

CURRICULUM R 2022 A (in line with NEP 2020) Course Category and Distribution



SALIENT FEATURES OF CURRICULUM 2022

- 1. Focus on implementing the salient features of NEP 2020
- 2. Inter department electives and Department electives to focus on practical sessions and hands on training
- 3. More emphasis on project-based learning for professional core courses
- 4. A course on case study / product study / Field study helps in enhancing experiential learning
- 5. A course on Industry support, where domain specific industry personnel will frame the syllabus content on cutting edge technology and deliver the content to the students. Helps in bridging the industry academia gap
- 6. Students are encouraged to take up two internships during their summer vacation to enhance their skill set with real-time hands-on learning
- 7. NCC and NSS and other outreach activities helps students to transform themselves to become responsible citizens of India with Empathy and sense of inclusiveness
- 8. Outreach activity enables the students to have 50 hours of field service to the needy and poor thereby realizing the importance of contributing to the betterment of society
- 9. Innovation and Fabrication lab helps the students to explore and innovate
- 10. A course on Fine arts to aid in holistic growth of the student
- 11. Design thinking course followed by three semesters on design project courses help in conceiving innovative ideas, design and development of products
- 12. A course on Entrepreneurship in the final year helps in learning the process and procedures for starting a business and promoting innovative products.
- 13. Final semester dedicated for project work helps students to connect to industry and take real time challenge issues and work on a project in collaboration with industry
- 14. Fourth year is focused on the research aspects of Engineering and a course on Research Methodology and Intellectual Property Rights, will instill the desire to carry out research work.
- 15. Communication, Personality development, Soft skills, Creative and Technical writing skills courses in every semester helps groom the students, to become professionals who will be industry ready

- 16.A course on regional language is essential to bring the connect to the mother land and desire to serve the community with societal responsibilities
- 17. Every student is encouraged to take up two noncredit courses on social work, proficiency certification, paper presentation and journal publication, patent filing, sports and cultural activities.
- 18. Mandatory non-credit courses are given in the second, third and fourth semesters to give the exposure in the areas of social relevance such as Women Empowerment, Law for Engineers, Business management and wellbeing.
- 19. In the first semester a course on Tamil Culture and Technology helps the students to cherish the richness of the regional culture and its contribution to the growth of technology.

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.

S.No.	Course / Activity	Credits
1	Technical Certification Course	2
2	Sports	2
3	Art and Cultural activities	2
4	Foreign Languages	2
5	Publication in Conferences / Seminar	2
6	Indexed Journal Publications	2
7	Patent Publication	2
8	Start ups	2
9	Industrial Training	2
10	Proficiency Certification	2
11	Technical Certification	2
12	State / National Level Social activity to support gender equality and Inclusion	2

Table 1. Non – CGPA Courses

MANDATORY COURSES I

S.N o	Course Code	Course Title	Periods Per week			Total Contact Periods	Credits
1		Introduction to Women and	3 0 0			3	0
		Gender Studies					
2		Public and Personal	3 0 0			3	0
		Administration					
3		Constitution of India	3	0	0	3	0
4		Law for Engineers	3	0	0	3	0
5		Indian Knowledge System (IKS)	3	0	0	3	0

MANDATORY COURSES II

S.No.	Course Code	Course Title	Pe	eriods week	Per	Total Contact Periods	Credit s
1		Wellbeing with Traditional Practices (Yoga, Ayurveda and Siddha)	3	0	0	3	0
2		History of Science and Technology in India	3	0	0	3	0
3		Political and Economic Thought for a Humane Society	3	0	0	3	0
4		State, Nation-Building and Politics in India	3	0	0	3	0
5		Industrial Safety	3	0	0	3	0

MANDATORY COURSES III

S.No	Course Code	Course Title	Periods Per week			Total Contact Periods	Credit s
1		Principles of Management	3	0	0	3	0
2		Human Resource Management	3	0	0	3	0
3		Green Technology	3	0	0	3	0
4		Industrial Management	3	0	0	3	0
5		Fintech and Financing new Business	3	0	0	3	0

SI. No.	Course Title	Semester	Credit	Outcomes	Course Description
1	Communication Skills (Improving English communication skills.)	1 / 11	2	 Acquire the accuracy through the knowledge of Syntax. Demonstrate the skill of using the vocabulary and use it in sentences appropriately. Infer texts and improvise its usage. Illustrate language acquisition skills through formal correspondence. Analyze and transcode the data and interpret it in text format. 	This course is designed to improve the communication skills of students by teaching them how to listen, speak and understand grammar in real-world contexts. It also aims to help them communicate accurately, appropriately, and fluently in both professional and social situations.
2	Personality Development and Soft Skills (Enhancing the personality through English communication skills)	1 / 11	2	 Demonstrate the ability to construct the grammatically correct sentences with accuracy and syntax structures. Integrating various components of English Language and determining it through reading and listening. Analyze 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. Infer details about presentation skills and implementing it in various professional situations. 	This course provides students with the skills and knowledge needed to effectively communicate in professional and social situations. It also prepares them for Cambridge Certification, which will add value to their profile and demonstrate their language proficiency.

3	Advanced Academic Writing (Developing essential writing skills for academic and professional settings)	111	1	 Understand the fundamentals of academic writing, including the purpose, structure, and conventions of different genres. Construct clear, concise, and cohesive sentences and paragraphs. Demonstrate the ability to edit and revise written work. Produce accurate and well-structured documents. Utilize a range of writing techniques to enhance clarity and coherence. 	Advanced Academic Writing is a course that focuses on developing writing skills for an academic setting. Students will write essays, research papers and take part in discussions on course topics. The course aims to help students understand the writing process, communicate their ideas more effectively and become more proficient in writing for academic purposes.
4	Professional Editing and Project Writing (Presenting the skills of creating professional documents and projects that are clear, concise, and effective)	IV	1	 Develop a comprehensive understanding of professional editing and project writing. Effectively edit and revise documents for clarity, accuracy and consistency. Demonstrate an understanding of the different types of content used in professional writing. Construct coherent and well-structured documents for various audiences. Gain experience in developing and delivering effective presentations. 	Professional Editing and Project Writing is a course to help students develop their editing and writing skills for professional purposes. Topics include document structure, editing for clarity and accuracy, content types and project management. Students will edit documents, prepare presentations and develop writing projects. The course aims to help students understand the writing process and become more proficient in editing and writing for professional purposes.

5	Public Speaking (Providing instruction and experience in preparation and delivery of speeches within a public setting and group discussion)	V	1	 Evaluate speeches based on a variety of verbal and non-verbal criteria; Analyze the audience and design speeches to reflect the analysis Organise the speech that informs, persuades, or fulfill the needs of a special occasion; Apply the presentation aids to enhance the speech Analyse meaningful research on a variety of topics 	This course is an introduction to speech communication which emphasizes the practical skill of public speaking, including techniques to lessen speaker anxiety, and the use of visual aids to enhance speaker presentations. Civility and ethical speech-making are the foundations of this course. Its goal is to prepare students for success in typical public speaking situations and to provide them with the basic principles of organization and research needed for effective speeches.
6	English for Competitive Examinations (Developing the necessary skills and knowledge to succeed in competitive exams)	VI	1	 Acquire knowledge of the structure and format of competitive examinations. Improve vocabulary and grammar to increase success in competitive examinations. Develop critical thinking and problem-solving skills to answer complex questions. Analyse their vocabulary and communication ability to build the knowledge of idioms, phrasal verbs and commonly used expressions. For better productivity, job performance and to develop self-confidence. Learn how to approach and solve comprehension and essay questions with confidence. 	This course provides students with the skills and strategies needed to succeed in competitive exams, such as English grammar, vocabulary, reading and writing skills, listening comprehension, and critical thinking. It also helps them to understand the English language and exam structure better.

Verbal Reasoning and Interview Skills (Enhancing the understanding 7 of reasoning using concepts framed in words and equipping to succeed in interviews)	VII	1	 Illustrate verbal ability skill. Develop verbal reasoning ability to improve logical reasoning skills. Analyse language strategies and techniques for speaking in formal and informal professional contexts. Enhance the ability to use linguistic structures and vocabulary in professional contexts. Develop the ability to prepare and present a report in professional and academic contexts. 	This course seeks to enhance their verbal thinking abilities and employment skills. In the course, students learn how to use their newly acquired speaking skills to compete in the outside world. Students who participate in this course will master the speaking techniques necessary to maximize their potential through practice with verbal reasoning.
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GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Range of Credits: In the light of the fact that a typical Model Four-year Under Graduate degree program in Engineering has about 160 credits, we have adopted 165 credits. In addition to this, Industry collaborated courses can amount to 12 credits out of which we have allotted 7 more credits to the courses of B. Tech CSE (AI & ML) and B. Tech CSE (Cyber Security) with a 172 credits.

C. Structure of UG Program: The structure of UG program shall have essentially the following categories of courses with the breakup of credits as given:

S. No.	Category Code	Category	Breakup of Credits
1.	HS	Humanities & Social Science Courses	16
2.	BS	Basic Science Courses	24
3.	ES	Engineering Science Courses	15
4.	PC	Program Core Courses (Branch specific)	57
5.	PC	Industry Collaborated Courses (Branch specific)-Professional Core	26
6.	NE	Open Elective Courses (Cross Discipline Subjects) – Non-Department Elective	12
7.	EEC	Employment Enhancement Courses (Project/ Summer Internship/ Seminar)	22
		TOTAL	172

CURRICULUM COURSE DISTRIBUTION (BASED ON COURSE COUNT)

Semester	HS	BS	ES	PC	PC (ICC)	NE	EEC	МС	Total Courses per semester
1	4	2	2	1	1				10
2	3	2	2	1				1	9
3	1	1	1	3	1		2	1	10
4	1	1		3	1	1	1	1	9
5	1		1	4	1	1	2		10
6	1			2	2	1	1		7
7	1		1	2	2	1	1		8
8							1		1
Total Courses	12	6	7	16	8	4	8	3	64

CURRICULUM COURSE DISTRIBUTION (BASED ON CREDITS)

Semester	HS	BS	ES	PC	PC (ICC)	NE	EEC	Total Credits per semester
1	6	8	4	4	4			26
2	5	8	5	4				22
3	1	4	2	10	3		2	22
4	1	4		10	3	3	1	22
5	1		2	13	3	3	2	24
6	1			10	6	3	1	21
7	1		2	6	7	3	3	22
8							13	13
Total Credits	16	24	15	57	26	12	22	172





Category-wise Courses

HUMANITIES & SOCIAL SCIENCES COURSES [HS]

- (i) Number of Humanities & Social Science Courses: 12
- (ii) Credits: 16

SL. NO	COURSE CATEGORY	SEMESTER	NAME OF THE COURSE	L	т	Ρ	С
1	HS	1/2	English 1 - Communication Skills	1	0	2	2
2	HS	1/2	English 2 - Personality Development and Soft Skills	1	0	2	2
3	HS	1/2	Fine Arts, NCC, NSS & Others (Level -1)	0	0	2	1
4	HS	1/2	Fine Arts, NCC, NSS & Others (Level -2)	0	0	2	1
5	HS	1/2	Regional Language OR Foreign Language	2	0	0	2
6	HS	1/2	Universal Human Values	2	0	0	2

7	HS	1	Tamil Culture and Technology	1	0	0	1
8	HS	3	English 3 – Advanced Academic Writing	1	0	1	1
9	HS	4	English 4 - Professional Editing and Project Writing	1	0	1	1
10	HS	5	English 5 – Public Speaking	1	0	1	1
11	HS	6	English 6 - English for Competitive Examinations	1	0	1	1
12	HS	7	English 7 – Verbal Reasoning and Interview Skills	1	0	1	1

BASIC SCIENCE COURSES [BS]

- Number of Basic Sciences Courses: 6 (i)
- Credits: 24 (ii)

SL. NO	COURSE CATEGORY	SEMESTER	NAME OF THE COURSE	L	т	Ρ	С
1	BS	1	Mathematics – 1	3	0	2	4
2	BS	1/2	Physics	3	0	2	4
3	BS	2	Mathematics – 2	3	0	2	4
4	BS	1/2	Chemistry	3	0	2	4
5	BS	3	Mathematics – 3	3	1	0	4
6	BS(ICC)	4	Mathematics – 4	3	1	0	4

ENGINEERING SCIENCE COURSES [ES]

- Number of Engineering Sciences Courses: 6 Credits: 13 (i)
- (ii)

SL. NO	COURSE CATEGORY	SEMESTER	NAME OF THE COURSE	L	т	Ρ	С
1	ES	1	Design Thinking	1	0	2	2
2	ES	1/2	Immersion Lab	1	0	2	2
3	ES	1/2	FAB lab	1	0	2	2

4	ES	2	Engineering Graphics and Computer- Aided Design	2	0	2	3
5	ES	3	Environmental Science and Sustainable Development	2	0	0	2
6	ES	5	Entrepreneurship	1	0	2	2
7	ES	7	Research Methodology & IPR	2	0	0	2

PROGRAM CORE COURSES [PC]

- Number of Program Core Courses: 16 Credits: 57 (i)
- (ii)

SL.	COURSE	OFMEOTED			-	D	•
NO	CATEGORY	SEMESTER	NAME OF THE COURSE	L	1	Р	C
1	PC	1	Programming Fundamentals using C	3	0	2	4
2	PC	2	Object-Oriented Programming Using C++	3	0	2	4
3	PC	3	Data Structures	3	0	2	4
4	PC	3	R Programming	2	0	2	3
5	PC	3	Database Management Systems	3	0	2	3
6	PC	4	Operating Systems	3	0	2	4
7	PC	4	Design and Analysis of Algorithms	2	0	2	3
8	PC	4	Computer Networks	2	0	2	3
9	PC	5	Theory of Computation	3	0	2	4
10	PC	5	Computer Architecture	3	0	0	3
11	PC	5	Java Programming	2	0	2	3
12	PC	5	Computer Vision	2	0	2	3
13	PC	6	Principles of Compiler Design	3	0	2	4
14	PC	6	Web Programming	2	0	2	3
15	PC	6	Virtualization and Cloud Computing	2	0	2	3

16	PC	7	Applied Cryptography and Network Security	2	1	0	3
17	PC	7	Modern Software Engineering	2	0	2	3

DEPARTMENT ELECTIVE COURSES [DE] – PROFESSIONAL ELECTIVE COURSES

(i) Number of Professional Core- Industry Collaborated Courses: 8

(ii) Credits: 26

SL. NO	COURSE CATEGORY	SEMESTER	NAME OF THE COURSE	L	т	Р	С
1	PC (ICC)	1	Python programming	3	0	2	4
2	PC (ICC)	3	Artificial Intelligence	3	0	0	3
3	PC (ICC)	4	Predictive Analytics	2	0	2	3
4	PC (ICC)	5	Machine Learning	2	0	2	3
5	PC (ICC)	6	Application of Machine Learning in Industries	2	0	2	3
6	PC (ICC)	6	Deep Learning	2	0	2	3
7	PC (ICC)	7	Computational Linguistics and Natural Language Processing	3	0	2	4
8	PC (ICC)	7	Pattern Recognition and Anomaly Detection	2	0	2	3

NON DEPARTMENT ELECTIVE COURSES [DE] - OPEN ELECTIVE COURSES

The open elective courses in the curriculum are designed for a student to widen his knowledge from other areas of engineering, science or humanities. For these course the student can take any institute wide courses being offered in programs other than host Program. In addition, the open elective courses are to be of the level as suitable for the level of the student. For example, the NE1 is slotted in the fifth semester (i.e. third year) of the program of the student. He should be able to take any institute wide course which is slated for the third year student of the corresponding department.

(i) Number of Open Elective Courses: 4

(ii) Credits: 15

SL. NO	COURSE CATEGORY	SEMESTER	NAME OF THE COURSE	L	т	Ρ	С
1	NE	4	NE 1 (May be lab integrated)	2	0	2	3
2	NE	5	NE 2 (May be lab integrated)	2	0	2	3
3	NE	6	NE 3 (May be lab integrated)	2	0	2	3
4	NE	7	NE 4 (May be lab integrated)	2	0	2	3

EMPLOYMENT ENHANCEMENT COURSES [EEC] PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY OR ELSEWHERE

(i) Number of EEC Courses: 8(ii) Credits: 22

SL. NO	COURSE CATEGORY	SEMESTER	NAME OF THE COURSE	L	т	Р	С
1	EEC	3	Design Project – 1	0	0	2	1
2	EEC	3	Internship -1 (To be carried out in summer after 2 nd semester and evaluated in 3 rd semester)	0	0	0	1
3	EEC	4	Design Project – 2	0	0	2	1
4	EEC	5	Design Project – 3	0	0	2	1
5	EEC	5	Internship -2 (to be evaluated in 5 th semester. To be carried out in summer after 4 th semester))	0	0	0	1
6	EEC	6	Design Project – 4	0	0	2	1
7	EEC	7	Project Phase 1	0	0	6	3
8	EEC	8	Project Phase 2	0	0	26	13



		FRAMEWOR	K OF CURRICULUM 2022 (in line with NEP	202	20)								
	SEMESTER – I												
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	Т	Ρ	С	S	TC H				
1	BS		Mathematics – 1	3	0	2	4	2	5				
2	BS		Physics Chemistry	3	0	2	4	2	5				
3	HS		English 1 English 2	2	0	1	2	1	3				
4	PC		Programming Fundamentals using C OR Programming in Python Engineering Graphics and Computer Aided Design	2	0	2	3	2	4				
5	ES		Design Thinking	2	0	2	3	2	4				
6	ES		Engineering Practices Lab Fab Lab	0	0	4	2	2	4				
7	HS		Outreach (NCC, NSS, Y's Men, Rotaract) – Level I	0	0	2	1	4	2				
8	HS		Regional Language OR Foreign Language Universal Human Values	2	0	0	2	2	2				
9	HS		Tamil Culture and Technology	1	0	0	1	2	1				
10	PC	EAL51001	Python programming	3	0	2	4	2	4				
			Total	18	0	17	26	21	34				

	JEIVIEJTEK - II												
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	Т	Ρ	С	S	TC H				
1	BS		Mathematics – 2	3	0	2	4	2	5				
2	BS		Physics Chemistry	3	0	2	4	2	5				
3	HS		English 1 English 2	2	0	1	2	1	3				
4	PC		PC – 1 (Department specific)	3	0	2	4	2	5				
5	ES		Programming Fundamentals using C OR Programming in Python Engineering Graphics and Computer Aided Design	2	0	2	3	2	4				
6	ES		Engineering Practices Lab Fab Lab	0	0	4	2	2	4				
7	HS		Outreach (NCC, NSS, Y's Men, Rotaract) – Level II	0	0	2	1	4	2				
8	HS		Regional Language OR Foreign Language Universal Human Values	2	0	0	2	2	2				
9	MC		Mandatory Course #1 Mandatory Course I is a Non-credit course (Student shall select one course from the list given under Mandatory Course I)	3	0	0	0	2	3				
			Total	18	0	15	22	19	33				

	FRAMEWORK OF CURRICULUM 2022 A (in line with NEP 2020)													
			SEMESTER – III											
SL.	COURSE	COURSE	NAME OF THE COURSE		т	Р	C	s	тсн					
NO	CATEGORY	CODE		-	•	•	Ŭ	U	1011					
1	BS	EMA51005	Discrete Mathematics	3	1	0	4	2	4					
2	HS		Advanced Academic Writing	1	0	1	1	1	2					
3	PC	ECS51004	Data Structures	3	0	2	4	2	5					
4	PC	EAL51002	R Programming	2	0	2	3	2	4					
5	PC	ECS51006	Database Management Systems	2	0	2	3	2	4					
6	PC(ICC)	EAL51003	Artificial Intelligence	3	0	0	3	2	3					
7	ES		Environmental Science and Sustainable Development	2	0	0	2	2	2					
8	EEC	ECS51800	Design Project – 1	0	0	2	1	6	2					
0	550	ECS51801	Internship -1 (To be carried out in summer	0	0		4	2						
9	EEC		semester)	0	0	0	I	2	0					
			Mandatory Course #2											
10	MC		Mandatory Course I is a Non-credit course	3	0	0	0	2	З					
	NIC .		5	0		0	2	5						
			list given under Mandatory Course I)											
			Total	19	1	9	22	23	29					
			SEMESTER – IV		-	-	-							
SL.	COURSE	COURSE	NAME OF THE COURSE	L	т	Р	с	s	тсн					
NO	CATEGORY	CODE												
1	BS	EAL51004	Applied statistics	3	0	2	4	2	5					
2	HS		Professional Editing and Project Writing	1	0	1	1	1	2					
3	PC	ECS51008	Operating Systems	3	0	2	4	2	5					
4	PC	ECS51009	Design and Analysis of Algorithms	2	0	2	3	2	4					
5	PC	ECS51010	Computer Networks	2	0	2	3	2	4					
6	PC(ICC)	EAL51005	Predictive Analytics	2	0	2	3	2	4					
7	NE	E**51***	NE 1 (May be lab integrated)	2	0	2	3	2	4					
8	EEC	ECS51802	Design Project – 2	0	0	2	1	6	2					
9	MC		Mandatory Course #3	3	0	0	0	2	3					

		Ν	Mandatory Course I is a Non-credit course	e]
		(Student shall select one course from the							
		li	ist given under Mandatory Course I)							
-			Total	18	0	15	22	21	33	
	FI	RAMEWOR	K OF CURRICULUM 2022 A (in line with	n NEF	° 202	20)				
			SEMESTER – V							
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тс	СН
1	HS		Public Speaking	1	0	1	1	1	2	2
2	PC	ECS51011	Theory of Computation	3	0	2	4	2	Ę	5
3	PC	ECS51012	Computer Architecture	2	0	2	3	2	4	4
4	PC	ECS51013	Java Programming	2	0	2	3	2	4	4
5	PC(ICC)	EAL51006	Machine Learning	2	0	2	3	2	4	4
6	NE	E**51***	NE 2 (May be lab integrated)	2	0	2	3	2	4	4
7	EEC	ECS51803	Design Project – 3	0	0	2	1	6	2	2
8	ES	EGE51002	Entrepreneurship	2	0	0	2	6	2	2
9	EEC	ECS51801	Internship -2 (to be evaluated in 5 th semester. To be carried out in summer after 4 th semester))	0	0	0	1	0	(С
10	PC	EAL51007	Computer Vision	2	0	2	3	2	4	4
			Total	16	0	15	24	25	3	51
						1				
			SEMESTER – VI		-					
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Р	с	S	т	сн
1	HS		English for Competitive Examinations	1	0	1	1	1	2	2
2	PC	ECS51014	Principles of Compiler Design	3	0	2	4	2	Ę	5
3	PC	ECS51016	Web Programming	2	0	2	3	2	4	4
4	PC(ICC)	EAL51008	Application of Machine Learning in Industries	2	0	2	3	2	2	4
5	PC(ICC)	EAL51009	Deep Learning	2	0	2	3	2	4	4
6	NE		NE 3 (May be lab integrated)	2	0	2	3	2	2	4
7	PC	ECS51017	Virtualization and Cloud Computing	2	0	2	3	2	2	4
8	EEC	ECS51805	Design Project – 4	0	0	2	1	6	2	2
			Total	14	0	15	21	19	2	29

	FRAMEWORK OF CURRICULUM 2022 A (in line with NEP 2020)												
			SEMESTER – VII										
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн				
1	HS		Verbal Reasoning and Interview Skills	1	0	1	1	1	2				
2	PC(ICC)	EAL51511	Computational Linguistics and Natural Language Processing	3	0	2	4	2	5				
3	PC	ECS51019	Applied Cryptography and Network Security	2	1	0	3	2	3				
4	PC	ECS51020	Modern Software Engineering	2	0	2	3	2	4				
5	PC(ICC)	EAL51512	Pattern Recognition and Anomaly Detection	2	0	2	3	2	4				
6	NE	E**51***	NE 4 (May be lab integrated)	2	0	2	3	2	4				
7	ES	EGE51003	Research Methodology & IPR	2	0	0	2	2	2				
8	EEC	ECS51806	Project Phase 1	0	0	6	3	6	6				
		То	tal	14	0	17	22	19	31				
			SEMESTER – VIII	1	1	-							
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн				
1	EEC	ECS51807	Project Phase 2	0	0	26	13	10	24				
Total 0 0 26 13 10 24													
		Total C	redits for the Program				172						

CREDIT COUNT

Semester	Credit Count
1	26
2	22
3	22
4	22
5	24
6	21
7	22
8	13
	172

SEMESTER-III

COURSE TITLE			DISC	CRETE I	MATHEI	CREDIT	S	4								
COURSE CODE		EMA5	1005	CC C/	OURSE ATEGOR	Y	BS			L-T-I	P-S		3-1-0-	-2		
Version		1.0		Ap De	proval etails					LEARN LEV	ING EL		BTL-3			
ASSESSME	NT SCI	IEME														
CIA										ESE						
First Periodical Assessment	First Second Periodical Periodical ssessment Assessment				minar/ ments roject	s/	Su / C ap the Exa Co "D	rprise Quiz etc provec a partm aminat mmittc EC"	Test c., as d by ent tion ee	Attend	ance*	End S Exar	er on			
15%		15%		10)%		5%			5%		50	1%			
Course Descriptior	Course To make the student understand the basic analytical mathematical skills that is Description imperative for effective understanding of engineering subjects using MATLAB. 1. To learn the concept of logics and proofs															
Course Objective		2. Toaț 3. Tokr 4. Top 5. Tom	oply the now ab erform odel th	e conce out the coding le grap	ept of Co concep using tl h and cl	ombina ots of so he cono lassify t	torics ets and cept of the nat	d funct f algeb cure of	ions. raic syst graphs.	ems.						
Course Outcome		Upon co 1. Form 2. Appl 3. Expla 4. Iden 5. Expla	ompleti n the tro y gener ain the tify the ain the	on of t uth tab rating f concep variou basic te	his cour le and v unction ots of se s types erminol	rse, the validate s to sol ts and of grou ogy of a	stude e the a ve a va functio ips and a grap	nts wil rgume ariety o ons and d apply h and o	II be able nt. of comb d prove the gro classify t	e to inatorial p some theo up coding he differe	problems prems. g concept ent types	t. of grap	ohs.			
Prerequisit	es: Bas	ics in Alք	gebra													
CO, PO, PS		PPING	T	I	,		1		I				T			
CO	0 P 0 0 1 -2	PO- 3	РО- 4	РО- 5	РО- 6	РО- 7	PO -8	PO -9	PO -10	PO- 11	PO- 12	PS 0- 1	PS O- 2	PSO -3		
CO-1 3	3	3	1	-	-	-	-		1	-	2	-	-	3		
CO-2 3	3 3 1 1 - 2									3						

CO-3	3	3	3	1	-	-	-	-	-	1	-	2	-	-	3	
CO-4	3	3	3	1	-	-	-	-	-	1	-	2	-	-	3	
CO-5	3	3	3	1	-	-	-	-	-	1	-	2	-	-	3	
			1: We	eakly re	elated,	2: Mo	deratel	y relat	ed and	3: Stro	ngly relat	ed	1		L	
MODUL	E 1: LC	DGICS	AND F	PROOFS	5							(9L+3T=	=12)			
Proposit	tions -	– Log	gical co	onnecti	ves –	Comp	ound p	ropos	itions	– Cond	itional ar	nd bi-				
conditional propositions – Truth tables – Tautologies and contradictions – Contra positive – Logic equivalences and implications. Predicates – Statement function – Variables – Free													CO-1			
 Logic equivalences and implications. Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and 												- Free	BTI	3		
implications for quantified statements.												s and				
Suggested Reading: Basics of logical operators																
MODULE2: COMBINATORICS (9L+3T=12)																
Mathematical Induction-Strong induction and well ordering – the basics of counting – The																
pigeonh	ole pr	incipl and a	e – Pei poplicat	rmutati tions	ions an	id com	binatio	ns – R	ecurrei	nce relat	tions – in	clusion	со	-2		
Suggest	ed Rea	ading	: Basics	s of pro	babilit	y							BT	-3		
MODUL	E 3: SE	TS A	ND FUI	NCTION	IS							(9L+3T	=12)			
Sets: Rel	ations	on s	ets – Ty	ypes of	relatic	ons and	d their p	roper	ties – P	artition	s – Equiva	lence				
relations	s – Par	tial oi	rdering	– Pose	t – Has	se dia	gram. Fi	unctio	ns: Cha	racterist	tic functio	n of a	CO	-3		
set – Has	shing f od Por	uncti ading	ons – F	Recursiv	e func	tions –	- Permu I Eunctiv	tation	functio	ons.			BT	3		
Juggesi	eu nea	aung	. Dasic	Suggested Reading: Basic concepts of sets and Functions												
MODULE 4: ALGEBRAIC SYSTEMS (9L+3T=12)																
MODUL	E 4: Al	LGEBI	RAIC S	(STEMS	5							(9L+	3T=12)			
MODUL Groups,	E 4: Al	L GEB I Grou	RAIC S ps, Sub	(STEMS groups	5 , Coset	s, Lagr	ange's t	heore	m, Nor	mal sub	groups – ((9L+ Codes	3T=12)			
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MOOC	
1.	http://nptel.ac.in/courses/106106094/

CO	URSE TIT	TLE ADVANCED ACADEMIC WRITING CREDITS 1						1									
со	OURSE CO	DE			СО	URSE	CATEG	ORY	H	S	L	- T -	– P – S	5		1 - 0 - 0 - 1	
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	15 %		15%	6		10 %			5 %			5 %			50%		
De	Course escription	/ s t i	Advanced Academic Writing is a course that focuses on developing writing skills for a setting. Students will write essays, research papers and take part in discussions topics. The course aims to help students understand the writing process, communideas more effectively and become more proficient in writing for academic purpose.								kills for an academic cussions on course communicate their purposes.						
By the end of this course, students will be able1. Gain a comprehensive grasp of the foundat the purpose, structure, and conventions specifi2. Develop the ability to construct sentences coherent. Students will demonstrate master thereby improving readability and comprehens3. Apply effective techniques for editing and re the capacity to critically evaluate and enhance t inconsistencies, and areas in need of improvem 4.Produce precise, well-structured document standards. This includes employing proper for							e to: ationa fic to es and ry in sion f revision their ment. ents rmat	al prin differ d par n org for th ng the writi that that ting, y con	ncipl rent ragra ganizi neir i neir i neir v ing b cor citat	les of genre aphs t ing a ntend vritten y ider nform tion, a utions	acade es thro that a nd pr led rea n work n to to and rea	emi oug re ade k. S g a est efer	ic writing, including th vocabulary skills. clear, concise, and enting information, ership. tudents will display nd rectifying errors, ablished academic rencing practices to				
			5. Emp transiti enhanc n more	loy a d on wo e clarit e impac	iverse ords, a cy, coho ctful ar	array c nd eff erence nd enga	of writi ective , and c aging s	ng tec ly inco overall scholar	hniques prporat persua ly disco	s, suc ing e isiver ourse	ch as e evide ness ir e.	empl nce n stu	loying and idents	logica exam s' acac	al p ple lem	orogression, utilizing s. These skills will nic writing, resulting	
Cours	se Outcor		 Upon completion of this course, the students will be able to 1.Understand the fundamentals of academic writing, including the purpose, structure, and conventions of different genres through vocabulary enhancement. 2. Construct clear, concise, and cohesive sentences and paragraphs. 3. Demonstrate the ability to edit and revise written work. 4. Produce accurate and well-structured documents. 5. Utilize a range of writing techniques to enhance clarity and coherence. 									ose, structure, and					
CO. PO	AND PSC) MAP	PING	, in the	meuic												
со	PO PO2	РОЗ	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO:	012	PSO1	PSO2		PSO3	

CO1 CO2 CO3 CO4	-	- - - 2	2 - 2 2	2 3 3 -	- - 2 -	- - - -	- - - 2	3 3 3 3	2 3 2 -	3 3 3 3	- 2 3 2	3 3 3 3	To be	marked by respective department
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MOI	DULI	E 3: V	Vritin	g Tec	hniqu	es		<u>.</u>				<u>,</u>		(3L + 6P
= 9)														
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MOD 9)	OULE	4:	Accui	acy ii	n Writ	ing SI	cill							(3L + 6P =
Intro Docu Trans Pract	ductio ment sition icum	on to a Struct al Wor Voca	iccurac ture- R ds. bulary	cy in wi Researd enhan	riting- ch Tech	Abbrev nnique: nt by le	viation s- Argu arning	s – Aca umenta ; new t	ademic ation a erms (Vocat Ind Cri Alphal	oulary - tical Th pets fro	Under iinking om P-T	rstanding – Use of)	CO-4 BTL-3
MOD 9)	OULE	5: Eo	diting	& Rev	vising	Writt	en W	ork						(3L + 6P =
Editir Clarit Word symb Pract	ng an ay and l Cho ols- (icum	d Pro Cohe ice-Ed Checkin	ofread rence- iting G ng for I bulary	ing-Im Enhar iramm Format enhan	portar ncing A ar and tting a cemer	nce of .cadem Syntax nd Cita nt by le	Editin ic Styl -Iden tion A arning	g- Self e and ⁻ tifying ccurac ; new t	f-Editir Tone- the co y (MLA erms (ng Tec Revisir mmon A/APA) Alphal	hnique ng for C errors pets fro	s- Rev oncise - Proof om K-O	vising for ness and Reading	CO-3 BTL-3
		000		<u> </u>	(2222									
	She	rine, A	ккага	& et al	. (2023	s). Adva	anced	Acade	mic wi	iting:	leverf	ox Pub	hisning, Ch	ennal.
1	Gilt		anet e	t al (20	17) ^	cadem	ic Writ	ting · A	n Intro	ductio	n 3rd	ad Bri	nadview P	
		. U vv, JC	, C	ι ur (20	, ₋ , _j . A	cuuciii				auctio		-u., Dr		
2.	VN	arayar	aswar	ni (201	.7). Str	engthe	n Youi	r Writii	ng. Ori	ent Bla	ackswa	n Pres	s, UK	
3.	Aud	lio Lea	rn (202	15). Th	e 1000	Most	Comm	ion SA ⁻	T Word	ds, Auc	lio Leai	n Publ	ishers, UK	
4.	GR	Pillai, ŀ	< Rajee	evan &	PB Na	ir (201	5). Wr	itten E	nglish	for You	u. Emei	ald Pu	blishers, lı	ndia
E Bo	oks													

1.	https://edisciplinas.usp.br/pluginfile.php/3928474/mod_resource/content/1/Introduction%20to%20Academ ic%20Writing.pdf
2.	https://www.routledge.com/rsc/downloads/A_Practical_Guide_to_Academic_Writing_for_International_Stu dents-A_Routledge_FreeBookFINAL_VERSIONpdf
3.	https://joepucc.io/static_assets/projects/SAT-vocab.pdf
MOO	OC Courses
1	https://www.coursera.org/specializations/academic-english
2	https://www.coursera.org/learn/introduction-to-academic-writing

COURSE TITLE		DATA STRUCTURES		CREDITS	4
COURSE CODE	ECS51004	COURSE CATEGORY	РС	L-T-P-S	3- 0- 2- 2
VERSION	1.0	APPROVAL DETAILS		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

		CIA			ESE	
First Periodical Assessment (Theory)	Second Periodical Assessment (Theory)	Practical Assessments	Observation / lab records as approved by the Department Examination Committee "DEC"	Attendance*	Theory	Practical
15%	15%	10%	5%	5%	25%	25%
Course Description	This is a course su course develops t idea about develo	itable for B. Tech s he knowledge in th ping the projects ir	tudents. It deals wi e graphs, algorithr n the data structure	ith basic data structun, creation, deletion es.	ires, arrays, heaps , insertion. Also gi	etc. This ves an
Course Objective	 To develop the centre of the ce	e knowledge in the concept of algorith ucture. concept of Sort, arr idea of graphs and e implementation	e basic designing of ms for the creation ays, linked lists etc lits traversal. knowledge in the p	f algorithms a, insertion, deletion, projects.	, searching, and so	orting of

	Upon completion of this course, the students will be able to
Course Outcome	 Compute and analyse the algorithms for efficiency using Asymptotic Notations. Develop knowledge of basic data structures such as arrays, linked lists, binary trees, heaps, and hash tables for storage and retrieval of ordered or unordered data. Solve problems by applying suitable data structures with the algorithms for the creation, insertion, deletion, searching, and sorting of each data structure. Define graphs and illustrate graph traversals. Design and develop projects requiring the implementation of the data structures.

Prerequisites: C Programming Language

CO, PO AND PSO MAPPING

со	PO - 1	Р О- 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	3	3	1	-	2	-	-	-	3	2	-	2	1	1	1
CO-2	3	3	1	-	2	-	-	-	3	2	-	2	1	1	1
CO-3	3	3	1	-	2	-	-	-	3	2	-	2	1	1	1
CO-4	3	3	1	-	2	-	-	-	3	2	-	2	1	1	1
CO-5	3	3	1	-	2	-	-	-	3	2	-	2	1	1	1

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

MODULE 1: LINEAR DATA STRUCTURES (9L+3P=12) Introduction to Data Structures - Fundamental Elements - Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an example -Arrays and its representations – Stacks and Queues – Linked lists - Singly Linked List -Doubly linked list - Linked list-based implementation of Stacks and Queues - Evaluation of Expressions. CO-1 **Practical Component** BTL-2 1. Write a c program to implement the various operations of stack using Pointer/Array 2. Implement the functions of Queue 3. Develop the source code to implement the linked list operations 4. Write a c program to convert the infix expression to postfix expression **MODULE 2: NON-LINEAR DATA STRUCTURES** (9L+3P=12) **Trees:** Introduction to Trees – Basic concepts - Binary Trees – Binary tree representations (Array and list) and Traversals Techniques (Preorder, Inorder, Postorder) – Binary Search Trees – AVL Trees – Splay Trees-Priority Queues – Heaps implementations – Binary Heap. CO-2 **Practical Component** BTL-2 1. Write a program to traverse the tree in inorder, preorder and post order. 2. Implement the Binary Search Tree to perform the various operations. 3. Write a Program to simulate the functions of Min heap/Max heap

MODULE	3: GRAPHS	(9L+3P=12)					
Graphs: D Elementar Search-To Componer	Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search-Topological sort – Shortest path problems-Spanning Tree, Connected Components.						
Practical C	Component:	BTL-3					
1. Im 2. W 3. De	pplement the BFS Traversing rite a program to implement the DFS Traversing evelop the source code to find the shortest path in the given Graph						
MODULE	4: SORTING AND SEARCHING	(9L+3P=12)					
Sorting Al Sort – She	gorithms: Basic concepts - Bubble Sort - Insertion Sort - Selection Sort - Quick Il sort - Heap Sort - Merge Sort - External Sorting.						
Searching	: Linear Search, Binary Search.	CO-4					
Practical C	Component:	BTL-3					
1. W 2. Im	rite a program to implement the Bubble sort and Quick Sort aplement Linear Search and Binary Search algorithms						
MODULE	5: INDEXING AND DISJOINT SETS	(9L+3P=12)					
Indexing: I Quadratic	Hashing - Hash Functions – Separate Chaining – Open Addressing: Linear Probing- Probing- Double Hashing- Rehashing – Extendible Hashing.						
Disjoint Se	ets: Basic data structure - Smart Union Algorithms - Path Compression.	CO-5					
Practical C	Component:	BTL-3					
1.Hash tak 2.Impleme	ole implementation in c using arrays ent the various operations of Set						
TEXT BOO	DKS						
1.	Ellis Horowitz, S. Sahni, Freed. (2015). Fundamentals of Data Structures in C, 2nd	dedition.					
2.	D.S.Kushwaha and A.K.Misra(2022),"Data structures A Programming Approach v	with C", PHI.					
3.	Puntambekar, A. A., and Dr. M. Sambath. Data Structures. First Edition: May 202	23, Technical Publications.					
REFEREN	CE BOOKS						
1.	Langsam, Y., Augenstein, M. J. And Tanenbaum A. M. (2004). Data Structures us Asia.	ing C, Pearson Education					
2	R.F.GilbergAndB.A.Forouzan (2022),"Data structures: A Pseudo code Approach v Cengage Learning.	vith C", 2nd edition,,					
3	M.A.Weiss(2022),"Data structures and Algorithm Analysis in C", 2nd edition,, Pe	arson.					
E BOOKS							
1.	https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf						
2.	https://courses.csail.mit.edu/6.851/spring12/scribe/lec12.pdf						
3.	http://lib.mdp.ac.id/ebook/Karya%20Umum/Dsa.pdf						

моос	
1.	https://www.mooc-list.com/tags/data-structures
2.	https://nptel.ac.in/courses/106102064/
3.	https://www.udemy.com/algorithm/

COURSE	TITLE	R PROGRAMMING CREDITS 3									3					
COURSE	CODE	E	CS510	02		COUF CATEG	RSE ORY		PC		Ŀ	T-P-S		2- 0- 2- 2		
VERSIO	ON		1.0			APPRO DETA)VAL ILS				LEA	RNING EVEL	BTL-3			
ASSESSMI	ASSESSMENT SCHEME															
	CIA ESE												SE			
First Perio Assessm	odical nent	Second Periodical A Assessment					ar/ ents/ ect	Su	rprise ⁻ Quiz	Гest /	Atte	endance	The	ory	Practical	
15%	•		15%			10%	6		5%			5%	2!	5%	25%	
Course Descriptio	Course R offers a wide variety of statistics-related libraries and provides a favourable environment for statistical computing and design. In addition, the R programming language can also be used by students as a programming tool since it's useful for data importing and cleaning.									onment for be used by						
Course Objective		1. T 2. T 3. T 4. T 5. T	¯o dev ¯o app ¯o kno ¯o defi ¯o dev	elop th ly the c w the i ine and elop ap	e knov concep dea of proce pplicat	wledge ot of pr mathe ss data ions by	in the actical ematics a using conne	basic F R for tl of R to list and cting d	a progr ne basi o proce d frame ata so	amming c mathe ess array es. urces an	g. ematica ys and r nd to ge	l computat natrices. nerate gra	ions. phical	repres	entations.	
Course Outcome		 Upon completion of this course, the students will be able to Identify and learn basics concepts in R. Understand and work with R studio Analyse the Matrix operations using R built in functions Create the list and data frames Design graphs using ggplot2& R statistics 														
Prerequisi	ites: C P	Program	nming	g Langu	age											
CO, PO AN	ND PSO	MAPP	ING						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	PS O	PSO -2	PSO -3	

													-1		
CO-1	2	1	3	1	-	-	-	1	-	1	2	-	-	1	2
CO-2	1	1	3	1	-	-	1	-	3	3	3	3	-	2	2
CO-3	1	2	2	2	2	-	2	1	1	1	1	1	2	2	2
CO-4	1	3	3	2	2	-	-	-	2	2	2	2	2	2	2
CO-5	2	3	2	3	2	2	1	1	3	3	3	3	3	2	3
	L		1:	Weakl	y relat	ed, 2:	Modera	ately re	lated	and 3: St	rongly	related			
MODULE 1: BASICS												(6L+3P)			
 R Overview – Datatypes – Variables – Operators – Decision Making – Loops – R Functions – String Handling – Introduction to R Data Structures -Vectors – Lists – Matrices – Arrays – Ordered and Unordered factors. Preview to Functions-variable scope- Default Parameters. Running R Interactive Mode and Batch Mode- Introduction to R studio. Installation of R- Console and Editor Panes- Comments- Installing and Loading R Packages- Help Files and Function Documentation- Saving Work and Exiting R. Practical Component Basic programs using Decision Making Basic Programs using Looping Statements Fundamental Program to understand the R data Structure 										nctions – Arrays – rameters. ion of R- Files and		CO BTI	-1 2		
MODULE	2: VECT	rors a	& MA	TRIX									(6L+3P)		
 Vectors- Creating a Vector- Sequences, Repetition, Sorting, and Lengths- Subsetting and Element Extraction- Vector-Oriented Behavior.Defining a Matrix- Row and Column Bindings-Matrix Dimensions- Row, Column, and Diagonal Extractions- Omitting and Overwriting- Matrix Operations - Matrix Transpose- Identity Matrix- Matrix Addition and Subtraction- Matrix Multiplication- Matrix Inversion-Multidimensional Arrays- Subsets, Extractions, and Replacements Practical Component: Develop R program for Basic Mathematical computation Create and manipulate data stored in Vectors and Matrices. 										tting and Bindings- ng- Matrix n- Matrix ons, and		CO BTI	-2 -2		
MODULE	3: LIST	& DA1	ΓA FR	AMES										(6L+	3P)
Lists- Crea of a List. A Using the	ating Lis Accessin Iapply()	ts-Ope g List (and sa	eration Compo apply(ns-Inde onents () Funct	xing -A and Va ions. R	Adding alues. / Recursi	and De Applyin ve Lists	eleting g Funct	List Ele ions to	ements - 9 Lists.	Gettin	g the Size			
Data Fram Data Colu Infinity-Na Coercion I	nes: Ma umns au aN-NA-f Functiou	aking d nd Cor NULL-A ns- Dat	ata fr mbini Attribu ca Res	ames a ng Dat ıtes-Ob haping	ttach (a Frar ject-Cl) and (nes-Lo ass-Is-	detach (gical R DotObj	() –Woi ecord 3 ect-Che	rking v Subset ecking	vith data s-Some F	frame Specia unctio	s- Adding Il Values- ns-As-Dot		CO BTI	-3 3
Practical	Practical Component:														

1. To c Software Re	reate and process data using lists and data frames. equired						
MODULE 4: E	BASIC PLOTTING & DATA VISUALISTION	(6L+3P)					
Creating Grap Labels-Color- an Existing P Geoms.	Creating Graph-Using plot (), abline().Automatic Plot Types - Bar-Scatter-Box Plot -Title and Axis abels-Color-Line -Point Appearances-Plotting Region Limits-Adding Points, Lines, and Text to In Existing Plot- ggplot2 Package-Quick Plot with qplot-Setting Appearance Constants with Geoms.						
READING AN Files-Reading Machines via	READING AND WRITING FILES- Using the scan (), read line () Function -Reading and WritingFiles-Reading a Data Frame or Matrix from a File -Reading Text Files-Accessing Files on RemoteCO-4Machines via URLs- Writing to a File -Getting File and Directory Information. Exception HandlingBTL-3						
Practical Co 1. Gene 2. To re Software Re R-4.3.1and R	mponent: erate different types of graphical representations (Bar Plot/Scatterplot) ad and write data in files equired E Packages (ggplot/Matplot), R Studio						
MODULE 5: F	R DATA INTERFACES & R STATISTICS	(6L+3P)					
R Data Interfa Statistics-Me Analysis of Co Practical Co 1. To cr 2. Apple Software Re R-4.3.1and R	R Data Interfaces -CSV Files- Excel Files-XML Files- JSON Files- Web Data- Database Statistics-Mean, Median & Mode, Linear Regression, Logistic Regression, Normal Distribution, Analysis of Covariance, Time Series Analysis, Decision Tree, R - Chi Square Tests Practical Component: 1. To create simple applications by connecting to data sources. 2. Applying Logistic Regression Models/Linear Models to a data set Software Required P. 4.3 Land P. Daskages (ggnlot/Matplet), P. Studie (lumiter NeteBack						
TEXT BOOKS							
1.	Tilman M.Davies, "THE BOOK OF R - A FIRST PROGRAMMING AND STATISTICS" Lib Cataloging-in-Publication Data, 2016.	rary of Congress					
REFERENCE E	BOOKS						
1.	Langsam, Y., Augenstein, M. J. And Tanenbaum A. M. (2004). <i>Data Structures usir</i> Asia.	ng C, Pearson Education					
2.	Roger D. Peng,"R Programming for Data Science"Lean Publishing, 2016.						
3.	Hadley Wickham, Garrett Grolemund," R for Data Science", OREILLY Publication, 20)17					
4.	Steven Keller, "R Programming for Beginners", CreateSpace Independent Publishi	ng Platform 2016.					
E BOOKS							
1.	https://web.itu.edu.tr/~tokerem/The_Book_of_R.pdf						
2.	2. <u>https://www.tutorialspoint.com/r/r_tutorial.pdf</u>						
MOOC							
1.	https://online-learning.harvard.edu/subject/r						
2.	https://www.udemy.com/course/r-basics/						

COURSETITLE	ARTIFICIAL INTELLIGENCE CREDITS 3							
COURSECODE	CSD4391	COURSECATEGORY	NE	L-T-P-S	3-0-0-2			
Version	1.0	Approval Details		LEARNING LEVEL	BTL-3			
ASSESSMENT SC	CHEME							
First Periodical Assessment	Second Periodical Assessment	Second PeriodicalSeminar/Surprise Test /AssessmentAssignments/ ProjectQuiz						
15%	15%	15% 10% 5% 5% 50%						
Course Description	This course introduc different type of learn	ces the different search ing techniques and vario	strategies, type ous expert systems	s of knowledge s.	representation,			
Course Objective	 To have knowledge To Compare variou Al. To Comprehend ar To identify the nee To enhance the knowledge 	e on logical approach to A is Probabilistic approaches id analyze the different ty d of Neural Networks and owledge on learning Dete	, Knowledge repres to AI and the evo pes of learning. NLP. rministic models.	sentation and exp lutionary intelliger	ert systems. nce concepts of			
Course Outcome	 Upon completion of Recall logical appro Compare various P algorithms. Comprehend and a Elaborate and appl Use the Determinity 	of this course, the student baches to AI, its knowledg robabilistic approaches of analyze the different types y Neural Networks and NI stic models for impleme	s will be able to e representation, e AI and gain knowl of learning. P. ntation of classific	expert systems and edge on the evolu cation and regress	l solving logics. tionary sion.			
MODULE 1: INT SYSTEM	RODUCTION TO ARTIFIC	IAL INTELLIGENCE & LOO	GICAL APPROACH	TO AL AND KNO	WLEDGE-BASED 9L			
History of artifici between strong , of AI, Characteris process of Cogn science, Introdu Propositional log Tautologies and I algorithm, Know systems, Semant	History of artificial intelligence, Todays' AI, Historical milestones in the development of AI, Differences between strong AI and weak AI, Technological advances, Machine Learning, Deep Learning, Functions of AI, Characteristics of artificial intelligence, Applications of AI, Cognitive science and AI, Cognition and process of Cognition, Linguistics, Artificial intelligence as Cognitive science, Methods in Cognitive science, Introduction to knowledge representation systems, Knowledge representation using logic, Propositional logic, Semantics of propositional logic, Properties of propositional logic statements, Tautologies and logical implication, Resolution, Conjunctive normal form, Resolution is valid, Resolution algorithm, Knowledgebase systems, Structure of a knowledge based system, Components of expert systems, Semantic networks.							
MODULE 2: PRO	BABILISTIC APPROACH TO	DAL & EVOLUTIONARY IN	ITELLIGENCE		9L			
Probability, Basi relations, Condit Examples. Rando Function, Proba Variables, The va	Probability, Basic concepts, Probability of an event, Example on Sample Space, counting rules, Event relations, Conditional Probabilities, Defining Independence, The Law of Total Probability, Bayes' Rule, Examples. Random Variables, Discrete Random Variable, Probability Distributions, Probability Mass Function, Probability Density Function, Expectations of Random Variables, Medians of Random Variables, The variance of a Random Variable, Chebyshev's Inequality, Quantiles of Random Variables,CO-2							

Covariance, Bayesian Networks, Merits of Bayesian Networks, Construction of a Bayesian Network, Representation in Bayesian Networks, Benefits of Bayesian Networks, Why learn Bayesian networks? Constructing Bayesian networks, Example from medical diagnostics, Software for Bayesian networks, Gaussian Bayesian Networks, Linear Gaussian BN to joint Gaussian, Theorem: From Gaussian to Bayesian networks, Noisy OR-Gate model, Promedas: A clinical diagnostic decision support system, Organization of PROMEDAS development. Biological background - The cell, Chromosome, genes and genomes, Reproduction, Natural selection, Inspiration - Evolution, Classes of search techniques, Introduction - Genetic algorithm, Vocabulary, Pseudo code - Genetic Algorithm, Roulette Wheel's Selection Pseudo Code, Population/Representation, Representation, cross over and mutation, TSP Example - 30 cities, Ant colony and artificial ants for TSP, Pheromone trails, Ant colony optimization algorithms, Particle swarm optimization – Introduction, Kennedy and Eberhart's (1995) refined algorithm, A (partial) example in two dimensions, Algorithm termination, Financial applications, An automatic stock trading system using Particle Swarm Optimization, PSO based methodology, Trading decision, Considering the GA technology, Some GA application types.

MODULE 3: INTRODUCTION TO MACHINE LEARNING

9L

CO-3

BTL-3

9L

Motivation for Machine Learning, Applications, Machine Learning, Learning associations, Classification,						
Regression, The Origin of machine learning, Uses and abuses of machine learning, Success cases, How						
do machines learn, Abstraction and knowledge representation, Generalization, Factors to be						
considered, Assessing the success of learning, Metrics for evaluation of classification method, Steps to						
apply machine learning to data, Machine learning process, Input data and ML algorithm, Classification						
of machine learning algorithms, General ML architecture, Group of algorithms, Reinforcement learning,						
Supervised learning, Unsupervised learning, Semi-Supervised learning, Algorithms, Ensemble learning,						
Matching data to an appropriate algorithm.						

MODULE 4: INTRODUCTION TO NEURAL NETWORK & NATURAL LANGUAGE UNDERSTANDING

Artificial Neural Network, Appropriate problems for neural network learning, Characteristics of the problems, Basic understanding of neural networks, A single neuron, Activation Functions, Architectures of neural networks, Feedforward neural network, Single-Layer feedforward architecture, Multiple-Layer feedforward architecture, Types of feedforward networks, multi-layer perceptron, Training MLP: The back-propagation algorithm, Step 1: Forward propagation, Step 2: Back propagation and weight updation, Process of learning in neural network, Recurrent or feedback architecture, Mesh Architectures, GRADIENT-DESCENT (training examples, η), Stochastic GRADIENTDESCENT (training examples, η), Multilayer networks and Backpropagation algorithm, The Backpropagation algorithm, Natural language processing, Classical NLP, Feed-forward networks, Recurrent neural networks and recursive networks, Features for NLP problems, Framenet Vs. Wordnet, Features for text, Features for word relations, NGRAM features, Some terminologies.

MODULE 5: LEARNING DETERMINISTIC MODELS

9L

CO-4

BTL-2

<u>TEXT BOOK</u>

<u>1. Introduction to Artificial Intelligence and Machine Learning (IBM ICE Publications).</u>

COURSE TITLE	DATABASE	MANAGEMENT SYST	EMS	CREDITS		3	
COURSE CODE	ECS51006	COURSE CATEGORY	PC	L-T-P-S	2-0-2-2		
VERSION	1.0	APPROVAL DETAILS		LEARNING LEVEL	В	ГL-3	
ASSESSMENT SCI	HEME						
		CIA			E	SE	
First Periodical Assessment (Theory)	Second Periodical Assessment Practical Practical Assessments (Theory) (Theory) Department (Theory) Committee (Theory) Committee (Theory) Committee					Theory Practical	
15%	15%	10%	5%	5%	25%	25%	
Course Description	Focuses on concepts a system. Various mode An SQL database syste	nd structures necessa n data models, data s m is designed and im	ry to design and security and inte plemented as a g	implement a da grity, and concu group project.	tabase mai rrency are o	nagement discussed.	
Course Objective	 To learn the basic To know about SQ To Apply the concequeries. To be able to dem To be aware about databases. 	concepts of DB syster L Queries. ept of relational DB th onstrate the Transact t Object Oriented DB,	ns. neory and to wri ion Processing a Distributed DB,	te relational alge nd Concurrency Data Warehousi	bra expres Control. ng and Mo	sions for bile	

Course Outcome	 Upon completion of this concepts of Recall the basic concepts of Identify the SQL Queries for Illustrate relational databas queries. Demonstrate transaction production of the second second	ourse, the students will be able to f database systems. or a given scenario. se theory, and be able to write relational algebra expressions for rocessing and concurrency control. , Distributed dB, Data Warehousing and Mobile databases.
Course Outcome	 Identify the SQL Queries for Illustrate relational databas queries. Demonstrate transaction pr Explain Object oriented dB, 	r a given scenario. se theory, and be able to write relational algebra expressions for rocessing and concurrency control. , Distributed dB, Data Warehousing and Mobile databases.

Prerequisites: Nil

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

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

MODULE 1: CONCEPTUAL MODELING AND SQL	(6L+3P)
Introduction to File and Database Systems- Database system structure - Data Mode	ls –
Introduction to Network and Hierarchical Models – ER model – Relational Model – Relationa	onal
Algebra and Calculus- SQL – Data definition- Queries in SQL	
	CO-1
Suggested reading: http://nptel.ac.in/courses/106106093/1	BTL-2
Practical Component:	
1. To study and execute Basic SQL commands (create table, use, drop, insert).	
MODULE 2: RELATIONAL MODEL	(6L+3P)
SQL Updates- Views - Compound Conditions-Aggregate Functions-Grouping-Integrity a	and
Security – Relational Database design – Functional dependencies and Normalization	for
Relational Databases (up to BCNF)	
Suggested reading: http://nptel.ac.in/courses/106106093/4	
Practical Component:	CO-2
1. To execute the viewing commands (select, update)	BTL-3
2. To execute the commands to modify the structure of table (alter, delete) and to execute	ute
3. To execute the commands that involve compound conditions (and, or, in, not in, betwee	een,
not between, like, not like)	
4. To execute the aggregate functions (sum, count, max, min, average)	
5. To execute the grouping commands (group by, order by)	
MODULE 3: DATA STORAGE AND QUERY PROCESSING	(6L+3P)

Record storage Heap File- Sort Indexes- B-Tree	Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.									
Suggested read Practical Compo 1. To execute	ing: <u>http://nptel.ac.in/courses/106106093/11</u> onent: the commands involving data constraints.	CO-3								
 To execute To execute To execute To execute reverse, up To study an 	DIL-3									
MODULE 4: TRA	ANSACTION MANAGEMENT	(6L+3P)								
Transaction Pro Transaction- Sch – Types of Locks Suggested read Practical Compo	cessing – Introduction- Need for Concurrency control- Desirable properties of nedule and Recoverability- Serializability and Schedules – Concurrency Control s- Two Phases locking- Deadlock- Recovery Techniques. ing: http://nptel.ac.in/courses/106106093/18 onent:	CO-4 BTL-3								
 To study an To study an 	Id execute the commands involving indexes Id execute the conditional controls and case statement in PL-SQL									
MODULE5: OBJ	ECT ORIENTED DB AND WAREHOUSING	(6L+3P)								
Object Oriented Enterprise ware OLAP-OLTP- Dis	d Databases- Need for Complex Data types- OO data Model -ETL-Metadata- ehouse (EWD)-Data mart- Virtual Warehouse- Operational Data Store (ODS)- tributed databases- Distributed data Storage-Mobile Databases.									
Suggested read Practical Compo	ing: <u>http://nptel.ac.in/courses/106106093/31</u> onent:	CO-5								
 Experin Experin panel, r Load a process 	BTL-3									
TEXT BOOKS										
1.	Abraham Silberschatz, Henry F. Korth and S. Sudarshan- —Database System Co McGraw-Hill, 2011.	oncepts , Sixth Edition,								
2.	Puntambekar, A. A., and Dr. M. Muthukumaran. Database Management Syster 2023, Technical Publications.	ems. First Edition: May								
REFERENCE BO	DKS									
1.	Ramez Elmasri and Shamkant B. Navathe, —Fundamental Database System Pearson Education, 2016.	ms∥, Seventh Edition,								
2.	Raghu Ramakrishnan, — Database Management System, Tata McGraw-Hill Puk Third Edition, 2014.	blishing Company,								
3.	Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TAT, Edition.2022	A McGrawHill 3rd								

4.	Jiawei Han, Micheline Kamber, Jian Pei -Data Mining Concepts and Techniques, Morgan Kaufmann, Third Edition, 2012.
E BOOKS	
1.	https://inspirit.net.in/books/database/Database%20System%20Concepts.pdf
MOOC	
1.	https://www.udemy.com/database-management-system/
2.	https://www.edx.org/course/database-systems-concepts-design-gtx-cs6400x-1

COURSE TITLE	ENVIRONMENT	AL SCIENCE AND S	USTAINABLE	CREDITS	2							
COURSE CODE	ECT51002	COURSE CATEGORY	ES	L-T-P-S	2-0-0-2							
Version	1.0	D Approval Details		LEARNING LEVEL	BTL-3							
ASSESSMENT SO	CHEME											
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz etc., as approved by the Department Examination Committee "DEC"	Attendance	ESE							
15%	15%	10%	5%	5%	50%							
Course Description	To expose the students to the basics of environmental science and sustainable development.											
Course Objective	 To make the for preservi To provide To provide To educate To give a br 	e students aware of ng the resources. knowledge on the v basic knowledge an the students about road knowledge on	the natural resources various aspects of envir d concepts of sustaina the concepts of sustai environmental manag	and to educate them To le ronmental pollution and i bility. inable habitat. ement system.	earn the need							
Course Outcome	Upon comp 1. Recognise the life on earth 2. Apply sustant 3. Implement 4. Use appropriation transport sy 5. Manage the	letion of this course he effects of over ex n. inable solutions for the concepts of sus priate methods for ystem, industries, et e environment for su	e, the students will be xploitation of natural r environmental polluti tainability in the produ designing green hou cc. ustainable product dev	able to esources and their impact on and issues. uct development. use and maintaining sust velopment.	: on day-to-day tainable cities,							

Prerequisites: NIL																		
CO, PO A	AND PS	О МАР	PING															
со	PO -	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO-	PO -	PO-	PO-	PSO-	PSO-	PSO-3			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	100 0			
CO-1	2	2	2	-	-	1	3	-	-	-	-	2	To b r d	To be marked by respective department				
CO-2	2	2	2	-	-	1	3	-	-	-	-	2						
CO-3	2	2	2	-	-	1	3	-	-	-	-	2						
CO-4	2	2	2	-	-	1	3	-	-	-	-	2						
CO-5 2 2 2 - - 1 3 - - - 2																		
1: Weakly related, 2: Moderately related and 3: Strongly related																		
MODUL	E 1: NA	TURAL	RESOL	JRCES										(6	L)			
utilization – Mineral resources: Use and exploitation – Food resources: World food problems, effects of modern agriculture – Energy resources: conventional and nonconventional, solar energy, fuel cells, wind energy, hydro plants, bio-fuels, Energy derived from oceans, geothermal energy – Land resources: Use and over-exploitation – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study – Documentation of nearby environmental assets – river / forest / grassland / hill / mountain.										C B'	0-1 TL-3							
MODUL	E 2: EN	VIRON	MENTA	L POLL	UTION		SSUES							(61	L)			
Air polle treatme issues – and loca Field Stu	ution, e nt; Solic Resour I envirc Idy - Ob	effects d waste ce degr onment oserve a	of air e – sour radation tal issue a pond	pollut ces, im n, clima es – Ca nearby	tions; N pacts, ate cha rbon cr v and ai	Water zero wa nge, glo edits a nalyze t	pollution poste con obal wa nd cark the diff	on – s ncept, 3 arming, oon trac erent r	sources BR conc ozone ding, ca neasur	, susta cept, Gl layer d arbon fo es that	inable obal er epletic oot prii can be	waste nvironm on – Reg nt. e adopte	water iental gional ed for	C B'	0-2 TL-3			
Its conse).)			
MODUL	E 3: SUS	STAINA	BILITY											(6	oL)			
Introduc – sustair for susta develop Field Stu resource	tion, ne nable de ainable ment m ndy - As es / ene	eed of s evelopr develo nechani sessme rgy res	sustaina ment, N opment ism (CD ent of s ources	ability - lexus b t – mu DM) – E ustaina / food	– Social etweer Itilater nviron ability i supplie	l, enviro n techn al envi mental n your es/ lanc	onmen ology a ronme legislat neighb d use /	tal and ind sust ntal ag tions in ourhoc enviror	econor tainabl reemer India - od in economenta	mic sus e devel nts anc - water ducatio al prote	tainabi opmer l protc act, ai n / hou ction, e	ility con nt, chall cools – r act. using / v etc.	cepts enges clean water	C B'	0-3 TL-3			
MODUL	e 4: CO	NCEPT	S OF SI	USTAIN	IABLE I	HABITA	Т							(61	L)			
Green b increasin	ouilding ng ener alisatior	s: mat gy effi n and	erial for the formation of the formation	or sust of bui v redu	ainable Idings ction -	e desig – susta – Indu	gn, gre ainable strial p	en bui urbani	Iding of isation es: ma	certifica - susta	ation, ainable selectio	methoc transp	ls for ort – lution	C B	0-4 TL-3			

prevention, industrial ecology, industrial symbiosis.										
Assignme	nt – Explore the different methods that can be adopted for maintaining a sustainable									
transport	system in your city.									
MODULE	5: ENVIRONMENTAL MANAGEMENT	(6L)								
Environmental management: Principles and strategies, Indicators of environmental quality – economic valuation - environmental cost-benefit analysis – Fiscal incentives in pollution control and management – Environmental management system: ISO 14000, Life Cycle Analysis (LCA) – scope and goal, bio-mimicking – Environmental Impact Assessment (EIA) – Procedures of EIA in India.CO-5Assignment – Conducting an EIA study of a small project (example, construction of house, road, bridge, etc.) in your local area.BTL-3										
TEXT BOO	DKS									
1.	Basu, M., Savarimuthu, X. (2017). <i>Fundamentals of Environmental Studies</i> , Cambridge University Press, 1 st Edition.									
2.	2. Bhavik R. Bakshi (2019). <i>Sustainable Engineering: Principles and Practice</i> , Cambridge University Press, 1 st Edition.									
REFERENC	CE BOOKS									
1.	Wasewar, K. L., Rao, S. N. (2022). <i>Sustainable Engineering, Energy, and the Environment Challenges and Opportunities,</i> CRC Press, 1 st Edition.									
2.	Singh, J.S., Singh, S.P., Gupta, S. R. (2017). <i>Ecology, Environmental Science and Conservatio</i> Publishing Company, New Delhi,	on. S. Chand								
3.	Mulligan, C. (2020). Sustainable Engineering: Principles and Implementation, CRC Press, 15	st Edition.								
E BOOKS										
1.	https://www.hzu.edu.in/bed/E%20V%20S.pdf									
2.	https://library.oapen.org/handle/20.500.12657/33379									
MOOC										
1.	https://www.my-mooc.com/en/categorie/environmental-science									
2.	https://www.coursera.org/specializations/sustainable-cities									

COURSE TITLE		Design Project- I	CREDITS	1	
COURSE CODE	ECS51800	COURSE CATEGORY	PC/DE/NE	L-T-P-S	0-0-2-6
Version	1.0	Approval Details		LEARNING LEVEL	BTL-4

	ASSESSMENT SCHEME															
							CIA							Proje	ct report	
	Firs	st Rev	iew			Se	cond R	eview			Thiı	d Revi	ew	and Vi [.] (I	va – Voce ESE)	
		20%					20%					10%		5	60%	
Co Desci	urse ription	This indu scie	s cours ustry re nce an	e is ma eady. T id build	ainly fc o appl d produ	ocused y the co ucts/to	on tean oncepts ols/app	n build s, princ olicatio	ing an ciples a ns add	d prod ind alg ressing	uct de orithn g the r	velopn ns leari needs c	nent as it w nt in the fie of real-worl	rill make t ld of com d societal	hem outer issues.	
Course Object	e ive	 I o analyse, design and develop products/tools/applications to solve the issues related to real world problems. To apply the concepts, principles and algorithms learnt in the field of computer science. To exercise the lifecycle of project development by following the principles of software engineering. To inculcate the qualities of team building and develop the skills of technical document writing. To examine the various algorithms of study and thus to evaluate and compare the output generated. 														
Course Outcoi	e me	Upc	n com 1. A 2. D 3. D 4. A 5. E p	ipletion nalyse vesign, vemons pprais emons xamin roject	n of thi , desig develo strate t e the h stration e and n work.	is cours n and c op and f the soft hardwa hs and i make a	se, the s develop test pro ware e re/soft report g compa	oprodu oprodu ogram nginee ware p genera arative	ts will acts/to segme ring pr product tion th analy:	be abl ols/ap nts tha inciple t devel rough sis of t	e to plication at conses and loped team the alg	ons to a stitute improv in the s work. gorithm	address the a software, /e the proje form of tec ns involved	e societal i /hardware ct manage hnical pre in the co	needs. e product ement skills sentations, urse of the	
со, го	PO- 1	PO- 2	PO- 3	PO- 4	РО- 5	РО- 6	РО- 7	PO- 8	РО- 9	РО- 10	PO- 11	PO- 12	PSO-1	PSO-2	PSO-3	
CO-1	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	
CO-2	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	
CO-3	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	
CO-4	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	
CO-5	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	
			1	1: Wea	akly re	lated, 2	2: Mode	erately	relate	ed and	3: Stro	ongly r	elated			
Note																

 The students in convenient groups of not more than 3 members have to identify a product for design and fabrication. Every project work shall have a guide who is the member of the faculty of the Department. Design, develop, test and implement a hardware/software system that is demonstrable with required data set. Assessment is based on creativity, applicability to the society, project development skills, team work. Technical communication, presentation and report writing skills form an essential component in assessment. 	CO1, CO2, CO3, CO4, CO5 /BTL4
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COURSE TITLE		INTERNSHIP- I		CREDITS	1								
COURSE CODE	ECS51801	COURSE CATEGORY	PC/DE/NE	L-T-P-S	0-0-0-2								
Version	1.0	Approval Details	хх	LEARNING LEVEL	BTL-3								
		ASSESSMEI	NT SCHEME										
CIA													
Technical re	port/ Certificate	Pr	ESE										
		-											
Course Description Course	 This course is mainly focused on providing links to classroom learning with industry. To apply the concepts, principles and algorithms learnt in the field of computer science and build products/tools/applications addressing the needs of real-world societal issues. 1. To analyse, design and develop products/tools/applications to solve the issues related to real world problems. 2. To learn critical thinking and problem-solving knowledge in an applied work setting 												
Objective	 To get professional behaviour and knowledge. To develop the skills of technical document writing and presentation. To develop communication skills and technical knowledge. 												
Course Outcome	Upon completion of 1. Analys 2. Design produ 3. Demo skills 4. Appra presen 5. Displa	of this course, the stude se, design and develop p n, develop and test p ct nstrate the software en ise the hardware/sof ntations, demonstration y his communication sk	ents will be able to products/tools/applica rogram segments that gineering principles ar tware product deve as and report generati sills and elaborate on h	ations to addre at constitute a nd improve the eloped in the on through tea nis skillset achi	ss the societal needs. a software/hardware project management form of technical am work. eved.								

CO, PO AND PSO MAPPING															
со	РО- 1	PO- 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	3	3	3	3	3	3	3	3	3	3	1	3	3	3
CO-2	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3
CO-3	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3
CO-4	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3
CO-5	3	3	3 3 3 3 3 3 3 3 1												3
			1	: Wea	kly rel	ated, 2	2: Mod	eratel	y relat	ed and 3	3: Stron	gly relat	ed		
Note															
 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. Assessment is based on creativity, applicability to the society, project development skills, team work. Technical communication, presentation and report writing skills form an essential component in assessment 											CO3, /BTL3				