Management- Laddering in	BIL-3								
PERT/CPM-P	robability Models in Networks- I-Probability Model in Networks- II-									
MODULE 4	PROBABILITY MODEL IN NETWORKS&CRASHING OF NETWORKS(9)									
MODOLL 4.										
Probability	Model in Networks- III-Probability Model in Networks- IV-Simulation of Networks- I-Simulation of									
Networks U Slacka & Elasta & Elasta & Elasta & Time and Cast Delationalis Control for the standard of the stan										
Notworks II (	-stacks & Floats- i- stacks & Floats- i- fille and Cost kelationship-clashing of Networks- i-clashing of	BTL-3								
MODULE 5:										
Crashing of	Networks- IV-Introduction to Project Cost Management-Cost Control (Tools and Techniques)-Cost									
Estimation-Ir	ntroduction to Quality Management-Cost of Quality-57 Quality Management (Source of variability and Six	CO-5								
Sigma)-Quality Management (Six Sigma Tools) Procurement Management- I-Procurement Management- II and Project										
Termination										
TEXT BOOKS										
1.	ASQ Quality Press and Infotech Standards India Pvt. Ltd.	веіт напароок,								
2.	T. M. Kubiak and Donald W. Benbow. (2011). The Certified Six Sigma Black Belt Handbook, Pearson Public	cation.								
3.	Mitra, Amitava. (2002). Fundamentals of Quality Control and Improvement, Wiley India Pvt Ltd.									
4.	Montgomery, D C. (2011). Statistical Quality Control: A modern introduction, Wiley.									
REFERENCE B	BOOKS									
1.	Forrest W. Breyfogle. (2011). Implementing Six Sigma, John Wiley & Sons, INC.									
2.	Evans, J R and W M Lindsay. (2012). An Introduction to Six Sigma and Process Improvement, CENGAGE Lea	arning.								
3.	Howard S. Gitlow and David M. Levine. (2001). Six Sigma for Green Belts and Champions, Pearson Education	on, Inc.								
4.	Montgomery, D C. (2001). Design and Analysis of Experiments, Wiley									
E BOOKS										

1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20management
MOOC	
1.	https://nptel.ac.in/courses/110/107/110107081/#
## MINORS

COURS	E TITLI	E				Cou	rse	I - FUI	NDA	MENTALS	OF G	ilS			CRED	ITS	4
COURSE	COD	E		CEI	M4276	6		COUR	SE CA	TEGORY		М	INORS		L-T-F	-S	4-0-0-0
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ASSESSMEN	т ѕсн	EME															
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Map with m conducted p	Map with multiple courses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should be conducted per course.														should be		
Course De	script	ion	Explore the world of spatial analysis and cartography with geographic information systems (GIS). In-depth with common data types (such as raster and vector data), structures, quality and storage													In-depth	
Course Obje	The course should enable the students to         1. Develop the skills needed to use GIS software in a professional setting.         2. Learn how GIS grew from paper maps to the globally integrated electronic software packages of tod Explore data using ArcMap.         3. Learn the foundational concepts of GIS, how to analyse data, and draw the first map         4. Learn about data models and formats, including a full understanding of vector data and raster concepts         5. Learn common data storage mechanisms within GIS, including geo data bases and shape files.													of today.			
<ul> <li>Upon completion of this course, the students will be able to         <ol> <li>Perform a project assessment using information from previous projects and lessons</li> <li>Symbolize data and create an eye-catching final product. Learn to store, organize and anal spatial data, using cartography techniques to communicate results in maps, and collaborate w peers in GIS and GIS-dependent fields</li> <li>Create a professional-quality GIS portfolio piece using a combination of data identification a collection, analytical map development, and spatial analysis techniques.</li> <li>Create a vector data model by using vector attribute tables, writing query strings, defining quer and adding and calculating fields</li> <li>Use digital elevation models and creating slope and distance analysis products. Bring maps ar data to the Internet and create web maps quickly with ArcGIS Online.</li> </ol> </li> </ul>													d analyze brate with ation and g queries, haps and				
Prerequisite	s: Nil																
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со	Р О 1	Р О 2	Р О З	Р О 4	Р О 5	Р О 6	Р О 7	Р О 8	Р О 9	Р О 10	1	Р О L1	Р О 12		PSO1	PSO2	PSO 3
CO1	3	2	1	2	3	2	1	1	2	-	-		3		2	2	-

CO2	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-	
CO3	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-	
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CO5	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-	
					1: We	akly re	elate	d, 2: M	odera	tely related	and 3: Stro	ongly relate	d			
MODULE 1:	INTRO	DUC		ro ge	OGRA	PHIC I	NFO	RMATI	ON SY	STEMS (9)						
Course Mechanics - Module 1 Overview - Why GIS is Awesome - What is GIS? - A First Look at Using Desktop GIS - GIS Terminology to Know - Tour of ArcMap - Data Representation in GIS - Desktop GIS Software Packages - Getting Help with GIS - Relevant Skills for the GIS Analyst - ArcGIS Desktop Licensing and Authorization - ArcGIS Desktop Installation Instructions - How Assignments Work in this Course - Module 1 Summary - Glossary of Terms - Resources and Help for GIS - ArcGIS Installation for Desktop - Troubleshooting ArcGIS Installation Problems - Assignment 1: Introduction to ArcMap (Part 1) - Extra Practice: Getting to Know ArcGIS - Lesson 1 Quiz - Lesson 2 Quiz MODULE2: ArcGIS BASICS & MAKING MAPS (14)													GIS elp top ces t 1:	CO-1 BTL-2		
MODULE2: ArcGIS BASICS & MAKING MAPS (14)																
<ul> <li>ArcGIS Basics</li> <li>Module 2 Overview - Using ArcMap to Explore Data - Viewing and Changing Layer Properties - Using Feature Classes and Attribute Tables - Select By Attribute and Calculate Geometry - Select by Location - An Introduction to Projections - Analyzing Data with Geoprocessing Tools - Setting Environment Variables - Assessing Spatial Relationships with the Spatial Join Tool - Assignment 2 Overview - Module 2 Summary -Assignment 2: Introduction to ArcMap (Part 2)- Extra Practice: Maps, Geoprocessing, and Projections -Lesson 3 Quiz - Lesson 4 Quiz.</li> <li>Making Maps with Common Datasets</li> <li>Module 3 Overview -Finding Common Datasets - Using Layout View to Make Maps - Core Map Elements - Symbology: Changing How Your Data Looks - Symbology Examples - Setting Up Symbology in ArcGIS - Labeling Map Features - Making Map Books Assignment 3 Overview - Module 3 Summary-Assignment 3: Laying Out and Exporting Maps - Extra Practice: Maps, Maps, Maps! - Lesson 5 Quiz - Lesson 6 Quiz.</li> </ul>													ses ons the ctra CC BT ygy: es - os -	)-2 L-3		
MODULE 3: RETRIEVING AND SHARING DATA (9)																
Retrieving and Sharing Data Module 4 Overview - Using Metadata to Document Data Products - Sharing Data: Making and Using Map Packages - Sharing Maps: Uploading Packages to ArcGIS Online - Sharing Data: Creating Layer Files and Layer Packages - Choosing a Data Format 8m Joins and Relates - Troubleshooting ArcGIS - Module 4 Summary - Assignment 4 (Peer Review) Overview - Course Summary - Extra Practice: Make your own data - Electoral Politics Assignment Instructions - Lesson 7 Quiz - Lesson 8 Quiz - Coursera and UC Davis Honor Code Acknowledgement - Electoral Politics Results Quiz.													es - eer CC ons BT ults	)-3 L-3		
MODULE 4 :	DAT	ΓΑ ΜΟ	DELS	& VE	CTOR	DATA	1	(14)								
Course Over	view	& Dat	a Moo	dels ai	nd For	mats	. 1 0	Workie	N \/-	octor Data C	onconto 1	lactor Data	in Action De-	stor		
Course Overview & Data Models and Formats Course Overview - Course Mechanics - Module 1 Overview - Vector Data Concepts - Vector Data in Action - Raster Data Concepts - Raster's in Action - Scale and Implications - Managing Data in the Catalog Window - Data Design: Attribute Types - Using Vector Attribute Tables - Data Design: Joins and Relates - Data Design: Separating Data, Part 1 - Data Design: Separating Data, Part 2 - Module 1 Summary - Getting Started in this Course - Getting a license - Tutorial Assignment 1: Data Structures and Personal Geo data bases - Extra Practice for Lessons 1 and 2 - Lesson 1 Quiz: Raster's and Vectors - Lesson 2 Quiz: Data Design <b>Creating and Working with Vector Data</b> Module 2 Overview - Working with Geoprocessing Tools - Intersect Tool - Writing Query Strings - Writing Query Strings: Boolean Operators - Adding and Calculating Fields - Interactive Selection - Using and Configuring Selections in ArcGIS - Editing Existing Data - Data Design: Creating New Feature Classes - Basic Digitizing - Workflow: Preparing Data - Workflow: Making Point Data from Coordinates - Module 2 Summary - Tutorial Assignment 2: Editing Data - Extra Practice for Lessons 3 and 4 - Lesson 3 Quiz: Processing and Geoprocessing - Lesson 4 Quiz: Creating and Editing Data .												gn: rt 1 Se - n 1 CC BT ery s in fing ta - ting	CO-4 BTL-3			
MODULE 5:5	TORA	GE FO	ORMA	TS& C	REAT	ING W	/EB N	IAPS		(14)						
Storage Forr Module 3 Or files - Workf	<b>nats a</b> vervie low: l	a <mark>nd W</mark> w – G Percei	orking Geo da nt Ove	<b>g with</b> ata ba erlap	Raste se Fea - Supr	e <b>rs</b> atures pleme	and ntal:	Design Intro t	- File o SQI	Geo data k Lite Databas	oases - Pers ses - Overv	onal Geo da iew of Spat	ata bases – Shi ial Analyst – (	ape BT	)-5 L-4	

referencing Rasters - Raster Calculator - Workflow: Zonal Statistics as Table - Workflow: Managing Data with Zonal Statistics and Join Field - Module 3 Summary - Tutorial Assignment 3: A Suitability Analysis: Spatial Analyst, Raster Data, and DEMs - Extra Practice for Lessons 5 and 6 -Lesson 5 Quiz: Data Storage - Lesson 6 Quiz: Creating Raster Data.

## **Data Quality and Creating Web Maps**

Overview - Assessing Data Quality and Uncertainty - Data Quality, Part 2: Measurement and Representation -Topology - Loading Layers in ArcGIS Online - Applying Symbology in ArcGIS Online - Map Annotations and Scaling in ArcGIS Online - Saving and Sharing Maps with ArcGIS Online - Module 4 Summary =- Course Summary - Short Tutorial: Exporting Shapefiles and Uploading them to Web Maps - Extra Practice for Lessons 7 and 8 - Lesson 7 Quiz: Uncertainty and Quality - Lesson 8 Quiz: ArcGIS Online - Moving Valmeyer Final Quiz.

TEXT BOOKS											
1.	Wise, Stephen. (2014). GIS fundamentals, CRC Press.										
2.	Paul Bolstad. (2016). GIS Fundamentals_ A First Text on Geographic Information Systems, XanEdu.										
3.	Hu, Fei_ Huang, Qunying_ Jiang, Yongyao_ Li, Zhenlong_ Liu, Kai_ Sun, Min_ Xia, Jizhe_ Yang, Chaowei Phil_ Yu, Manzhu. (2017). Introduction to GIS programming and fundamentals with Python and ArcGIS.										
4.	Michele Campagna. (2005). GIS for Sustainable Development, CRC Press.										
REFERENCE BOOKS											
1.	Alias Abdul-Rahman, MorakotPilouk. (2007). Spatial data modeling for 3D GIS, Springer.										
2.	Shashi Shekhar, Shashi Shekhar, Hui Xiong. (2007). Encyclopedia of GIS, Springer.										
3.	Lena Sanders . (2007). GIS- Models in spatial analysis, Geographical Information Systems Series ISTE										
4.	Alias Abdul-Rahman, MorakotPilouk. (2007). Spatial data modeling for 3D GIS, Springer.										
5.	U.M. Shamsi. (2005). GIS applications for water, wastewater, and stormwater systems, Taylor & Francis.										
E BOOKS											
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management										
2.	https://www.scribd.com/search?content_type=tops&page=1&query=construction%20%20management										
МООС											
1.	https://www.coursera.org/learn/gis										
2.	https://www.coursera.org/learn/gis-data										

COUR	SE TITLE		СС	DURSE	ll - GIS D/	АТА АС АРІ	QUIST PLICAT	ION, A	итом	ATION A	ND	CREDITS			3			
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Ve	rsion			1.0		,	Approv Detail:	al S		33 ACN 06.02.20	1, 21	LE	ARNING LEV	ΈL	BTL-3			
ASSESSMEN	T SCHEMI	E																
First Periodi	cal Assessi	nent	Sec /	ond Per Assessm	riodical nent	As	Semina signme Project	r/ nt/ :	Surp	orise Test	/ Quiz		Attendance		ESE			
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Map with m	Map with multiple courses for 45 Hours per course. CIA calculated from Coursera platform. End Semester Examination should l conducted per course.														n should b			
Course I	Description       Geographic Information System (GIS) Imagery Analysis Spatial Analysis satellite imagery of Applications         Focuses on the basic building blocks of GIS data, so that you know what types of GIS files exist, a the implications of choosing one type over another. How to take non-GIS data, such as a list addresses, and convert it into "mappable" data using geocoding.													magery Gi es exist, and as a list c				
Course Obje	ctive		<ol> <li>The course should enable the students to</li> <li>Learn all about remotely sensed and satellite imagery, and be introduced to the electromagne spectrum</li> <li>Develop a large processing workflow in Model Builder.Use products derived from digit elevation models</li> <li>Practice with tools to support image analysis using Raster Calculation and Spatial Analyst</li> <li>Learn remote sensing and satellite imagery, starting out with an introduction to remotely sense data and the electromagnetic spectrum</li> <li>Learn how to use some basic tools to support image analysis using Raster Calculation and Spatial Analyst</li> </ol>											romagneti rom digita yst stely sense and Spatia				
Course Outco	ome s: Nil		<ul> <li>Upon completion of this course, the students will be able to</li> <li>1. Find and download satellite imagery online and use it for two common types of analysis: NDVI and trained classification.</li> <li>2. Build own models, and undertake building a large processing workflow together in Model Builder that uses parameters, preconditions, variables, and a set of tools</li> <li>3. Collect and Manage Data for Workflows.</li> <li>4. Evaluate a data set preparing data by merging and clipping files as needed</li> <li>5. Create project, find own data and create own quantitative map- Create choropleth maps in ArcMap-Data classification for mapping.</li> </ul>															
CO, PO AND	PSO MAR	PPING	1	1		I	1		1									
со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	2 PSO 3			

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CO 5	3	2	1	2	3	2	1	1	2	-	-	3	2	2	-
			1:	Weakl	y related	, 2: Mo	oderate	ely rela	ted an	d 3: Stro	ngly re	lated			
MODULE 1:	COURSE C	VERVI	EW, IN	IAGER'	Y, AND R	ASTER	CALCU	LATOR	(7)						
Course Over	view, Imag	gery, ai	nd Rast	er Calo	ulator				.,						
Course Over	view- Cou	urse M	echani	cs -Rei	mote Ser	nsing B	asics -	Charac	teristio	s of Rer	notely	Sensed	Data -Mo	odes of	CO-1
Acquisition -/	Acquisitio	n Platfo	orms -A	Acquirii	ng Image	ry and	Terrair	n Data	-Worki	ng with	Imagery	y in Arc	Map -Nori	malized	BTL-2
Difference Vegetation Index (NDVI) Classifying Imagery and Derived Products															
MODULE 2: MODEL BUILDER ANDDIGITAL ELEVATION MODELS (11)															
Model Builder and Other															
Overview -What is Model Builder -Creating Toolboxes and Tools with Model Builder -Setting Up a Larger Model -Using												-Using			
Interface Tools as Geoprocessing Tools in Model Builder- Feature Layers and Selections in Models Branching,												nching,	CO-2		
Models to Pv	s, and vi thon -Geo	ewing	Progre	ss inte everse	Geocodi	-Polis ng -Tim	ning N Ne Enat	lodels led Da	tor Re	euse -Ac	ivanceo	i wode	is and Ex	porting	BTI -3
Digital Eleva	tion Mod	els and	Comn	non Alg	orithms			neu bu	iu -						512.5
Overview -Contours –Hill shade –Viewshed- Cut Fill -Vector-Based Suitability Analysis -Fuzzy Suitability Analysis -															
Watershed Processing -Processing DEMs into Streamlines															
MODULE 3: S	SPATIAL A	NALYS	т				(8)								
Spatial Analyst and where to go from here         Overview -Region Group -Focal Statistics and the Swiss Hill shade -Reclassify- Point Density -Online and Connected         Applications -Collecting and Managing Data for Your Workflows- Additional Desktop GIS Topics Programming GIS         Software, Server-Side GIS, and Cartography -Other GIS Tools & Plugins, and Joining Communities -Course Summary         MODULE 4: GIS FILE, GEOCODING & MAP DESIGN PRINCIPLES       (9)         GIS File Types, Data Models, and Topology												CO-3 BTL-3			
Introduction	to topolo	ogy -To	pology	and d	ata form	ats –Sł	napefile	e: simp	le, wit	h no top	ology -	Covera	ge: Compl	ex, but	
has topology	· -Compar	ison o r data	f shape	e file, o	coverage	, and g	geo da	tabase	-Build	ing basic	topolo	ogy – G	Seorelation	nal and	
Finding data	and prep	aring it	for vo	ur pro	iect										
Evaluating data	ata using r	netada	ata - Da	ta dict	joot ionarv -T	he imp	ortanc	e of me	etadata	a - Viewir	ng and e	editing	metadata	in	
ArcMap - Dov	wnloading	and us	sing GI	S data.	,						0	0			
ArcMap - Downloading and using GIS data. Geocoding addresses and postal codes What is geocoding- Geocoding in ArcGIS Online -Geocoding postal codes -Geocoding postal codes in ArcMap -Postal codes and census data -Canadian census units -Ecological fallacy -Geocoding Street addresses -Geocoding Street addresses in ArcMap Map Design Principles Developing a critical eye - The map design process -Controls on map design, part 1 -Controls on map design, part 2 - Controls on map design, part 3 -Design principles -Visual hierarchy Figure-ground relationship- Contrast -Legibility - Visual Balance-Map elements -Creating a map layout in ArcMap. Basic map design in ArcMap 13mExporting a map as an image in ArcMap 1mTypography 8mCreating and customizing labels in ArcMap 9m															
Mapping Qu Colour mode for mapping Working with Quantitative Dot maps -C proportional Project: Gett	MODULE 5: MAPPING QUANTITATIVE&PROJECT (11) Mapping Quantitative Data Colour models: HSV -Colour models: CMYK -Choropleth maps -Creating choropleth maps in ArcMap-Data classification for mapping -Data classification methods for mapping -Mean vs. median –Zero values on your map -Joining tables - Working with tables in ArcMap -Field calculations in tables. Quantitative Map Types Dot maps -Creating dot density maps in ArcMap -Proportional symbol maps -Graduated symbol maps -Creating proportional and graduated symbol maps in ArcMap -Contour maps -Flow maps -Multivariate maps.													fication tables - reating	CO-5 BTL-3

TEXT BOOKS	
1.	Wise, Stephen. (2014). GIS fundamentals-CRC Press.
2.	Paul Bolstad. (2016). GIS Fundamentals_ A First Text on Geographic Information System, XanEdu.
3.	Hu, Fei Huang, Qunying Jiang, Yongyao Li, Zhenlong Liu, Kai Sun, Min Xia, Jizhe Yang, Chaowei Phil_Yu, Manzhu. (2017). Introduction to GIS programming and fundamentals with Python and ArcGIS.
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REFERENCE BOOKS	
1.	Alias Abdul-Rahman, MorakotPilouk. (2007). Spatial data modeling for 3D GIS, Springer
2.	Shashi Shekhar, Hui Xiong. (2007). Encyclopedia of GIS, Springer.
3.	Lena Sanders. (2007). Models in spatial analysis, Geographical Information Systems Series ISTE-GIS
4.	Alias Abdul-Rahman, MorakotPilouk. (2007). Spatial data modeling for 3D GIS, Springer.
5.	U.M. Shamsi. (2005). GIS applications for water, wastewater, and stormwater systems, Taylor & Francis.
E BOOKS	
1.	http://www.ebooksdirectory.com/googlesearch.php?q=construction%20management
2.	https://www.scribd.com/search?content type=tops&page=1&query=construction%20%20management
MOOC- COURSERA	
1.	https://www.coursera.org/learn/gis-applications
2.	https://www.coursera.org/learn/gis-data-acquisition-map-design

COURS	E TITL	E		Course III -REMOTE SENSING AND GIS CREDITS													
COURS	E COD	E		CE	M437	6	CO	URSE C	ATEGOR	Y	МІ	NORS	L	-T-P-S	4	-0-0-0	
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ASSESSMEN	т ѕсн	EME															
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Map with m	nultipl	e cou	rses f	or 45	Hour	s per c	ourse. (	CIA calc	ulated f	rom C	oursera p	atform. End	Semeste	r Examination	sho	uld be	
Course DescriptionThis course will introduce the students to the state-of-the-art concepts and practices of GIS. It starts with the fundamentals of remote sensing and GIS and subsequently advance covered. This course is designed to give comprehensive understanding on the application and GIS in solving the research problems. Upon completion, the participants should be sensing (Satellite images and Field data) and GIS in their future research work.													es of remote s dvanced meth cation of rem ld be able to	sensii ods v ote si use ri	າg and will be ensing emote		
Course Obje	ctive		<ul> <li>The course should enable the students to</li> <li>1. Understand the application of remote sensing and GIS in solving the research problems</li> <li>2. Learn Digital Image Processing</li> <li>3. Understand the concepts of Imaging spectroscopy</li> </ul>														
Course OutcomeUpon completion of this course, the students will be able to 1. Identify the error corrections in satellite images 2. Process images using complex algorithms to manipulate data. 3. Detect and identify minerals, terrestrial vegetation, man-made mate hyperspectral remote sensing										materials	and backgrou	nds	using				
Prerequisite	s: Nil																
CO, PO AND	PSO	MAPP	ING														
со	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO	PO	PSO 1	PSO 2		PSO 3	
CO1	3	2	1	2	3	2	1	1	2	-	-	3	2	2		-	
CO2	3	2	1	2	3	2	1	1	2	-	-	3	2	2		-	
CO3	3	2	1	2	3	2	1	1	2	-	-	3	2	2		-	
CO4	3	2	1	2	3	2	1	1	2	-	-	3	2	2		-	
CO5	3	2	1	2	3	2	1	1	2	-	-	3	2	2		-	
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MODULE 1:	REMO	DTE SE	NSING	G & S/	ATELLI	TE IMA	GE COR	RECTIO	NS (8)								
Overview and and Correction	d Intro on - III	oducti	on -Ba	asics c	of Rem	iote Se	nsing-Er	ror corr	ections i	in sate	llite image	. I, Error,Err	or Identif	ication	CO- BTL	1 -2	
MODULE2:	DIGIT	AL IM	AGE P	ROCE	SSING	i, THER	MAL AN	D MICR	OWAVE	(11)	1						
Digital Image Remote Sens	e Proc sing	essing	g-I, II, ∣	III, IV	- Imag	e Class	ification	I, Phot	ogramn	netry	- Thermal	Remote Sens	ing - Micr	owave	CO- BTL	2 -3	

MODULE 3: IMAGING SPECTROSCOPY & APPLICATION (11)												
Hyperspectral Rem	note S	Gensing – I, II, III, IV, V- GIS-I - GIS-I - Applications of Remote Sensing GIS-I&GIS-I	CO-3 BTL-3									
TEXT BOOKS												
1.	Lill	esand, T.M. and Kiefer, R.W. (1987). Remote sensing and Image Interpretation, John Wiley.										
2.	Jen geo	Jensen, J. R. (2012). <i>Introductory digital image processing a remote sensing perspective</i> , Prentice Hall series in geographic information science.										
3.	Scł	Schowenger dt, R. A. (2007). Remote Sensing: Models and Methods for Image Processing, Academic Press.										
4.	Ca	Campbell, J.B. (1996). Introduction to Remote Sensing, Taylor & Francis, London.										
5	Jos	Joseph, G. (2003). Fundamentals of Remote Sensing, University press.										
6	Cracknell, P. and Hayes, L. (2007). Introduction to remote sensing, Routledge											
REFERENCE BOOKS	5											
1.	Gu	Gupta, R. P. (2005). Remote Sensing Geology, Springer.										
2.	Va Net	n-dr-Meer, F., De Jong, S. (2006). <i>Imaging spectrometry: Basic principles and prospective applice</i> therlands: Springer Publishers	<i>ations,</i> The									
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