HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

With Specialisation in Artificial Intelligence

(Duration: 4 Years)

CURRICULUM and SYLLABUS

(Applicable for Students admitted from Academic Year 2023-24)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

VISION AND MISSION OF THE INSTITUTE

Motto:

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 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.

VISION, MISSION OF THE DEPARTMENT

Vision

To educate the students in the recent developments of emerging fields in Electrical and Electronics Engineering, to encourage research activities, innovative techniques and to develop managerial abilities so as to make them excel globally with ethical values.

Mission

The Electrical and Electronics Engineering program continuously strives,

M1: To empower students with state-of-art knowledge and technological skills in Electrical and Electronics Engineering.

M2: To keep pace with changing industrial requirement and to imbibe the students with new technology

M3: To mould students for research, innovation and entrepreneurship.

M4: To inculcate managerial and professional capabilities with ethics and human values.

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PEO1. Graduates will be capable of modelling, designing and developing innovative solutions for critical Electrical and Electronics Engineering problems using advanced techniques.

PEO2. Graduates will demonstrate professional competence, practical and innovative skills in integrating various electrical and electronics components enabling them to have successful careers in electrical power, electrical vehicle or allied industry

PEO3. Graduates will be able to pursue higher studies, involve in research and development activities in interdisciplinary topics by applying recent technological developments in Artificial Intelligence, Electronics and Embedded systems

PROGRAM OUTCOME (PO)

Graduate Attributes (NBA): All graduates of any higher education programs are expected to have identified technical/ functional, generic and managerial competencies. The competencies that a graduate of a program should have been called Graduate Attributes. The Attributes a graduating engineer should have been generally identified by the Accreditation agency for Engineering and Technical Education, namely, National Board of Accreditation (NBA) in India. The Graduate Attributes of Engineering Programs as identified by NBA are

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice**.**
9	**Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions**.**
11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1	Use logical & technical skills to model, simulate, analyze and develop electrical components and systems
PSO2	Integrate the knowledge of fundamental Electronics, Power Electronics, Control System, Artificial Intelligence and Embedded systems for designing industrial control systems
PSO3	Contribute for the development of smart power grid, electric vehicle and integrating green energy to meet the increasing demand of the society

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B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING with Specialisation in Artificial Intelligence CURRICULUM R2023 (in line with NEP 2020)									
SEMESTER – I									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51001	Matrices and Calculus	3	0	2	4	2	5
2	BS	EPH51001	Engineering Physics	3	0	2	4	2	5
3	PC	ECS51001	Programming Fundamentals Using C	3	0	2	4	1	5
4	HS	ELS51002	Personality Development and Soft Skills	1	0	2	2	1	3
5	ES	EME51002	Technical Graphics	2	0	2	3	1	4
6	ES	EEC51400	FAB Lab for Electronics Engineers	0	1	2	2	2	3
7	HS	EGE51400/ EGE51401/ EGE51402/ EGE51403	Fine Arts (Drawing)/ Fine Arts (Singing)/ Fine Arts (Dance)/ Fine Arts (Music)	0	0	2	1	0	2
8	PC	EEC51402	Design Thinking for Electronics Engineers	0	1	2	2	1	3
Total				**12**	**2**	**16**	**22**	**10**	**30**
SEMESTER – II									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51002	Analytical Mathematics	3	0	2	4	2	5
2	BS	ECT51001	Engineering Materials	3	0	2	4	2	5
3	PC	EEE51001	Circuits and Networks	3	0	2	4	1	5
4	HS	EGE51001	Universal Human Values	2	0	0	2	1	2
5	ES	EEE51401	Innovation Lab for Electrical Engineers	0	1	2	2	2	3
6	HS	ELS51003/ ELS51004/ ELS51005	Regional Language (Tamil)/ Regional Language (Hindi)/ Regional Language (Telugu)	2	0	0	2	1	2
7	HS	EGE51404/ EGE51405	Outreach (NCC/NSS)	0	0	2	1	0	2
8	ES	ELS51001	Communication Skills	2	0	2	3	1	4
Total				**15**	**1**	**12**	**22**	**10**	**28**

SEMESTER – III									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51003	Partial Differential Equations and Transforms	3	0	2	4	2	5
2	PC	EEE51002	Electrical Machines	2	1	2	4	1	5
3	PC	EEE51003	Electromagnetic Theory	2	1	0	3	1	3
4	DE	****	DE 1	2	1	0	3	0	3
5	NE	****	NE 1	2	1	0	3	0	3
6	EEC	EEE51402	Design Project – 1	0	0	2	1	2	2
7	ES	ECT51002	Environmental Science and Sustainable Development	2	0	0	2	2	2
8	EEC	EEE51403	Internship -1 (To be carried out after 2nd semester and evaluated in 3rd semester)	0	0	0	1	2	0
Total				**13**	**4**	**6**	**21**	**10**	**23**
SEMESTER – IV									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51004	Numerical Methods	3	0	2	4	2	5
2	PC	EEE51004	Control Systems	3	0	2	4	2	5
3	PC	EEE51005	Electronic Devices and Circuits	2	0	2	3	2	4
4	PC	EEE51006	Data Structures and OOPS	2	0	2	3	2	3
5	PC	EEE51007	Industry Collaborated Course - Transmission and Distribution	2	0	2	3	2	4
6	DE	****	DE 2	2	1	0	3	0	4
7	NE	****	NE 2	2	1	0	3	0	4
8	EEC	EEE51404	Design Project – 2	0	0	2	1	2	2
Total				**16**	**2**	**12**	**24**	**12**	**31**

SEMESTER – V									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	PC	EEE51008	Power Electronics	3	0	2	4	2	5
2	PC	EEE51009	Microcontroller and Embedded Systems	2	0	2	3	2	4
3	PC	EEE51010	Digital Logic Circuits	2	0	2	3	2	4
4	DE	****	DE 3	2	1	0	3	0	3
5	NE	****	NE 3	2	1	0	3	0	3
6	EEC	EEE51405	Design Project – 3	0	0	2	1	2	2
7	ES	EGE51002	Entrepreneurship Development	1	0	2	2	0	3
8	EEC	EEE51406	Internship -2 (to be evaluated in 5th semester. To be carried out in summer after 4thsemester))	0	0	0	1	2	0
Total				**12**	**2**	**10**	**20**	**10**	**24**
SEMESTER – VI									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	PC	EEE51011	Power System Analysis	2	1	2	4	2	5
2	PC	EEE51012	Power System Protection and Control	3	0	2	4	2	5
3	PC	EEE51013	Solid State Drives	2	0	2	3	2	4
4	PC	EEE51014	Case Study / Field Study / Product study-Electric Vehicles	2	0	2	3	2	4
5	DE	****	DE 4	2	1	0	3	0	3
6	NE	****	NE 4	2	1	0	3	0	3
7	EEC	EEE51407	Design Project – 4	0	0	2	1	2	2
8	HS	EGE51406	Skill Development and Career Planning	0	0	2	1	2	2
9	ES	EGE51003	Research Methodology & IPR	2	0	0	2	2	2
Total				**15**	**3**	**12**	**24**	**14**	**30**

SEMESTER – VII									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	PC	EEE51015	Electric Energy Utilization and Conservation	3	1	0	4	2	4
2	PC	EEE51016	Renewable Energy Systems	2	0	2	3	2	4
3	PC	EEE51017	Electric Vehicle Technology	2	1	0	3	2	3
4	PC	EEE51018	Term Paper on Research Findings	2	0	0	2	2	2
5	DE	****	DE 5	2	1	0	3	0	3
6	NE	****	NE 5	2	1	0	3	0	3
7	EEC	EEE51408	Project Phase 1	0	0	6	3	2	6
Total				**13**	**4**	**8**	**21**	**10**	**25**
SEMESTER – VIII									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	EEC	EEE51409	Project Phase 2	0	0	24	11	4	24
Total				**0**	**0**	**24**	**11**	**4**	**24**

B.Tech. EEE in Specialisation with AI

LIST OF DEPARTMENTAL ELECTIVES								
Department Elective 1								
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**TCH**
3	DE	EEE51503	Basic Python Programming	2	0	2	3	4
3	DE	EEE51541	Introduction to Data Science and Python	2	0	2	3	4
Department Elective 2								
4	DE	EEE51542	Applied statistics for Artificial Intelligence	2	1	0	3	3
4	DE	EEE51543	AI Fundamentals using MATLAB	2	0	2	3	4
Department Elective 3								
5	DE	EEE51544	Artificial Neural Networks	2	1	0	3	3
5	DE	EEE51545	Deep Learning	2	1	0	3	3
Department Elective 4								
6	DE	EEE51546	Machine Learning Algorithms	2	1	0	3	3
6	DE	EEE51547	Optimisation for Machine Learning	2	1	0	3	3
Department Elective 5								
7	DE	EEE51548	Applications of AI and ML in Electrical Engineering	2	1	0	3	3
7	DE	EEE51549	Applications of AI and ML in Industry	2	1	0	3	3

LIST OF DEPARTMENTAL ELECTIVES							
Department Elective 1							
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**
3	DE	EEE51500	Solar Energy Systems	2	1	0	3
3	DE	EEE51501	Measurement and Instrumentation	2	1	0	3
3	DE	EEE51502	Electrical Safety	2	1	0	3
3	DE	EEE51503	Basic Python Programming	2	0	2	3
3	DE	EEE51504	Sensor and Network	2	1	0	3
Department Elective 2							
4	DE	EEE51505	Wind Energy Conversion Systems	2	1	0	3
4	DE	EEE51506	High Voltage Engineering	2	1	0	3
4	DE	EEE51507	Power Plant Engineering	2	1	0	3
4	DE	EEE51508	Applied Statistics for Machine Learning	2	1	0	3
4	DE	EEE51509	Internet of Things	2	1	0	3
4	DE	EEE51510	Fundamentals of Data Science and Machine Learning	2	1	0	3
Department Elective 3							
5	DE	EEE51511	Alternative Sources of Energy	2	1	0	3
5	DE	EEE51512	Special Electrical Machines	2	1	0	3
5	DE	EEE51513	Advanced Control Theory	2	1	0	3
5	DE	EEE51514	Data Science for Electrical Engineers	2	1	0	3
5	DE	EEE51515	Embedded Internet of Things	2	1	0	3
Department Elective 4							
6	DE	EEE51516	Energy Conversion and Storage Technologies	2	1	0	3
6	DE	EEE51517	Electrical System Design	2	1	0	3
6	DE	EEE51518	Power Quality	2	1	0	3
6	DE	EEE51519	Machine Learning for Electrical Engineers	2	1	0	3
6	DE	EEE51520	Industrial Internet of Things	2	1	0	3
Department Elective 5							
7	DE	EEE51521	Power Electronics for Renewable Energy Systems	2	1	0	3
7	DE	EEE51522	Distributed Generation and Microgrids	2	1	0	3
7	DE	EEE51523	Power System and Smart grid	2	1	0	3
7	DE	EEE51524	Artificial Intelligence for Electrical Engineers	2	1	0	3
7	DE	EEE51525	Smart Grid Technologies and IoT	2	1	0	3

LIST OF NON DEPARTMENT ELECTIVES OFFERED BY DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

S.No	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
Non-Department Elective 1 (NE 1)								
1	EEE51700	Personality Development in Defence Service	2	1	0	3	0	3
2	EEE51701	Introduction to MATLAB Programing	2	1	0	3	0	3
Non-Department Elective 2 (NE 2)								
1	EEE51702	Energy from Wastes	2	1	0	3	0	3
2	EEE51703	Electrical Safety	2	1	0	3	0	3
Non-Department Elective 3 (NE 3)								
1	EEE51704	Introduction to Solar Energy	2	1	0	3	0	3
Non-Department Elective 4 (NE 4)								
1	EEE51705	Energy Generation Using Solar, Wind and Other Renewable Sources	2	1	0	3	0	3
2	EEE51706	Energy Conservation and Management	2	1	0	3	0	3
Non-Department Elective 4 (NE 4)								
1	EEE51707	Hybrid and Electric Vehicles	2	1	0	3	0	3
2	EEE51708	Alternative Sources of Energy	2	1	0	3	0	3

Curriculum Coordinator **Head / EEE** **IQAC**

Dean (E&T)

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech-EEE CURRICULUM AND SYLLABUS-R2022

Departmental Elective Courses: Verticals						
SEM	**Course Category**	**Renewable Energy System**	**Power and Energy System**	**Data Science**	**IOT and Embedded System**	**Artificial Intelligence**
3	DE-1	• Solar Energy Systems • Measurement and Instrumentation	Electrical Safety	Basic Python Programming	Sensor and Network	Basic Python Programming
4	DE-2	Wind Energy Conversion Systems	• High Voltage Engineering • Power Plant Engineering	Fundamentals of Data Science and Machine Learning	Internet of Things	Fundamentals of Artificial Intelligence
5	DE-3	Alternative Sources of Energy	• Special Electrical Machines • Advanced Control Theory	Data Science for Electrical Engineers	Embedded Internet of Things	Artificial Neural Networks
6	DE-4	Energy Conversion and Storage	• Electrical System Design • Power	Machine Learning for Electrical	Industrial Internet of Things	Machine Learning for Electrical

		Technologies	Quality	Engineers		Engineers
7	DE-5	• Power Electronics for Renewable Energy Systems • Distributed Generation and Microgrids	Power System and Smart grid	Artificial Intelligence for Electrical Engineers	Smart Grid Technologies and IoT	Applications of AI in Electrical Engineering

Registration for Department Elective Courses from verticals:

Department Elective courses will be registered in semester 3, 4, 5, 6 and 7. These courses are arranged in sequential manner and listed in groups called verticals that represents a particular specialization/ diversified group. Students are permitted to choose all departmental elective courses from a particular vertical or from different verticals. Only one departmental elective course can be chosen in the semester horizontally. However, if the students wish to choose courses from different verticals, it must be made sure the requisite prerequisite for the courses is completed.

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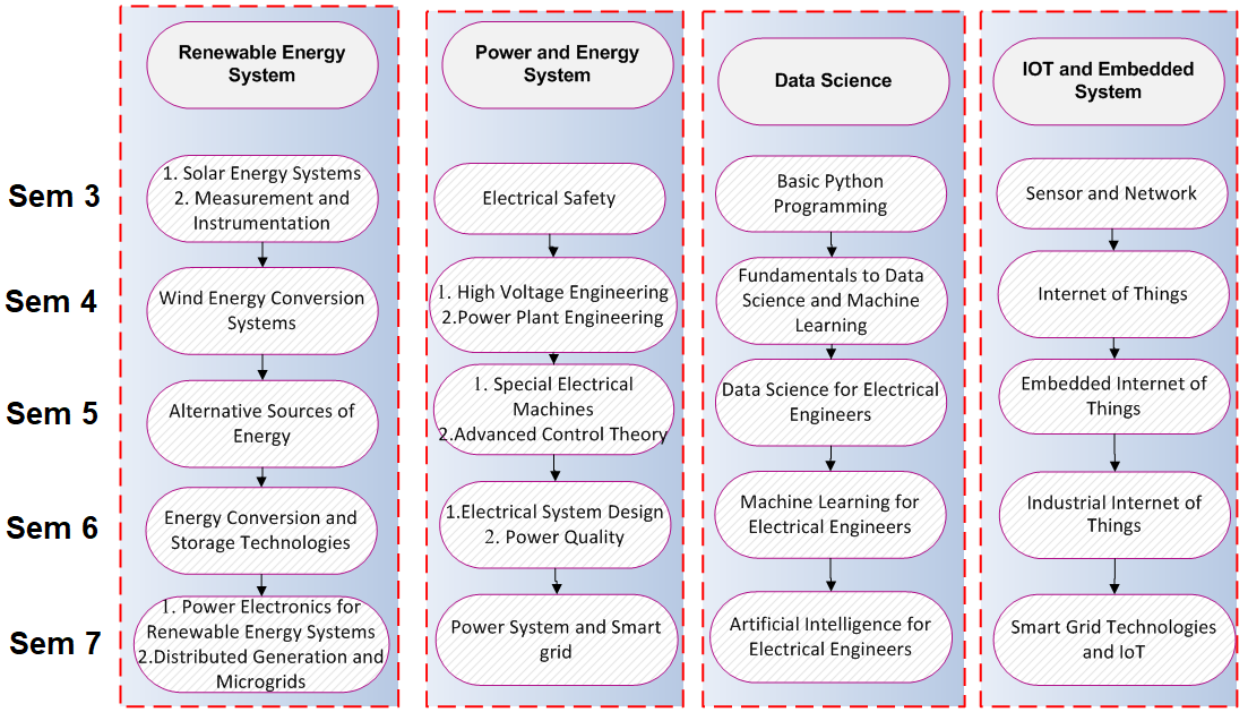
Departmental Elective Courses: Verticals

Course Flow Diagram



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DEPARTMENT ELECTIVE COURSES: VERTICALS								
SEM	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
VERTICAL – 1: RENEWABLE ENERGY SYSTEM								
3	EEE51500	Solar Energy Systems	2	0	2	3	0	4
3	EEE51501	Measurement and Instrumentation	2	0	2	3	0	4
4	EEE51505	Wind Energy Conversion Systems	2	0	2	3	0	4
5	EEE51511	Alternative Sources of Energy	2	1	0	3	0	3
6	EEE51516	Energy Conversion and Storage Technologies	2	1	0	3	0	3
7	EEE51521	Power Electronics for Renewable Energy Systems	2	1	0	3	0	3
7	EEE51522	Distributed Generation and Microgrids	2	1	0	3	0	3
VERTICAL-2 POWER AND ENERGY SYSTEMS								
3	EEE51502	Electrical Safety	2	1	0	3	0	3
4	EEE51506	High Voltage Engineering	2	1	0	3	0	3
4	EEE51507	Power Plant Engineering	2	1	0	3	0	3
5	EEE51512	Special Electrical Machines	2	1	0	3	0	3
5	EEE51513	Advanced Control Theory	2	1	0	3	0	3
6	EEE51517	Electrical System Design	2	1	0	3	0	3
6	EEE51518	Power Quality	2	0	2	3	0	4
7	EEE51523	Power System and Smart grid	2	1	0	3	0	3
VERTICAL-3 DATA SCIENCE								
3	EEE51503	Basic Python Programming	2	0	2	3	0	4
4	EEE51510	Fundamentals of Data Science and Machine Learning						

5	EEE51514	Data Science for Electrical Engineers	2	1	0	3	0	3
6	EEE51519	Machine Learning for Electrical Engineers	2	1	0	3	0	3
7	EEE51524	Artificial Intelligence for Electrical Engineers	2	1	0	3	0	3
VERTICAL-4 - IOT and Embedded System								
3	EEE51504	Sensor and Network	2	0	2	3	0	4
4	EEE51509	Internet of Things	2	1	0	3	0	3
5	EEE51515	Embedded Internet of Things	2	0	2	3	0	4
6	EEE51520	Industrial Internet of Things	2	1	0	3	0	3
7	EEE51525	Smart Grid Technologies and IoT	2	1	0	3	0	3

Curriculum Coordinator **Head / EEE** **IQAC**

Dean (E&T)

SEMESTER I

<table>
<tr><td>COURSE TITLE</td><td colspan="3">MATRICES AND CALCULUS (Common to ALL B. Tech)</td><td>CREDITS</td><td colspan="2">4</td></tr>
<tr><td>COURSE CODE</td><td>EMA51001</td><td>COURSE CATEGORY</td><td>BS</td><td>L-T-P-S</td><td colspan="2">3-0-2-1</td></tr>
<tr><td>Version</td><td>1.0</td><td>Approval Details</td><td></td><td>LEARNING LEVEL</td><td colspan="2">BTL-3</td></tr>
<tr><td colspan="7">ASSESSMENT SCHEME</td></tr>
<tr><td colspan="5">CIA</td><td colspan="2">ESE</td></tr>
<tr><td>First Periodical Assessment (Theory)</td><td>Second Periodical Assessment (Theory)</td><td>Practical Assessments</td><td>Observation / Lab records as approved by the Department Examination Committee “DEC”</td><td>Attendance</td><td>End Semester Examination (Theory)</td><td>End Semester Examination (Practical)</td></tr>
<tr><td>15%</td><td>15%</td><td>10%</td><td>5%</td><td>5%</td><td>25%</td><td>25%</td></tr>
<tr><td>Course Description</td><td colspan="6">To make the student understand the basic concepts of matrices and calculus using MATLAB</td></tr>
<tr><td>Course Objective</td><td colspan="6">1. To perform some simple operations on matrices
2. To give a strong foundation on the basic concepts of differentiation and integration.
3. To demonstrate the fundamental understanding of integrals
4. To classify ordinary differential equations.
5. To impart the knowledge of sequences and summation of series.</td></tr>
<tr><td>Course Outcome</td><td colspan="6">Upon completion of this course, the students will be able to
1. Calculate the inverse of the matrix using Cayley Hamilton theorem and diagonalize the matrix
2. Determine the derivative and higher derivatives of a given function explicitly and integrate the standard functions using suitable differentiation and integration formulae
3. Evaluate surface area and volume using multiple integrals
4. Compute the solution of second order the differential equations
5. Determine the convergence and divergence of the sequence using the appropriate tests.</td></tr>
</table>

Prerequisites: Knowledge in calculus at high secondary level.

CO, PO AND PSO MAPPING															
CO	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO-10	PO-11	PO-12	PSO -1	PSO-2	PSO -3
CO-1	**3**	**3**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**1**
CO-2	**3**	**3**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**1**
CO-3	**3**	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**1**	**1**
CO-4	**3**	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**1**	**1**
CO-5	**3**	**3**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**1**
1: Weakly related, 2: Moderately related and 3: Strongly related															

MODULE1:MATRICES	**(9L+6P)**
Characteristic equation – Eigen values and Eigenvectors – Properties – Cayley Hamilton theorem (Statement only) – Verification and inverse of the matrix using Cayley Hamilton theorem- Diagonalization of matrices using similarity transformation Suggested Reading: Basics of Matrices **Lab: Eigen values and Eigenvectors, Verification and inverse using Cayley Hamilton theorem- Diagonalization**	**CO-1** **BTL-3**
MODULE 2: DIFFERENTIAL AND INTEGRAL CALCULUS	**(9L+6P)**
Basic Concepts and Simple Problems in Differentiation and Integration-Partial differentiation – Total differentiation- Taylor's series – Maxima and minima of functions of two variables. Integration – Methods of integration – Substitution method – Integration by parts – Integration using partial fraction – Bernoulli's formula. Suggested Reading: Basics of differentiation and integration. **Lab: Taylor's series – Maxima and minima of functions of two variables, Integration using partial fraction**	**CO-2** **BTL-3**
MODULE 3: MULTIPLE INTEGRAL (9L+6P)	
Double integration – Cartesian and polar co-ordinates – Change of order of integration. Area as a double integral – Triple integration in Cartesian coordinates – Volume as a triple integral - Change of variables between Cartesian and polar coordinates. Suggested Reading: Line Integrals **Lab: Area and Volume of double integration and triple integration.**	**CO-3** **BTL-3**
MODULE 4: ORDINARY DIFFERENTIAL EQUATIONS	**(9L+6P)**

Second order differential equations with constant coefficients – Particular integrals – eax, cosax, sinax, xm,eaxcosbx, eaxsinbx , Solutions of homogeneous differential equations with variable coefficients – Variation of parameters. Suggested Reading: Basics of Differential Equations. **Lab: Solution of Second order differential equations.**	**CO-4** **BTL-3**
MODULE 5: SEQUENCE AND SERIES	**(9L+6P)**
Definition of Sequence and series with examples, Convergence, divergence and Oscillation of sequence and series, properties, Tests for convergence of series (Comparison test, Limit Comparison test , Integral test, Ratio test, D' Alembert's test, Alternating Series). Suggested Reading: Basics of sequence and series. **Lab: Test the convergence and divergence.**	**CO-5** **BTL-3**

T BOOKS	
1.	A. Chandrasekaran, G Kavitha (2019), *Matrices and Calculus*, Dhanam Publications, 1st Edition, Chennai.
2.	B.S. Grewal (2017), *Higher Engineering Mathematics*, Khanna Publishers, 43rd Edition, New Delhi.
3.	A. P. Santhakumaran, P. Titus P (2017), *Engineering Mathematics – II*, NiMeric Publications, 2nd Edition, Nagercoil, India.
REFERENCE BOOKS	
1	D. G. Duffy (2021), *Advanced Engineering Mathematics With MATLAB (Advances in Applied Mathematics)*, Chapman and Hall Publisher, 5th Edition, CRC Press, USA.
	M. D. Weir, Joel Hass, Thomas (2016), *Calculus*, Pearson Publication, 12th Edition, India.
3	Srimantha Pal and S.C. Bhunia (2015), *Engineering Mathematics*, Oxford University Press, 1st Edition, New Delhi, India.
E BOOKS	
1. **2.**	https://www.elsevier.com/books/matrix-calculus/bodewig/978-1-4832-3214-0 https://www.ebooks.com/en-er/book/209983367/matrix-calculus-kronecker-product-and-tensor-product-a-practical-approach-to-linear-algebra-multilinear-algebra-and-tensor-calculus-with-software-implementations-third-edition/yorick-hardy/
MOOC	
1. 2.	https://www.coursera.org/learn/introduction-to-calculus https://nptel.ac.in/courses/111105035

COURSE TITLE	**ENGINEERING PHYSICS (Common to ALL branches of Engineering)**			**CREDITS**	**4**
COURSE CODE	**EPH51001**	**COURSE CATEGORY**	**BS**	**L-T-P-S**	**3-0-2-2**

Version	1.0	Approval Details		LEARNING LEVEL	BTL3
ASSESSMENT SCHEME					
First Periodical Assessment (Theory)	**Second Periodical Assessment (Theory)**	**Practical Assessments**	**Observation / lab records as approved by the Department Examination Committee "DEC"**	**Attendance**	**End Semester Examination**
15%	**15%**	**10%**	**5%**	**5%**	**Theory 25%** **Practical 25%**
Course Description	**This course is based on the developing areas of physics integrating both the theoretical and practical training for engineering students. Application of the concepts to solve engineering problems, to acquire practical thinking and logical reasoning.**				
Course Objective	1. To evaluate various types of modulus of elasticity and impart knowledge on production and application of ultrasonic wave in SONAR and NDT. 2. To provide a strong foundation on the concepts of crystal physics and thermal conductivity. 3. To illustrate theoretically and experimentally the wave – particle duality. 4. To evaluate the material properties based on energy band gap and magnetic moment. 5. To make the students understand the production of lasers and propagation of light through an optical fiber.				
Course Outcome	Upon completion of this course, the students will be able to 1. Evaluate the elastic properties of materials and apply the properties of ultrasonic waves for industrial applications 2. Evaluate the characteristics of crystal structure and the thermal conductivity of good and bad conductors. 3. Solve the Schrodinger's wave equations and derive energy density based on Planck's hypothesis 4. Apply the fundamental concepts to classify magnetic and semiconducting materials and thereby, illustrate their applications. 5. Apply lasers and optical fibers as engineering tools				
Prerequisites: Knowledge in fundamentals of Physics at higher secondary level					

CO, PO AND PSO MAPPING

CO	PO 1	PO 2	PO	PO 4	PO5	PO 6	PO 7	PO	PO	PO	PO	PO 12	PSO 1	PSO2	PSO3

			3					8	9	10	11				
CO1	3	3	-	-	-	-	-	-	3	-	-	3	1	-	-
CO2	3	3	-	2	3	-	-	-	3	-	-	3	1	-	-
CO3	3	3	-	-	1	-	-	-	3	-	-	3	1	-	-
CO4	3	3	-	2	-	-	-	-	3	-	-	3	2	-	-
CO5	3	3	-	-	3	-	-	-	3	-	-	3	2	-	-

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

MODULE 1: PROPERTIES OF MATTER AND ULTRASONICS	**(9L + 6P)**
Elasticity – Hooke's law – Elastic Moduli – Young's modulus of elasticity – Rigidity modulus - Bulk modulus – Twisting couple on a wire – Torsional pendulum – Determination of rigidity modulus of a wire – Depression of a cantilever – Non-uniform bending – Uniform bending – I shape girder. Introduction – Production of ultrasonic waves (Magnetostriction and Piezoelectric methods) – Properties of ultrasonic – Applications in SONAR and NDT. **Practical component:** Torsional pendulum – Determination of rigidity modulus of thin wire and moment of inertia of regular objects Non-uniform bending – Determination of Young's modulus of wooden beam	**CO1 BTL3**
MODULE 2: CRYSTALLOGRAPHY AND THERMAL PHYSICS	**(9L + 6P)**
Amorphous and crystalline solids – Unit cell – Lattice parameters – Crystal system and Bravais lattices (Qualitative) – Miller indices – Interplanar spacing for cubic crystal system – Crystal structures SCC, BCC, FCC, HCP (no. of atoms, coordination number, atomic packing fraction calculations) – Bragg's law – X-ray diffractometer. 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. **Practical component:** Lee's disc experiment – Determination of thermal conductivity of bad conductor	**CO2 BTL3**
MODULE 3: QUANTUM PHYSICS	**(9L + 6P)**
Black body radiation – Planck's hypothesis – Photoelectric effect – Compton effect – Theory and experimental verification Physical significance of wave function – Schrodinger's wave equation – Time independent and time dependent equations – Particle in a 1D box – Quantum Well (no derivation) **Practical component:** Photoelectric effect – To plot the KE as a function of frequency for different metals.	**CO3 BTL3**
MODULE 4: MAGNETISM AND SEMICONDUCTORS	**(9L + 6P)**
Magnetic moment – Classification of magnetic materials (Dia, para, ferro, anti-ferro) – Domain theory of ferromagnetism – Hysteresis – Hard and soft magnetic materials – Memory applications. Classification of semiconductors – Direct and in-direct bandgap – Fermi energy level – Intrinsic and extrinsic semiconductors – *n*-type and *p*-type semiconductors (Qualitative) –	**CO4 BTL3**

Hall effect – Determination of Hall voltage (Theory and experiment) – Applications of Hall effect. **Practical component:** Current – Voltage (IV) characteristics of semiconductor diode	
MODULE 5: MODERN OPTICS	**(9L + 6P)**
Principles of laser – Stimulated absorption – Spontaneous emission – Stimulated emission – Population inversion – Pumping action – Active medium – Laser characteristics – Nd-YAG laser – CO_2 laser – Dye laser – Laser in Industrial applications. Optical fiber – Principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – Types of optical fibers – Optical fiber as temperature sensors. **Practical component:** Laser – Determination of the wave length of the laser using grating Laser – Particle size determination using lycopodium powder	**CO5** **BTL3**

TEXT BOOKS	
1	Rajendran V. (2017), *Engineering Physics*, Tata McGraw Hill Publications, 3rd Edition, US.
2	Gaur R. K. and Gupta S.L. (2014). *Engineering Physics*, 8th edition, Dhanpat Rai publications (P) Ltd., New Delhi
3	Mani P. (2016), *Engineering Physics*, Dhanam Publications, 13th Edition, Chennai.
REFERENCE BOOKS	
1.	Arthur Beiser (2017), *Concepts of Modern Physics*, Tata McGraw Hill Publications, 7th Edition, US.
2.	Halliday, Resnick and Walker (2021), *Fundamental of Physics Extended*, Wiley & Sons, 12th Edition, US.
3	Shaikh I. A, Kulkarni H. R, Mohril, S. F. and Khairnar (2018), *Engineering Physics*, Nirali Prakashan Publishers, 5th Edition, Pune.
E BOOKS	
1.	https://industri.fatek.unpatti.ac.id/wp-content/uploads/2019/03/042-Fundamentals-of-Physics-II-Electromagnetism-Optics-and-Quantum-Mechanics-R.-Shankar-Edisi-1-2016.pdf
2.	https://zenodo.org/record/243407#.Y0EfilxBzIU
3.	https://salmanisaleh.files.wordpress.com/2019/02/physics-for-scientists-7th-ed.pdf
MOOC	
1.	http://nptel.ac.in/courses/115106061
2.	http://nptel.ac.in/courses/117101054/12

COURSE TITLE	**PROGRAMMING FUNDAMENTALS USING C**			**CREDITS**	**4**
COURSE CODE	**ECS51001**	**COURSE CATEGORY**	**PC**	**L-T-P-S**	**3-0-2-1**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-4**
ASSESSMENT SCHEME					
First Periodical	**Second Periodical Assessment**	**Practical Component**		**ESE**	

Assessment			
15%	**15%**	**20%**	**50%**
Course Description	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.		
Course Objective	1. To acquire the basic knowledge in computer hardware, programming languages and Problem-solving techniques. 2. To learn the fundamentals of C programming. 3. To gain knowledge in Functions, arrays and strings in C programming. 4. To understand the pointers, Structures and Union in C programming 5. To gain Knowledge on Embedded Programming and real time applications of C Programming.		
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the basics of digital computer and programming languages. 2. Demonstrate problem solving techniques using flowchart, algorithm/pseudo code to solve the given problem. 3. Design and Implement C program using Control Statements and Functions. 4. Design and Implement C program using Pointers and File operations. 5. Identify the need for embedded C and C Programming in real-time applications.		

Prerequisites: Nil

CO, PO AND PSO MAPPING

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

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

MODULE 1: PROGRAMMING LANGUAGES AND PROBLEM-SOLVING TECHNIQUES (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:** Drawing Flowcharts using E- Chart & Writing pseudo code for the following problems 1. Greatest of three numbers	**CO-1** **BTL-1**

2. Sum of N numbers 3. Computation of nCr	
MODULE 2: FUNDAMENTALS OF C	**(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** 1. Program to illustrate arithmetic and logical operators 2. Program to read and print data of different types 3. Program to calculate area and volume of various geometrical shapes 4. Program to compute biggest of three numbers 5. Program to print multiplication table 6. Program to convert days to years, months and days 7. Program to find sum of the digits of an integer	**CO-2** **BTL-3**
MODULE 3: FUNCTIONS, ARRAYS AND STRINGS	**(6L+6P=12)**
Functions – Storage Class – Arrays – Strings and standard functions - Pre-processor Statements. **Practical Component:** 1. Program to compute Factorial, Fibonacci series and sum of n numbers using recursion 2. Program to compute sum and average of N Numbers stored in an array 3. Program to sort the given n numbers stored in an array 4. Program to search for the given element in an array 5. Program to do word count 6. Program to insert a substring in a string 7. Program to concatenate and compare two strings 8. Program using pre-processor statements	**CO-3** **BTL-4**
MODULE 4: POINTERS, STRUCTURES AND UNION	**(6L+6P=12)**
Pointers – Dynamic Memory allocation – Structure and Union – Files. **Practical Component:** 1. Program to compute sum of integers stored in a 1-D array using pointers and dynamic memory allocation 2. Program to read and print records of a student/payroll database using structures 3. Program to simulate file copy	**CO-4** **BTL-3**

4. Program to illustrate sequential access file 5. Program to illustrate random access file	
MODULE 5: APPLICATIONS OF C **(6L+6P=12)**	
Structure of embedded C program - Data Types - Operators - Statements - Functions - Keil C Compiler. Game development using c - Analysing the environment - Snake game - Tic-Tac-Toe - flappy bird. **Practical component:** Simple programs using embedded C-Game Development using C	**CO-5** **BTL-2**

T BOOKS	
1.	Ashok Kamthane, "Computer Programming", Pearson Education, 7th Edition, Inc 2017.
2.	Mark Siegesmund, "Embedded C Programming", first edition, Elsevier publications, 2014.
3.	Robert Marmelstein, "Programming Games in C"
ERENCE BOOKS	
1.	Jeyapoovan T, "Fundamentals of Computing and Programming in C", Vikas Publishing house, 2015.
2.	Yashavant Kanetkar, "Let us C", 15th edition, BPP publication, 2016.
3.	S.Sathyalakshmi, S.Dinakar, "Computer Programming Practicals – Computer Lab Manual", Dhanam Publication, First Edition, July 2013.
EBOOK	
1.	https://en.wikibooks.org/wiki/C_Programming
MOOC	
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

COURSE TITLE		**Personality Development & Soft Skills**			**CREDITS**	**2**
COURSE CODE		**ELS51002**	**COURSE CATEGORY**	**HS**	**L - T – P – S**	**1 – 0 – 2 – 1**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**		**BTL – 4**
ASSESSMENT SCHEME						
First Periodical Assessment	**Second Periodical Assessment**	**Weekly assignment/ lab record and viva as approved by the Department Examination Committee "DEC"**	**Surprise Test / Quiz., as approved by the Department Examinatio**	**Attendance**		**End Semester Examination (ESE) Theory + Practical**

			n Committee "DEC"		
15 %	**15%**	**10 %**	**5 %**	**5 %**	**50%**

Course Description	This course teaches the learners LSRW Skills which is needed in today's global workplace together with essential business vocabulary & grammar. It equips them to communicate effectively and at professional and social scenario which in turn makes them confident individuals. This course would help them to appear for Cambridge Certification and add value to their profile and validate their language proficiency.
Course Objective	1.To acquire self-confidence by which the learner can improve upon their informative listening skills by an enhanced acquisition of the English language. 2.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. 3.To equip the students to Read, comprehend and answer questions based on literary, scientific and technological texts. 4.To enhance the writing skills of the students via training in instructions, recommendations, checklists, process-description, letter-writing and report writing. 5.To equip the learners in analyzing and applying creative thinking skills and participate in brainstorming, mind-mapping, audiovisual activities and excel in employability skills.
Course Outcome	Upon completion of this course, the students will be able to 1. Demonstrate the ability to construct the grammatically correct sentences with accuracy and syntax structures. 2. Integrating various components of English Language and determining it through reading and listening. 3. 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. 4. Organize and articulate ideas, concepts, and perceptions in a comprehensive manner in written business correspondence, and speaking in formal and informal situations. 5. Infer details about presentation skills and implementing it in various professional situations.
Prerequisites: Plus Two English-Intermediate Level	

CO	**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**
CO1	-	-	-	-	-	-	-	-	-	**3**	-	-	1	-	-
CO2	-	-	-	-	-	-	-	**2**	**2**	**3**	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	-	**3**	-	-	-	-	-
CO4	-	-	-	-	-	-	**2**	-	-	**3**	**2**	-	1	-	-
CO5	-	-	-	-	-	-	-	-	**2**	**3**	**2**	**3**	1	-	-

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

MODULE 1 : ATTITUDE **(3L + 6P =**

9)	
Grammar : 1. Countable and uncountable nouns 2. Asking questions 3. Expressing likes 4. Introducing reasons 4. Talking about large and small differences. 5. Expressing Results **Vocabulary :** 1. Recruitment Brochure : ability, certificate, course, etc., 2. Work, job, training course. 3. Job Responsibilities 4. Staff, Employee, member of Staff. 5. Phrases expressing enthusiasm 6. Adjective Forms **Writing :** 1. Report Writing – Staff Training Report 2. A Website entry 3. A short Email and an Email of a job application. **Reading :** Articles on Human Resources **Soft Skills And Employability Skills (LAB) : ATTITUDE :** The power of positive thinking – Positive self talk – self-esteem and positive attitude who Am I ? Attitude in the workplace – Building a positive attitude – Testing your attitude – Adaptability	**CO-1 BTL-2**
MODULE 2 : GOAL SETTING (3L + 6P = 9)	
Grammar: 1. Infinitive or verb + ing, 2. Prepositions in phrases describing trends 3. Formal requests 4. First and Second conditionals. 5. Phrases followed by a Verb + ing. **Vocabulary :** 1. Word related to marketing (Launch, Play, Find out, Learn, Know, etc.,) 2. Revenue outcome 3. Adjective – noun collocations, 3. Last and latest **Writing :** 1. A marketing Report 2. Email giving information – making an enquiry – answering enquiries – correcting information – confirming terms 3 Memo Writing **Reading :** Articles on Marketing **Soft Skills And Employability Skills (LAB): GOAL SETTING:** What is goal ? - What are SMART goals? - How does SMART goal setting work? - Goals as commitment – Useful Guideline for goal setting – Trying personal and professional goals – Goals at the workplace – Cascading goals – Types of goals	**CO-2 BTL-3**
MODULE 3 : TIME MANAGEMENT (3L + 6P = 9)	
Grammar : 1. Prepositions in time phrases 2. Making recommendations 3. Phrases signaling parts of a presentation 4. Can and could **Vocabulary :** 1. Financial Terms 2. Rising finance 3. Noun Phrases connected with starting companies 4. Assets, collateral etc., **Writing :** Formal Letter : 1. A letter of enquiry 2. Proposal Writing **Reading :**Articles on Entrepreneurship **Soft Skills And Employability Skills (LAB): TIME MANAGEMENT** : What is time management? Prioritization – Time stressors – Time stealers – Time management - Eisenhower Matrix– Strategies for effective time management – productivity pyramid – The four Ds of time management	**CO-3 BTL-3**
MODULE 4 : EMOTIONAL INTELLIGENCE (3L + 6P = 9)	
Grammar : 1. Referencing 2. Using the Passives to express opinions and ideas. 3. Relative Clauses **Vocabulary :** 1. Collocations describing reasons for meetings, 2. Collocations with meeting 3. Crucial, priceless, etc., **Writing :** Arranging to travel; an email agreeing to a request and making suggestions – giving instructions – about a business trip – announcing a job opportunity. . 2. A letter informaing about a new service – complaint, **Reading :** Articles on Business abroad **Soft Skills And Employability Skills (LAB): EMOTIONAL INTELLIGENCE :** What is Emotional Intelligence ? Enhancing your emotional self-awareness, - Emotional intelligence and change management – unfreezing the old, re-freezing the new – change	**CO-4 BTL-3**

and stress – emotional intelligence and crisis management.	
MODULE 5 : LEADERSHIP (3L + 6P = 9)	
Grammar : 1. Using the Definite Article 2. Expressing Causes 3. Reporting verbs and reported speech 4 Third Conditional(Imaginary) **Vocabulary :** 1. Verb – Noun collocations 2. Issues, impact, etc., 3. Way or method 4. Words and phrases expressing numbers. **Writing** : Mail arranging a meeting , introducing a company and asking for information – giving suggestions 2. A memo asking for suggestions 3. A proposal for out sourcing. **Reading :** Articles on Change in Business **Soft Skills And Employability Skills (LAB): LEADERSHIP :** Qualities of a leader – Leadership and assertiveness – problem –solving and decision-making – Approaches to problem – solving and decision-making – Brainstorming – Cause-and-effect analysis	**CO-5 BTL-4**

TEXT BOOKS	
1	Brook-Hart, Guy (2019). Cambridge English Business Benchmark, Upper Intermediate. Cambridge University Press. India (Pages 208)
2.	Pillai, Sabina. Fernandez, Agna.(2018). Soft Skills And Employability Skills. Cambridge University Press. India. (Pages 208)
REFERENCE BOOKS	
1	Murphy, Raymond(2019). Intermediate English Grammar. Cambridge University Press. India. (Pages 350)
2	Barnes, D., (2020). Exploratory talk for learning in Mercer, N. and Hodgkinson, S. (eds) Exploring Talk in School. London: Sage Publications. (Pages 208)
3	Dhanavel. S P (2018). English and Soft Skills. Orient BlackSwan. India. (Pages 136)
4	Goldsmith, Marshall & M.S. Rao.(2020) Soft Skills: Enhancing Employability. Dreamtech Press. India (Pages 256)
E Books	
1	https://www.pdfdrive.com/basic-english-grammar-with-exercises-e12486779.html
2	http://dspace.vnbrims.org:13000/jspui/bitstream/123456789/4733/1/Leadership%20The%20Power%20of%20Emotional%20Intellegence.pdf
MOOC Courses	
1	https://www.edx.org/professional-certificate/ritx-communication-skills
2	https://www.coursera.org/specializations/people-and-soft-skills-for-professional-success

COURSE TITLE	**TECHNICAL GRAPHICS (FOR CIRCUIT BRANCHES)**			**CREDITS**	**3**
COURSE CODE	**EME51002**	**COURSE CATEGORY**	**ES**	**L-T-P-S**	**2-0-2-1**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-3**
ASSESSMENT SCHEME					
First Periodical Assessment (Theory + Practical)	**Second Periodical Assessment**	**Weekly assignment/Observation / lab records and viva as**	**Surprise Test/ Quiz etc., as**	**Attendance**	**ESE (Theory + Practical)**

	(Theory + Practical)	**approved by the DEC**	**approved by the DEC**		
15%	**15%**	**10%**	**5%**	**5%**	**50%**

Course Description	This course broadly introduces basic drawings, free hand sketching, electrical circuit drawings and PCB diagrams using computer aided design tools. It prepares the students to learn the basic concepts involved in technical drawing skills and computer graphics. It also emphasis the principles and basic understanding of orthographic and isometric projections.
Course Objective	1.To apply the AutoCAD commands to generate simple drawings and understand drafting techniques. 2.To apply the acquired knowledge to solve simple problems involving planes and solids. 3.To comprehend the various isometric projections and its developments 4.To draw electrical circuit drawings using software. 5.To generate associated views of PCB circuit drawings using CAD software.
Course Outcome	Upon completion of this course, the students will be able to 1.Demonstrate the concepts of Engineering graphics and projection of straight lines using CAD software 2.Visualize the objects and to draw by free hand sketching and to draw the projection of solids 3.Visualize solid objects in isometric view and to develop surfaces of simple solids. 4.Develop own electrical circuit drawings using software. 5.Develop printed circuit boards for the chosen circuit using software.

Prerequisites: Nil

CO, PO AND PSO MAPPING

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

CO-5	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**	**-**	**2**	**-**	**-**	**-**

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

MODULE 1: BASICS OF ENGINEERING GRAPHICS (6L + 6P =12)	
Relevance of Graphics in Industry - BIS conventions and specifications - drawing sheet sizes - Lettering – Dimensioning - Scales. Drafting methods - introduction to Computer Aided Drafting – Exposure to Solid Modelling software – Printer and Plotter – 3D printer. Introduction to Orthographic projections - Naming views as per BIS - First angle projection method. Projection of points and projection of Straight lines. ***Suggested Reading:*** *Solid modelling Software commands*	**CO-1 BTL-2**
MODULE 2: PROJECTION OF SOLIDS AND FREE HAND SKETCHING (6L + 6P =12)	
Projections of solids. Solids in simple positions and axis inclined to one plane only. (Manual and CAD Drawing) Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Pictorial Projection methods - Layout of views- Conversion of pictorial views to orthographic view. ***Suggested Reading:*** *Solids inclined to both the planes. Section of solids with sectional planes inclined to VP.*	**CO-2 BTL-2**
MODULE 3: ISOMETRIC VIEW AND DEVELOPMENT OF SURFACES (6L + 6P =12)	
Concepts of isometric projection. Isometric scale, Isometric view of simple solids with simple sectional planes. Development of Surfaces of simple solids with simple sectional planes. Parallel line method and Radial line method only. (Manual and CAD Drawing) ***Suggested Reading:*** Isometric view of solids with multiple sectional planes.	**CO-3 BTL-3**
MODULE 4: ELECTRICAL WIRING DRAWINGS (6L + 6P =12)	
Schematic Wiring: Ladders, Wire Type, Wire Numbers 3-Phase Circuits, Source and Destination Signal Arrows, Multi-Wire 3-Phase Circuits, Point-2-Point Connectors. Schematic Components: Schematic Symbol Annotation, Swap/Update Blocks, Insert a Schematic Component. ***Suggested Reading:*** *Electrical CAD commands, panel layout*	**CO-4 BTL-3**
MODULE 5: PRINTED CIRCUIT BOARD DRAWINGS (6L + 6P =12)	
PCB Drawings, Standards – Practices, Basics of Printed circuit board drawings: PCB design flow, Placement and routing, steps involved in layout design, art generation methods-Manual and CAD, General design factor for digital and analog circuits, Layout and artwork making for single side boards, Design specification standards. ***Suggested Reading:*** *Layout and artwork making for double side and Multi-layer boards.*	**CO-5 BTL-3**

TEXT BOOKS

1.	Jeyapoovan, T., Engineering Graphics and Design, Vikas Publishing House Pvt Ltd., New Delhi, 8th Edition, 2022.
2.	Electric CAD manual – Autodesk Inc., 2022.

REFERENCE BOOKS

1.	Alf Yarwood, Introduction to AutoCAD – 2D and 3D Design, Newnes Elsevier, 2011
2.	Bhatt N.D and Panchal V.M, Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House, 2019.
3.	Kirstie Plantenberg, Engineering Graphics Essentials, SDC Publications., fifth Edition, 2016.
E – Books	
1.	https://www.amazon.in/Technical-Drawing-Engineering-Graphics-International-ebook/dp/B00IZ0FZHA
2.	Eagle Manual for PCB Drawings - Autodesk Inc., 2022.
MOOC	
1.	http://nptel.ac.in/courses/112103019/
2.	https://nptel.ac.in/courses/112102304/

COURSE TITLE	**FAB LAB FOR ELECTRONIC ENGINEERS**			**CREDITS**	**2**
COURSE CODE	**EEC51400**	**COURSE CATEGORY**	**ES**	**L-T-P-S**	**0-1-2-2**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-3**

ASSESSMENT SCHEME

First Periodical Assessment	**Second Periodical Assessment**	**Weekly assignment/Observation / lab records and viva as approved by the Department Examination Committee "DEC"**	**Surprise Test / Quiz etc., as approved by the Department Examination Committee "DEC"**	**Attendance**	**End Semester Examination**
15%	**15%**	**10%**	**5%**	**5%**	**50%**

Course Description	The Fab Lab is intended to help the students to acquire the foundational knowledge necessary to comprehend the fundamentals of diodes, transistor. The course provide a comprehensive idea to the students to design, simulate and develop a simple electronic system prototype in perf-board.
Course Objective	1. To introduce the concepts of identification and testing of passive and active devices. 2. To interpret the VI characteristic of Diode and Transistor. 3. To have hands on experience in soldering. 4. To have hands on experience in design and prototyping of simple electronic system using perf-board. 5. To summarize the characteristics of electrical machines.

Course Outcome	**Upon completion of this course, the students will be able to** 1. Interpret the specification and testing of active and passive devices. 2. Judge the diode and transistor characteristic using Multisim software. 3. Use soldering machines for assembly of active and passive devices in perf-board and test for the functionality. 4. Design and demonstrate simple electronic system using dotted board. 5. Apply and summarize the basic characteristics of Electrical machines.

Prerequisites: N/A

CO, PO AND PSO MAPPING

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

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

MODULE 1: IDENTIFICATION OF ELECTRONIC COMPONENTS AND SMD DEVICES (3T+6P=9)

Identification, specifications, testing of R, L, C components, potentiometers, bread boards, PCBs, identification, specifications of active devices, diodes, BJTs, JFETs, LEDs, LCDs. Characteristics of Fluorescent, Tungsten and Carbon filament lamps. **Lab:** Testing of transistor using Digital Multimeter, ohmmeter	**CO1BTL-3**

MODULE 2: DIODE AND TRANSISTOR VI CHARACTERISTICS (3T+6P=9)

PN junction diode, depletion layer, Forward & Reverse bias, V - I Characteristic. CB, CE and CC Configurations and their Input and Output Characteristics, JFET and its characteristics. Lab: Analyze the VI characteristics of diode and transistor using MULTISIM software	**CO2 BTL-3**

MODULE 3: SOLDERING PRACTICE AND ELECTRICAL SAFETY PRECAUTIONARY (3T+ 6P=9)

Soldering stages: Surface Preparation, Component Placement, Apply Heat, Apply Solder and Remove Heat Lab: Soldering exercises through dotted boards using passive and active devices	**CO3 BTL-3**

MODULE 4: ELECTRONIC SYSTEM DESIGN (3T+ 6P=9)

Lab: Demonstrate a simple electronic system design using basic active and passive devices in dotted board.	**CO4 BTL-3**

MODULE 5: INTRODUCTION TO ELECTRICAL MACHINES (3T+ 6P=9)		
Demonstration of cut-out sections of machines: DC Machine (commutator-brush arrangement) and transformer, Induction Machine (squirrel cage rotor). Lab: Test on single-phase Energy Meter, winding of transformer.		**CO5 BTL-3**
TEXT BOOKS		
1	Satya Sai Srikant, Prakash Kumar Chaturvedi., (2020). *Basic Electronics Engineering*, Springer Singapore,1st edition.	
2	John Cadick,Mary Capelli-Schellpfeffer, Dennis Neitzel, Al Winfield.,(2018). *Electrical Safety Handbook*, McGraw-Hill Education, 4th Edition.	
REFERENCE BOOK		
1	Jens Lienig, Hans Bruemmer., (2017). Fundamentals of Electronic Systems Design, Springer, 1st edition	

COURSE TITLE	**DESIGN THINKING FOR ELECTRONICS ENGINEERS**			**CREDITS**	**2**
COURSE CODE	**EEC51402**	**COURSE CATEGORY**	**PC**	**L-T-P-S**	**0-1-2-1**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-4**

ASSESSMENT SCHEME

First Periodical Assessment	**Second Periodical Assessment**	**Weekly assignment/Observation / lab records and viva as approved by the Department Examination Committee "DEC"**	**Surprise Test / Quiz etc., as approved by the Department Examination Committee "DEC"**	**Attendance**	**End Semester Examination**
15%	**15%**	**10%**	**5%**	**5%**	**50%**

Course Description	Engineering design is the process of devising a system, component, or process to meet desired needs. This purpose of this course is to excite the student on creative design and its significance, to make the student aware of the processes involved in design, to make the student understand the interesting interaction of various segments of humanities, sciences and engineering in the evolution of a design and also to get an exposure as to how to engineer a design.

Course Objective	1. To facilitate on creative design and its significance 2. To familiarize the processes involved in design 3. To interpret the interaction of humanities, sciences and engineering in the evolution of design 4. To get an exposure to redesign and reuse concepts
Course Outcome	**Upon completion of this course, the students will be able to** 1. Apply the appropriate design functionalities in practice as per the design requirement. 2. Classify the product-centered and user-centered aspects of product. 3. Develop a prototype product using hardware/ software tool 4. Investigate the product for redesign or reuse 5. Classify technical, aesthetic and other properties as required as per Design-X constraints.
Prerequisites: Nil	

CO, PO AND PSO MAPPING

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

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

Module 1: Introduction to Engineering and Design objectives	**(3T+3P=6)**
Introduction to Engineering and project overview. **Design and its objectives**; Design constraints, Design functions, Design means and Design from; Role of Science, Engineering and Technology in design. 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. **Project:** A simple problem is to be taken up to examine different solutions-Rectifier device- Group Presentation and discussion	**CO-1** **BTL -3**
Module 2: Electronic System Design Processes	**(3T+6P=9)**
Design process- Different stages in design and their significance; Defining the design space; Analogies and "thinking outside of the box" **Design Communication**; Realization of the concept into a configuration, drawing and model. Concept of "Complex is Simple". **Design detailing**- Material selection, Design visualization- Solid modelling; Detailed 2D drawings; Tolerance; Use of standard items in design; Energy needs of the design Project: An exercise in the detailed design of any two customer products	**CO -2** **BTL-3**
Module 3: Development of Prototype product	**(3T+7P=10)**
Prototyping- prototype assignment and process flow; testing and evaluation of design; Design modifications if required; Freezing the design; Cost analysis. Use of hardware/	**CO-3** **BTL-4**

software tool to develop an electronic circuit. **Project:** Develop a simple application oriented electronic circuit	
Module 4: Redesign and environment aspects of product development (3T+7P=10)	
Design for "X"; covering quality, reliability, safety, manufacturing, assembly, maintenance, logistics, handling; disassembly; recycling; re-engineering etc.	**CO-4** **BTL-4**
Module 5: User centred Designs for Electronic System (3T+7P=10)	
Product centered and user centered design. Product centered attributes and user centered attributes. Example: Smart phone. Aesthetics and ergonomics. Value engineering, Concurrent engineering, Reverse engineering in design; Culture based design; Architectural designs; Role of colors in design. Intellectual Property rights – Trade secret; patent; copy-right; trademarks; product liability. Group presentation of any such products covering all aspects that could make or mark it. **Project:** Examine the possibility of value addition for an existing .	**CO-5** **BTL-3**

REFERENCE BOOKS

1	Dym, C. L., Little, P. and Orwin, E. J., (2013). *Engineering Design - A Project based introduction* – Wiley Publications,4th edition.
2	Eastman, C. M. (Ed.), (2012). *Design for X Concurrent engineering imperatives*, Springer Publications, 11th edition.
3	Haik, Y. And Shahin, M. T., (2011*).Engineering Design Process*, Cengage Learning(CL-Engineering), 2nd edition.
4	Pahl, G., Beitz, W., Feldhusen, J. and Grote, K. H., (2007) *Engineering Design: A Systematic Approach*, Springer Publications,3rd Edition.
5	Voland, G.,(2004*). Engineering by Design*, Pearson India, 2nd edition.

TEXT BOOK

1	Balmer, R. T., Keat, W. D., Wise, G., and Kosky, P.,(2015). *An Introduction to Engineering and Design* ,Academic Press,3rd Edition .

E-BOOKS

1	https://focusu.com/download-design-thinking/
2	https://i.experiencepoint.com/free-pdf-download-design-thinking-101-ebook
3	https://www.researchgate.net/publication/329310644_Handbook_of_Design_Thinking

MOOC

1	https://iversity.org/en/courses/design-thinking-2nd-iteration
2	https://www.mooc-list.com/tags/design-thinking

SEMESTER II

<table>
<tr><td>COURSE TITLE</td><td colspan="3">ANALYTICAL MATHEMATICS (Common to ALL B. Tech)</td><td>CREDITS</td><td colspan="2">4</td></tr>
<tr><td>COURSE CODE</td><td>EMA51002</td><td>COURSE CATEGORY</td><td>BS</td><td>L-T-P-S</td><td colspan="2">3-0-2-1</td></tr>
<tr><td>Version</td><td>1.0</td><td>Approval Details</td><td></td><td>LEARNING LEVEL</td><td colspan="2">BTL-3</td></tr>
<tr><td colspan="7">ASSESSMENT SCHEME</td></tr>
<tr><td colspan="5">CIA</td><td colspan="2">ESE</td></tr>
<tr><td>First Periodical Assessment (Theory)</td><td>Second Periodical Assessment (Theory)</td><td>Practical Assessments</td><td>Observation / Lab records as approved by the Department Examination Committee “DEC”</td><td>Attendance</td><td>End Semester Examination (Theory)</td><td>End Semester Examination (Practical)</td></tr>
<tr><td>15%</td><td>15%</td><td>10%</td><td>5%</td><td>5%</td><td>25%</td><td>25%</td></tr>
<tr><td>Course Description</td><td colspan="6">To make the student understand the basic analytical mathematical skills that is imperative for effective understanding of engineering subject using MATLAB.</td></tr>
<tr><td>Course Objective</td><td colspan="6">1. To implement problem solving skills using vectors
2. To provide an exposure on the concepts of complex variables, conformal mapping and bilinear transformation.
3. To comprehend integrals using Cauchy’s integral and residue theorem.
4. To illustrate the applications of Laplace Transforms
5. To make the students understand the concept of Fourier series</td></tr>
</table>

Course Outcome	Upon completion of this course, the students will be able to 1. Verify the standard theorems in Vector Calculus and apply them to evaluate surface area and volume. 2. Construct an analytic function when real and imaginary parts are given. 3. Evaluate finite integrals using Cauchy's theorem. 4. Solve the system of ordinary differential equations using Laplace Transform 5. Expand the Fourier series for the given function.

Prerequisites: Knowledge in single-variable calculus.

CO, PO AND PSO MAPPING

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

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

MODULE 1:VECTOR CALCULUS (9L+6P)

Gradient, Divergence and Curl – Unit normal vector, Directional derivative – angle between surfaces- Irrotational and Solenoidal vector fields. Green's theorem - Gauss divergence theorem and Stoke's theorem (without proof) – Verification and evaluation of the above theorems - Simple applications to regions such as square, rectangle, triangle, cuboids and rectangular parallelopipeds. Suggested Reading: Basics of Vectors **Lab: Gradient, Divergence, Curl, Irrotational and Solenoidal vector fields**	**CO-1 BTL-3**

MODULE 2: COMPLEX VARIABLES (9L+6P)

Functions of a complex variable – Analytic function - Cauchy - Riemann equations – Properties of analytic function (Statement Only) – Construction of Analytic functions by Milne – Thomson method – Conformal Mapping – Mapping by functions $w = z + c, w = cz, w = 1/z$, Bilinear transformation. Suggested Reading: Complex Numbers **Lab: Verification of Analytic Function**	**CO-2** **BTL-3**
MODULE 3: COMPLEX INTEGRATION	**(9L+6P)**
Statement and Application of Cauchy's Integral theorem and integral formula (without proof)-Evaluation of integrals using the above theorem-Taylor and Laurent series expansions-Singularities-Classification. Residues-Cauchy's residue theorem (without proof)-Contour integration over unit circle and semicircular contours (excluding poles on boundaries) Suggested Reading: Types of integration **Lab: Evaluation of integrals using Cauchy's Integral formula and Cauchy's residue theorem.**	**CO-3** **BTL-3**
MODULE 4: LAPLACE TRANSFORMS	**(9L+6P)**
Laplace transform – Conditions of existence – Transform of elementary functions – properties – Transforms of derivatives – Initial and final value theorems – Transform of periodic functions. Inverse Laplace transforms using partial fraction and convolution theorem. Solution of linear ODE of second order with constant coefficients. Suggested Reading: Basics of Transform **Lab: Solutions of differential equations using Laplace transform**	**CO-4** **BTL-3**
MODULE 5: FOURIER SERIES	**(9L+6P)**
Dirichlet's Conditions – General Fourier Series – Odd and even functions – Half range sine and cosine series –Harmonic Analysis. Suggested Reading: Basics of series **Lab: Finding Fourier Series**	**CO-5** **BTL-3**
TEXT BOOKS	

1.	A. Chandrasekaran, G. Kavitha (2022), *Analytical Mathematics*, Dhanam Publications, 1st Edition, Chennai.
2.	T. Veerarajan (2016), *Engineering Mathematics-II*, McGraw Hill Education (India), Private Limited, 4th Edition, New Delhi.
3.	Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma (2016), *MATLAB and its Applications in Engineering*, Pearson Publication, 2nd Edition, New Delhi.
4.	D. G. Duffy (2021), *Advanced Engineering Mathematics With MATLAB (Advances in Applied Mathematics)*, Chapman and Hall Publisher, 5th Edition, CRC Press, USA.
REFERENCE BOOKS	
1.	P. Sivarama Krishna Das, C. Vijayakumari (2017), *Engineering Mathematics*, 1st Edition, Pearson Publishing, Chennai.
2.	A. P. Santhakumaran, P. Titus P (2017), *Engineering Mathematics – II*, NiMeric Publications, 2nd Edition, Nagercoil, India.
3.	Kreyszig Erwin (2016) *Advanced Engineering Mathematics*, John Wiley and Sons, 10th Edition, New Delhi.
4.	S.S. Sastry (2015), *Engineering Mathematics*, Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi.
E BOOKS	
1. 2. 3. 4.	http://ggn.dronacharya.info/APSDept/Downloads/QuestionBank/Mathematics-I/SectionD.pdf. https://people.math.sc.edu/girardi/m7034/book/AshComplexVariablesWithHyperlinks.pdf https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/pages/unit-iii-fourier-series-and-laplace-transform/ https://www.pdfdrive.com/calculus-ii-sequences-and-series-e11676778.html
MOOC	
1.	https://www.edx.org/course/introduction-engineering-mathematics-utarlingtonx-engr3-0x

COURSE TITLE	**ENGINEERING MATERIALS (Common to ALL B.Tech.)**			**CREDITS**	**4**
COURSE CODE	**ECT51001**	**COURSE CATEGORY**	**BS**	**L-T-P-S**	**3-0-2-2**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-3**
ASSESSMENT SCHEME					

First Periodical Assessment (Theory)	Second Periodical Assessment (Theory)	Practical Assessments	Observation / lab records as approved by the Department Examination Committee "DEC"	Attendance	ESE
15%	15%	10%	5%	5%	Theory 25% Practical 25%

Course Description	**To expose the students to the basics of Engineering Materials and their applications.**
Course Objective	1. To make the students understand the basics of crystal structure and phase rule. 2. To provide a knowledge on the theoretical basis of the chemical composition, properties and applications of abrasives, adhesives, lubricants and refractories. 3. To give a strong foundation on the basic concepts of nanomaterials, the general synthetic methods with emphasis on their applications. 4. To provide an exposure on the fundamentals and applications of polymeric materials and composites. **5.** To illustrate the applications of energy materials, liquid crystals and conducting polymers with a good exposure on their basic terminologies.
Course Outcome	on completion of this course, the students will be able to 1. Propose and justify suitable metals/materials for alloying. 2. Distinguish and select a suitable material as abrasives / adhesives / lubricants / refractories based on its properties and applications. 3. Select an appropriate technique for nanomaterial synthesis and characterization. 4. State and select a suitable polymeric / composite material for industrial applications. **5.** Develop the suitable organic/inorganic materials that can be employed in energy storage / production and electronic devices.

Prerequisites: Knowledge in fundamentals of chemistry at higher secondary level.

CO, PO AND PSO MAPPING

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

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

MODULE 1: CRYSTAL STRUCTURE AND PHASE RULE (9L + 6P)

Basic crystal systems – Types, characteristics, examples – Space lattice, Unit cell – types – X-ray diffraction and crystal structure. Phase rule: 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. Practical component: Construction of phenol-water phase diagram - Determination of apparent density of porous solids.	**CO-1** **BTL-3**
MODULE 2: ABRASIVES, ADHESIVES, LUBRICANTS AND REFRACTORIES	**(9L + 6P)**
Abrasives – Classification, Properties, Uses – Adhesives – Development of Adhesive strength, Physical and Chemical factors influencing adhesive action, Classification of Adhesives – Epoxy Resin (Preparation, Properties and Applications) – Lubricants – Mechanism of Lubrication, Classification and Properties, Semi Solid Lubricants, Solid Lubricants, MoS_2 and Graphite - Refractories – Classification, Properties, Applications. Practical components: Preparation of urea-formaldehyde resin - Determination of porosity of a refractory	**CO-2** **BTL-3**
MODULE 3: NANOMATERIALS	**(9L + 6P)**
Introduction – Scope of nanomaterials - Types of nanomaterials - Synthesis of Nanomaterials - Bottom-up and Top-down approaches – Methods of preparation – Laser ablation, Sol-gel process, Gas-phase condensation, Chemical Vapour Deposition. Properties **–** Optical, Electrical, Magnetic, Chemical properties (introduction only). Characterization **–** UV-Visible spectroscopy, FE-SEM and TEM (Principle and Applications only). Practical component: Preparation of ZnO nanoparticles by wet chemical method – Verification of Beer-Lambert's law using silver nanoparticles.	**CO-3** **BTL-3**
MODULE 4: POLYMERS AND COMPOSITES	**(9L + 6P)**
Introduction – Basic definitions – Classification of polymers – Structure and property relationship of polymers – Plastics – Synthesis, properties and applications of polycarbonates and phenol-formaldehyde - Biodegradable Polymers, examples and applications. Composites - Introduction - Definition – Constituents – Classification - Fiber-reinforced Composites –Types and Applications. Practical components: Determination of molecular weight / viscosity of polymer using Ostwald Viscometer.	**CO-4** **BTL-3**
MODULE 5: MATERIALS FOR ENERGY AND ELECTRONIC APPLICATIONS	**(9L + 6P)**
Energy storage materials – Metal-hydride batteries, Li-batteries - Materials for solar cells: Semi-conductors - Materials for hydrogen technology - production	**CO-5**

(electrolysis), storage (hydrides), fuel cells. Liquid Crystals - Introduction – Characteristics – Optical properties- Classification – Chemical constitution and liquid crystalline behaviour - Applications. Conducting Polymers: Classification, Intrinsic Conducting Polymers, Extrinsic Conducting Polymers, Applications. Practical component: Preparation of polyaniline / Polypyrrole.	**BTL-3**

BOOKS	
1.	Jain, P.C., Jain, M. (2018). *Engineering Chemistry*, Dhanpat Raj Publishing Company (P) Ltd, New Delhi, 17th Edition.
2.	Puri, B. R., Sharma, L. R., Pathania, M. S. (2020). *Principles of Physical Chemistry*, Vishal Publishing Co. Jalandhar, 47th Edition.
3.	Rangwala. (2017). *Engineering Materials*, Charotar Publishing House Pvt. Ltd, 43rd Edition.
RENCE BOOKS	
	Clyne, T. W., Hull, D. (2019). *An introduction to composite materials*, Cambridge University Press, 3rd Edition.
	Shah, M. A., Ahmad, T. (2021). *Nano Science & Technology*, Dreamtech Press, 2021 Edition.
	Palanna, O. G. (2018). *Engineering Chemistry*, Mc Graw Hill Education (India) Pvt. Ltd, 2nd Edition.
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`
MOOC	
1.	https://www.edx.org/course/materials-science-engineering-misisx-mse1x
2.	https://www.mooc-list.com/tags/materials-science

COURSE TITLE	**CIRCUITS AND NETWORKS**			**CREDITS**	**4**
COURSE CODE	**EEE51001**	**COURSE CATEGORY**	**PC**	**L-T-P-S**	**3-0-2-1**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-4**

ASSESSMENT SCHEME

First Periodical Assessment	**Second Periodical Assessment**	**Seminar/ Assignments/ Project/Practical**	**Surprise Test / Quiz**	**Attendance**	**ESE**
15%	**15%**	**10%**	**5%**	**5%**	**50%**

Course Description	The course begins with description with circuit elements , sources. Understanding of various interesting network theorems applied to solve linear, time invariant network problems efficiently in time and s-domain
Course Objective	1. To learn a number of powerful engineering circuit analysis techniques such as nodal analysis,mesh analysis, theorems, source transformation and several methods of simplifying networks. 2. To understand the concept of graphical solution to electrical network 3. To understand frequency response in electrical circuits 4. To understand the Different types of two-port network analysis using network parameters, with different types of connections.
Course Outcome	Upon completion of this course, the students will be able to 1. Familiarize the basic laws, source transformations, theorems and the methods of analyzing electrical circuits. 2. Describe on various electrical theorems to find voltage, current and power through any element 3. Describe resonance and coupled circuits 4. Evaluate Application of Laplace transform in analyzing the circuits. 5. Analyze various parameters of two port networks and interconnection of two port networks.

Prerequisites: Nil

CO, PO AND PSO MAPPING

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

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

MODULE I: BASIC CIRCUIT ANALYSIS (6L+ 6P)

Fundamental concepts of R, L and C elements, Ohm's Law - Kirchoffs laws - DC circuits, series and parallel circuits - loop and nodal analysis, A.C circuits - complex impedance - phasor diagram, real and reactive power - loop and nodal analysis applied to AC circuits. **Lab Experiments** 1. Verification of Kirchhoff's Laws 2. Verification of Mesh current and node voltage method	**CO-1** **BTL-3**

MODULE II: NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS (6L+ 6P)

Voltage source –current source transformations, Star-delta transformations, Various Network theorems and applications to dc and ac circuits: Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, and Maximum power transfer theorem. **Lab Experiments** 1. Verification of Thevenin's and Norton & Theorem 2. Verification of Superposition theorem and Maximum power transfer theorem	**CO-2** **BTL-4**
MODULE III: RESONANCE AND COUPLED CIRCUITS	**(6L+ 6P)**
Resonance in series and parallel circuits, self and mutual inductances, coefficient of coupling - dot convention - analysis of coupled circuits. **Lab Experiments** 1. Frequency response of Series and Parallel resonance circuits 2. Frequency response of Single tuned coupled circuits	**CO-3** **BTL-4**
MODULE IV: TRANSIENT RESPONSE FOR DC CIRCUITS	**(6L+ 6P)**
Time response of RL, RC and RLC circuits using Laplace transform for step and sinusoidal inputs. **Lab Experiments** 1. Transient response of RL and RC circuits for DC input	**CO-4** **BTL-4**
MODULE V: TWO PORT NETWORKS	**(6L+ 6P)**
Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid(H) Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks. **Lab Experiments** 1. To calculate and verify 'Z' parameters of two-port network 2. To calculate and verify 'H' parameters of two-port network 3. Electrical circuit simulation using Multisim	**CO-5** **BTL-4**
TEXT BOOKS	
1	Hayt, W. H, Kemmerly J. E. & Durbin, (2013) 'Engineering Circuit Analysis', McGraw Hill Publications, 8th Edition
2	Charles K. Alexander, Matthew N. O. Sadiku, (2007) 'Fundamentals of Electric Circuits', McGraw-Hill Publications, 3rd Edition
REFERENCE BOOKS	
1	Robins & Miller, 'Circuit Analysis Theory and Practice', (2012) Delmar Publishers, 5th Edition.
2	Sudhakar A and Shyam Mohan SP, Circuits and Network Analysis and Synthesis, (2007) Tata McGraw Hill
E BOOKS	

1	https://ia800708.us.archive.org/25/items/EngineeringCircuitAnalysis_280/HaytKemmerly-EngineeringCircuitAnalysis.pdf
2	Solutions of Fundamentals of Electric circuits Alexander-https://docs.google.com/file/d/0B21HoBq6u9TsYUt2cW9RZEs5UEk/edit
3	Circuit analysis,Robins miller-https://drive.google.com/file/d/0B7qpgUTOwkAdMnpFZlYyWTg3U2s/view
MOOC	
1	https://www.mooc-list.com/course/6002x-circuits-and-electronics-edx
2	https://www.mooc-list.com/course/linear-circuits-1-dc-analysis-coursera
3	http://www.nptel.ac.in/courses/108102042/

COURSE TITLE		**Basic Tamil**			**CREDITS**	**2**
COURSE CODE	**ELS51003**	**COURSE CATEGORY**	**HS**	**L - T – P – S**	**2 – 0 – 0 – 1**	
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL- 3**	

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz etc., as approved by the Department Examination Committee "DEC"	Attendance	End Semester Examination ESE
15%	15%	10%	5%	5%	50%

Course Description	This Tamil course improves Tamil language skills of the students' Tamil letters and Grammar are included. This course provides an opportunity not only to get interest in learning Tamil Language but also they can learn to converse easily.
Course Objective	1. By studying this course, students will be able to write and speak Tamil easily in any situation, daily life and daily conversations. 2. Develops language and interest in learning in students. 3. Facilitates students to create opportunities for themselves in the society. 4. Students also learn Tamil literature by developing interest in language department. 5. This lesson plan helps the students to learn about the culture by learning the Tamil language.
Course Outcome	Upon completion of this course, the students will be able to 1. Demonstrate the Letters and basic words of Tamil Language which are in daily use 2. Develops the listening skills of Tamil language 3. Utilize the letters and common words of the language for communication 4. Develop the conversational skills 5.Demonstrate the skill of reading and writing
Prerequisites: Plus Two -Intermediate Level	
CO, PO AND PSO MAPPING	

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	2	3	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	2	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	3	2	3	-	-	-

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

அலகு - 1 தமிழ் எழுத்துக்கள்	**(9L)**
தமிழ் எழுத்துக்கள் – ஓசைகள்-எண்கள் – வண்ணங்கள் – வடிவங்கள் - ஓர் எழுத்து சொற்கள் - பழங்கள் மற்றும் காய்கறிகள் – மலர்கள் – இயற்கை - மாதங்கள் சொற்கள் - பெயர்சொற்கள் – உரிச்சொற்கள் – வினைச்சொற்கள் – காலங்கள் - வாழ்த்துக்கள் . **வகுப்பறை செயல்முறைகள் :** 1. வார்த்தைகளை வட்டமிடுதல். 2. விடுபட்ட எழுத்துகளை நிரப்புக. 3. வடிவங்களுக்கு வண்ணம் தீட்டுக.	**CO-1** **BTL-1**
அலகு - 2 கேட்டல் மற்றும் உச்சரித்தல்	**(9L)**
உயிரெழுத்துக்கள், மெய்யெழுத்துகள் மற்றும் உயிர்மெய் எழுத்துக்களை உச்சரித்தல் - சிறுகதைகள் வாசித்தல் – எதிர்ச்சொற்கள் -பொருள்தருக – வாக்கியத்தில் அமைத்து எழுதுதல் – ஒரு சொல்லில் விடையளித்தல். **வகுப்பறை செயல்முறைகள் :** 1. சொற்களை கேட்டு உச்சரிக்க செய்தல். 2. குழுவிவாதம் செய்தல். 3. கோடிட்ட இடங்களை சரியான சொற்களைக் கூறுதல்	**CO-2** **BTL-2**
அலகு -3 எழுத்துப் பயிற்சி	**(9L)**
தமிழ் எழுத்துக்களை எழுத கற்பித்தல்- ஊயிர் எழுத்துகள்-மெய் எழுத்துக்கள-, உயிர்மெய் எழுத்துக்கள்- ஆயுத எழுத்து-சார்பெழுத்துக்கள்-ஒற்றெழுத்துக்கள்-ஒரு சொல் -இரு சொல் எழுதுதல்-ஒருவரி,இருவரி எழுதுதல் . **வகுப்பறை செயல்முறைகள்:** 1. கோடிட்ட இடங்களை நிரப்புக. 2. சரியான எழுத்துக்களை வட்டமிடுதல். 3. ஒருவரி சொற்களை எழுதுதல்.	**CO-3** **BTL-3**
அலகு - 4 உரையாடல்கள் கற்பித்தல்	**(9L)**
சிறு உரையாடல்கள் கற்பித்தல் – வாழ்த்துக்கள் - வங்கியில் பணம் செலுத்துதல் - சந்தையில் கடைகாரரிடம் உரையாடுதல், பொது இடங்களில் உரையாடுதல். **வகுப்பறை செயல்முறைகள்:** 1. குறு நாடகங்கள் நடித்து உரையாடல்கள் கற்பித்தல். 2. விண்ணப்ப படிவங்கள் பூர்த்தி செய்தல்.3. மின்னல் அட்டைகள் காண்பித்தால்.	**CO-4** **BTL-2**

அலகு- 5 தமிழ் வாசிக்க மற்றும் எழுத கற்பித்தல்:	**(9L)**
கடிதங்கள் வாசித்தல் மற்றும் எழுதுதல் – விண்ணப்ப கடிதம்,வங்கிகணக்கு படிவம்கள் ,இரயில் முன்பதிவு விண்ணப் படிவம் பூர்த்திசெய்தல் - கவிதை படித்தல் - செய்திதாள் வாசித்தல். **வகுப்பறை செயல் முறைகள்**: 1. விண்ணப்ப படிவங்கள் பூர்த்திசெய்தல். 2. கவிதை வாசித்தல் போட்டிகள் 3. வகுப்பறை தேர்வுகள்	**CO-5** **BTL-4**

TEXT BOOK	
1.	Saidhai. P.Sundaramurthy (2018). Learn Tamil Through english. Manimekalai Prasuram. Chennai - 17.Pages 1 to 84
2.	Pulavar Kulanthai (2020). Students Basic Tamil. Manimekalai Prasuram. Chennai -17. Pages1 to 84
REFERENCE BOOKS	
1.	Lenatamilvanan. (2017). Easy Tamil Grammar. Manimekalai Prasuram, Chennai -17, Pages 11 to 21
2.	Tamilnadu Board - NCERT/CBSE-Books Class – 6th TO 9th (2021-2022)
E-REFERENCES	
1	https://cbsetamil.com/cbse-tamil-book/,https://tamil.examsdaily.in/tnpsc-tamil-ilakkanam-material-pdf-download

COURSE TITLE		**Hindi**			**CREDITS**	**2**
COURSE CODE	**ELS51004**	**COURSE CATEGORY**	**HS**	**L - T – P – S**		**2 – 0 – 0 – 1**
VERSION	**1.0**	**APROVAL DETAILS**	**35th ACM 6th Aug. 2022**	**BTL LEVEL**		**3**

ASSESSMENT SCHEME					
First Periodical Assessment	**Second Periodical Assessment**	**Seminar/ Assignments/ Project**	**Surprise Test / Quiz etc., as approved by the Department Examination Committee "DEC"etc.,**	**Attendance**	**End Semester Examination ESE**
15%	**15%**	**10%**	**5%**	**5%**	**50%**

Course Description	This course has been designed to develop the regional language skills of the students. The course includes Hindi language, literature, vocabulary and grammar. This course teaches students how to communicate accurately, appropriately and fluently in regional language.
Course Objective	. To provide an environment to Speak and write in Hindi 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 texts. . To help student to become sensitive to the requirements of the society and respond to it in a constructive way. . To provide an environment to students to read and appreciate the literature.
Course Outcome	pon completion of this course, the students will be able to 1. Demonstrate the ability to write the grammatically correct sentences with accuracy. 2. Integrating various components of Hindi Language and determining it through reading and listening. 3. Organize and articulate ideas, concepts, and perceptions in a comprehensive manner in written correspondence, and speaking in formal and informal situations. 4. Infer details from after listening and reading and implement it in various professional situations. 5. Develop writing and speaking skills.

Prerequisites: Plus Two -Intermediate Level

CO, PO AND PSO MAPPING

CO	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO-9	PO 10	PO11	P O 1 2	PSO1	PSO2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	2	3	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	2	-	-	3	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	2	-	-	-

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

मॉड्यूल 1: **हिंदी पत्र और लिपि** (6 L)	
हिंदी स्वर और व्यंजन अक्षर - आश्रित स्वर सीखें - व्यंजन और व्यंजन समूह - अनुस्वर व्यंजन - संज्ञा - सर्वनाम - क्रिया (भविष्य) - संभावित विशेषण - काल - हिंदी के त्वरित नियम - अभिवादन - 2 अक्षर शब्द बनाना, 3 अक्षर शब्द - हर दिन शब्दावली - संख्याएं - रंग - परिवार - वस्त्र - बगीचा - घर - फल और सब्जियां - प्रकृति **सुझाई गई गतिविधियां:** देशी वक्ताओं द्वारा स्वर और व्यंजन का उच्चारण सुनना स्वर और व्यंजन के वीडियो, 2 अक्षर और 3 अक्षर के शब्द, और प्रतिदिन प्रयोगार्थ शब्दावली	CO-1 BTL-2
मॉड्यूल 2: **सुनने का कौशल** (6 L)	
स्वर और व्यंजन का उच्चारण सुनना - लघु कथाएँ सुनना - साक्षात्कार - भाषण - सामाजिक मुद्दों पर	CO-2

पॉड वार्ता - नर्धिारति पाठों को सुनना: इकाई 1 सभ्यता का रहस्य, इकाई 2 - युवावों से - वार्तालापों को सुनना - जानकारी सुनना - सम्मेलनों के भाषण **सुझाई गई गतविधियिां**: सुनें और चुनें उम्मीदवार पाठ को सुनते हैं और तीन वकिल्पों के साथ बहुवकिल्पीय प्रश्न का उत्तर देते हैं। उम्मीदवार टीवी चैनलों में बातचीत - साक्षात्कार- अतथिि व्याख्यान, सम्मेलनों और कार्यशालाओं के दौरान वशिषज्ञों के भाषण सुनते हैं	BTL-3
मॉड्यूल 3: बोलने का कौशल	(6 L)
औपचारकि संवाद - अनौपचारकि संवाद - लगि रूपों के साथ बोलना - संख्या - काल - परविार, शहर, त्योहारों, शौक आदि जैसे सामान्य वषियों पर बोलना - पसंद और नापसंद व्यक्त करना - ज़रूरतें और संपत्ति - भूमकिा नभिाना। **सुझाई गई गतविधियिां:** प्रस्तुति – कार्यक्रमों का संचालन - भाषण देना	CO-3 BTL-3
मॉड्यूल- 4 : **पढ़ने का कौशल**	(6 L)
नमूना पढ़ना - नकल पढ़ना - अक्षरों और शब्दों का सही उच्चारण करना - पढ़ने में प्रवाह - कहानयिाँ पढ़ना- संपादकीय, समाचारपत्र के लेख पढ़ना। **सुझाई गई गतविधियिां** फ्लैशकार्ड का उपयोग - चार्ट - चत्रिों की पहचान करना - शब्दों को पढ़ना	CO-4 BTL-3
मॉड्यूल-5 **लेखन कौशल**	(6 L)
सामान्य पत्राचार - पत्र लेखन: छुट्टी लेने पत्र, बैंक खाता खोलना, पुस्तकें मंगवाने के लिए पत्र, शकिायत पत्र - संकेत वकिास - ज्ञापन - नोटसि **सुझाई गई गतविधियिां:** नर्धिारति पाठ्यपुस्तक के अनुसार अभ्यास पूरा करना	CO-5 BTL-3

पाठ्य पुस्तक

1.	Sashtri. S.R.(2019). Hindi Shikshak, Dakshina Bharat Hindi Prachar Sabha, Chennai (Pages 137)

संदर्भ पुस्तकें

1.	Prathamatic Patya Pushthak. (2022), Dakshina Bharath Hindi Prachar Sabha, Chennai. (Pages 168)
2.	Madhyama Patya Pushthak. (2022) Dakshina Bharath Hindi prachar Sabha, Chennai (Pages 184)

ई-संदर्भ

1.	https://www.hindipod101.com/

COURSE TITLE	**TELUGU**			**CREDITS**	**2**
COURSE CODE	**ELS51005**	**COURSE CATEGORY**	**HS**	**L - T – P – S**	**2 – 0 – 0 – 1**
Version	**1.0**	**Approval Details**	**35th ACM 6th Aug. 2022**	**BTL LEVEL**	**3**

ASSESSMENT SCHEME					
First Periodical Assessment	**Second Periodical Assessment**	**Seminar/ Assignments / Project**	**Surprise Test / Quiz etc., as approved by the Department Examination Committee "DEC"etc.,**	**Attendance**	**ESE**
15%	**15%**	**10%**	**5%**	**5%**	**50%**

Course Description	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 skills and knowledge of grammar and vocabulary. This course teaches students how to communicate accurately, appropriately and fluently in professional and social situations.
Course Objectives	1. This course is aimed to teach the basic Telugu language speaking skills. 2. It will introduce basic skills of the Telugu Language: its alphabets, essential words and simple sentence construction methods. 3. The course intends to facilitate students in acquiring foundational skills of reading, writing and speaking Telugu along with synonyms to expand vocabulary.
Course Outcome	Upon completion of this course, the students will be able to 1. Demonstrate the basic skills of Letters and sounds in Telugu. 2. Develop the basic vocabulary for everyday's conversation. 3. Construct simple Telugu sentences with the simple words. 4. Utilize the words that have conjunct character, and can learn functional, everyday conversation**.** 5. Construct Simple sentences for delivering appropriate meaning.

Prerequisites: Plus Two Telugu-Intermediate Level

CO, PO AND PSO MAPPING

CO	PO 1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PO 9	PO1 0	PO 11	PO12	PSO1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-
CO2	-	-	-	-	-	-	-	2	2	3	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-
CO4	-	-	-	-	-	-	2	-	-	3	2	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	2	1	-	-

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

భగము 1 : వినడం, చెప్పడం మరియు
రాయడం (6L)

తెలుగు అచ్చులు & హల్లులు శబ్దాలు ధ్వనిచిత్రంతో పాటు తెలుగు హల్లుల సంయోగాల పరిచయం సూచించబడిన : కార్య కలాపాలు	**CO-1** **BTL-2**

చర్చలు : 5 గంటలు . అసైన్‌మెంట్‌లు / వ్యాజెంటేషన్ - 5 గంటలు	
భగము 2 : పేర్ల పదలకు, సంఖ్యలకు, మరియు వటి గుణాల పరిచయం (6L)	
తెలుగు నామవాచకం పరిచయం తెలుగు సర్వనామం & దని విషయం సంఖ్యలు దని పరిచయం & తెలుగు విశేషణాలు పరిచయం సూచించబడిన : కర్య కలాపాలు చర్చలు : 5 గంటలు . అసైన్‌మెంట్‌లు / వ్యాజెంటేషన్ - 5 గంటలు	**CO-2** **BTL-3**
భగము 3 : పదలను విడదీని వక్యాలను రయడం (6L)	
తెలుగు పూర్వ పదాలు – సంయోగాలు మరియు దని ఉపయోగం సూచించబడిన : కర్య కలాపాలు చర్చలు : 5 గంటలు . అసైన్‌మెంట్‌లు / వ్యాజెంటేషన్ - 5 గంటలు	**CO-3** **BTL-3**
భగము 4 : పనులు, సమయం, క్రియ మరియు కల వ్యయధుల పరిచయం (6L)	
వివిధ క్రియల యొక్క క్రియ & సమయం / కల సంయోగాలనికి పరిచయం సూచించబడిన : కర్య కలాపాలు చర్చలు : 5 గంటలు . అసైన్‌మెంట్‌లు / వ్యాజెంటేషన్ - 5 గంటలు	**CO-4** **BTL-3**
భగము 5 : తెలుగు చదవడం, రయడం మరియు వ్యాఖ్యానించడం (6L)	
తెలుగులో సరళమైన వక్యాలను రూపొందించడం (వ్యాధమిక వక్య నిర్మాణ నియమాలు) తెలుగులో వ్యాతీకూల వక్యాలును రూపొందించడం తెలుగు బోధన అభ్యాస వ్యాక్రియలో వ్యాఖ్యానార్ధకవక్యాలువక్యాలను రూపొందించడం సూచించబడిన : కర్య కలాపాలు చర్చలు : 5 గంటలు . అసైన్‌మెంట్‌లు / వ్యాజెంటేషన్ - 5 గంటలు	**CO-5** **BTL-3**
TEXT BOOK	

1.	Telugu Akademy. (2018). Sampradaya Telugu Vyakaranalu. Telugu Akademy. Vijayawada, Andhra Pradesh. India.
2.	Raghavendra. A. (2019). Telugu Vyakaranam. Prajasakti Book House. Tadepalli.
REFERENCE BOOKS	
	Ramarao, Chekuri. (2019). A Reference Grammar of Modern Telugu. Emesco Books. Hyderabad
	Vemuri, V. Rao. (2020). Learn Telugu with Its Grammar, Eco Foundation, Vijayawada.
E-References	
1	https://sarkarihelp.com/telugu-grammar-pdf-download/

COURSE TITLE	**INNOVATION LAB FOR ELECTRICAL ENGINEERS**			**CREDITS**	**2**
COURSE CODE	**EEE51401**	**COURSE CATEGORY**	**ES**	**L-T-P-S**	**0-1-2-2**
Version	**1.0**	**Approval Details**		**LEARNING LEVEL**	**BTL-3**

ASSESSMENT SCHEME

Experimental	**Calculation**	**Result**	**Viva**	**Record**	**ESE**
30%	**10%**	**10%**	**20%**	**10%**	**20%**

Course Description	This course focuses on basic Electrical Engineering design
Course Objective	• This course provides a solid foundation in core electrical engineering disciplines, critical thinking and problem-solving skills. • Through the academic program students also develop excellent practical skills, learn to work as a team and project management.
Course Outcome	After successful completion of the course, student will be able to CO1. Identify and use common electrical components. CO2.Develop electrical networks by physical connection of various components and analyze the circuit behaviour. CO3.Apply and analyze the basic characteristics of transformers and electrical machines
Prerequisites:	

CO, PO AND PSO MAPPING

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

CO-2	2	2	2	2	-	-	-	-	2	-	-	1	1	1	1
CO-3	2	2	-	2	-	-	-	-	2	-	-	1	2	1	1

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

MODULE 1 (9 Hrs)	
• Basic Electrical safety (precautionary measurements, Bonding and Earthing) • Introduction to Measuring Instruments – Voltmeter, Ammeter, Multimeter, Wattmeter,	**CO-1 BTL-3**
MODULE 2 (9 Hrs)	
• Performances of Passive Elements (Resistor, Capacitor, Inductor) • Characteristics of Fluorescent, Tungsten and Carbon filament lamps.	**CO-2 BTL-2**
MODULE 3 : (9 Hrs)	
• Demonstration of cut-out sections of machines: DC Machine (commutator-brush arrangement), Induction Machine (squirrel cage rotor). • Test on single-phase Energy Meter.	**CO-3 BTL-3**
TEXT BOOK	
1.	John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, Al Winfield (2018) ,'Electrical Safety Handbook', McGraw-Hill Education, 4th Edition.
REFERENCE BOOKS	
1.	S.K. Sen (2016), 'Principles of Electrical Machine Design with Computer Programmes', Oxford and IBH Publishing Co.Pvt Ltd., New Delhi.
2.	Vincent Del Toro.Pearson (2015), Basic electric machines, publications electric machines drives and power system,Theodore wildi
E BOOKS	
1.	https://www.studynama.com/community/threads/322-Electrical-Machine-1-pdf-download-ebook-lecture-notes-for-EE-engineers
2.	http://www.uotechnology.edu.iq/dep-eee/lectures/2nd/Electrical%20machines%201/DC%20MACHINES%20(PART1).pdf

COURSE TITLE		**Communication Skills**			**CREDITS**	**3**
COURSE CODE		**ELS51001**	**COURSE CATEGORY**	**HS**	**L - T – P – S**	**2 – 0 – 2 – 1**
Version	**1.0**	**Approval Details**	**35th ACM - 6th Aug. 2022**		**LEARNING LEVEL**	**BTL 4**

ASSESSMENT SCHEME

First Periodical Assessment	**Second Periodical Assessment**	**Weekly assignment/ lab record and viva as approved by the Department Examination**	**Surprise Test / Quiz., as approved by the Department Examination**	**Attendance**	**End Semester Examination (ESE) Theory + Practical**

		Committee "DEC"	**Committee "DEC"**		
15 %	**15%**	**10 %**	**5 %**	**5 %**	**50%**

Course Description	The course has been designed to improve the communication competency of the students. The course builds on students' English language skills by engaging them in listening, speaking and grammar learning activities (LSRW) that are relevant to authentic contexts. This course trains the students how to communicate accurately, appropriately and fluently in professional and social situations. The course is framed so that the students can appear for Cambridge B1 Preliminary exams and also enable them to get a certification.
Course Objective	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 and excel in employability skills.
Course Outcome	Upon completion of this course, the students will be able to 1. Acquire the accuracy through the knowledge of Syntax. 2. Demonstrate the skill of using the vocabulary and use it in sentences appropriately. 3. Infer texts and improvise its usage. 4. Illustrate language acquisition skills through formal correspondence. 5. Analyse and transcode the data and interpret it in text format.

Prerequisites: Plus Two English-Intermediate Level

CO AND PO MAPPING

CO	PO1	PO 2	PO3	PO 4	PO 5	PO6	PO7	PO8	PO 9	PO 10	PO11	PO 12	PSO1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	3	-	2	1	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	2	1	-	-
CO3	-	-	-	-	-	-	-	2	-	3	-	2	1	-	-
CO4	-	-	-	-	-	-	-	2	2	3	2	2	1	-	-
CO5	-	-	-	-	-	-	-	-	-	3	3	2	1	-	-

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

MODULE 1 : English for Employability (6L + 6P = 12)

Grammar : 1. Parts of Speech – Identification and Transformation 2. Kinds of Sentences – Identification and Transformation 3. Sentence Pattern – Framing Sentences 4. Tenses – Rules & its usage – Present simple and present continuous; time expressions; state verbs – Past simple	**CO-1 BTL-2**

; regular and irregular verbs and spelling of past simple forms ; past continuous. **Vocabulary :** 1. Job titles and describing jobs ; names of company departments 2. Computer terms; email and website terms. 3. Headings for CVs Describing application Procedures **Writing :** 1. Writing emails – formal and informal – phrases for emails & letters. 2. Writing a covering letter with a resume for a job application. **Reading :** Reading about Job and Company : 1. Changing places : job swapping at work. 2. The power of word of mouse : an article on the power of online customer options 3. Haier : an article about the history of a Chinese Company. 4. What kind of company Culture would suit you ? reading answering a quiz. **Lab Activities(Speaking) :** 1.Self Introduction. 2. Describing jobs ; asking other people about their jobs. 3. Asking about the history of a company ; past simple questions 4. Asking questions about companies and jobs. **Lab Activities(Listening) :** 1. Being a PA 2. Growing Pains : an interview with a business consultant about company's Growth. 3. Describing changes in a company : a Conversation on the phone.	
MODULE 2 : English for Marketing (6L + 6P = 12)	
Grammar: 1. Concord - Understanding Subject Verb agreement – Identifying the error and Correcting 2. Active and Passive Voice – Identifying the voices and Transforming Active to passive and passive to active 3. Modal Verbs – Using to express modalities – in active and passive voices 4. Words to Describe causes and effects. 5. Prepositions **Vocabulary : 1.** Vocabulary to describe objects; component parts, shapes, dimensions, materials Describing problems with equipment 2. Verbs to Describe process 3. Vocabulary to talk about advertising and marketing, Language to describe cause and effect. **Writing :** 1. Topic Sentence 2. Paragraph Writing 3. Developing a story with the hints 4. Promotional letter(Email) **Reading :** Product Description and Advertisement : 1. Problems with equipment : emails and headings on a form. 2. Waratah : an article on an Australian clothing company. , Short Texts : Notices, Notes and messages 3. Selling your product abroad; an article , Workplace signs and notices 4. Descriptions of advertising media, Singapore airlines; an article on the branding of an airline. **Lab Activities(Speaking) :** 1.Role Play – Telephone call to a supplier, 2. Describing Objects **Lab Activities(Listening) :** 1. Describing dimensions of products : Conversations with colleagues and suppliers. – The Gizmo game : listening to the uses of a gadget. 2. Channel No.5 : an interview about a production process 3. Telephone conversations : information about orders and deliveries. 4. Descriptions of how a product is advertised.	**CO-2 BTL-3**
MODULE 3 : Business Correspondence (6L + 6P = 12)	
Grammar : 1. Tenses – Present continuous for future arrangements; will and going to future forms 2. Using discourse markers ; Sentence starters - Contrast & similarity words, 3. Degrees of Comparison – Framing sentences with appropriate adjectives and adverts – transformation from one degree to another degree. 4. Infinitives and gerunds – using infinitives and gerunds in sentences as different elements. 5. Conditionals – Three types of conditionals **Vocabulary :** 1.Vocabulary for travel 2. Synonyms and Antonyms 3. Employment Vocabulary **Writing :** 1. A letter(Email) of invitation – Accepting the invitation and declining the invitation. **Reading :** Transport, Working Holidays and Conferences : Travel Arrangements : notices and short messages : Eurostar : an article on train travel. 2. Netflix : an article about a company's	**CO-3 BTL-3**

holiday policy; thinking outside the box: an article on offsite meetings 3. Short Texts : Feedback on conferences **Lab Activities(Speaking) :** Discussion: How to make decisions **Lab Activities(Listening) :** 1. Making and changing appointments : Voicemail messages and phone conversations ; Future intentions and predictions : Short Extracts. 2. A travel Anecdote 3. Half Holidays: a conversations between two employees. 4. Discussing possible venues for a conference : a conversation between colleagues; a welcome speech at a conference.	
MODULE 4 : English for Business Relationships (6L + 6P = 12)	
Grammar : 1. Writing Instructions and Recommendations – Transforming instruction to recommendation and recommendation to instruction 2. Expressions of quantity – semi-negative words 3. Present Perfect : time expressions : present perfect versus Past simple. 4. Reported Speech – Direct and Indirect Speeches – Identification and Transformation **Vocabulary :** 1. Affixes 2. Countable and Uncountable nouns 3. Global Management **Writing :** 1.Memo 2. Notice with agenda 3. Email : Requesting information **Reading :** Corporate gift-giving, New places, New people, Team Building and Thinking globally : 1. Career Advice : letters to an advice column 2. Promotional gifts : an article 3. Descriptions of team building events; Kaizen : an article 4. Global HR management : an Article. **Lab Activities(Speaking):** Role Play : 1. Interviewing someone about a job change 2. Discussion : Planning a team building event 3. Promoting a city : giving a speech. **Lab Activities(Listening) :** 1. An interview with someone who has changed career 2. An interview about corporate gift giving 3. Creating good teams : a Presentation 4. Working an international Team : short Extracts.	**CO-4 BTL-3**
MODULE 5 : English for Presentation (6L + 6P=12)	
Grammar : 1. Adjectives and adverbs 2. Pronouns and Reference Words 3. Types of Sentences – Simple, Compound and complex Sentences – Identification and transformation. **Vocabulary :** 1. Describing Trends 2. Finance Vocabulary 3. Stocks and Shares 4. Collocation - sets and money **Writing** : 1. Transcoding – Converting an image (Linegraph, piechart, bar chart, flowchart tree diagram etc.,) into a paragraph – Converting a paragraph into an image(Linegraph, piechart, bar chart, flowchart tree diagram etc.,) 2. Summary writing **Reading :** Describing Statistics, Company finances, investments and starting up : 1. Interpreting bar charts 2. Café Coffee day : an article on the growth of the Indian coffee shop. 3. Shares and the stock exchange: a web page; short articles from the financial news; men and women investments : an article 4. Teenage entrepreneus : reading and comparing two articles; Kalido: an article on funding. **Lab Activities(Speaking) :** 1. Describing figures and trends 2. Discussing qualities needed in candidates for a job vacancy **Lab Activities(Listening) :** 1. Listening to statistical information : short extracts 2. An interview with the employee of a company that helps failing business 3. An interview with someone who works in investor relations. 4. Radio interview : marketing director of a business support service.	**CO-5 BTL-4**
TEXT BOOK	
1	Whitby, Norman (2019). Cambridge English Business Benchmark, Pre-intermediate and Intermediate. Cambridge University Press. India (Pages 208)
REFERENCE BOOKS	
1	Murphy, Raymond(2021). Essential English Grammar, Cambridge University Press. India (Pages

	300)
2	Redman, Stuart(2020).English Vocabulary In Use: Pre - Intermediate And Intermediate. Cambridge University Press. India (Pages 264)
3	Bikram K. Das. et al.,(2019) An Introduction to Professional English and Soft Skills with audio CD, Cambridge University Press. India (Pages 272)
4	John, Dolly., (2018), English for Life and the Workplace Through LSRW&T Skills, Pearson Publications.India (Pages 263)
E BOOKS	
1.	https://www.cambridge.org/gb/files/9116/4138/4615/A1_Student_Book.pdf
2.	https://www.cambridge.org/gb/files/1416/4138/4681/A1_Workbook.pdf
3.	https://www.cambridge.org/gb/files/7216/4138/1999/A2_Student_Book.pdf
4.	https://www.cambridge.org/gb/files/6816/4138/2072/A2_Workbook.pdf
MOOC	
1.	https://www.edx.org/professional-certificate/tsinghuax-english-communication-skills
2.	https://www.britishcouncil.org.tr/en/english/mooc/english-for-the-workplace

COURSE TITLE	**UNIVERSAL HUMAN VALUES**			**CREDITS**	**2**
COURSE CODE	**IQAC**	**COURSE CATEGORY**		**L-T-P-S**	**2-0-0-1**
Version	**1.0**	**Approval Details**		**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 if mandatory as per the AICTE for the UG students to motivate the students for focusing on the human values. The main aim is to focus on the sustainability of happiness with harmony and natural acceptance in the career. Lecture cum power points are provided as guidelines from AICTE.**
Course Objective	1. To create awareness to students on the themselves and their surroundings (family, society, nature). 2. To create responsibility among students on life in handling problems with sustainable solutions 3. To prepare the students with human relationships and human nature in mind. 4. To Prepare the students on critical ability and sensitive to their commitment.(human values, human relationship and human society). 5. To Apply the learning to their real life

Course Outcome	Upon completion of this course, the students will be able to 1. Demonstrate the necessity of relationship with family, society and nature. Familiarize with the challenges ahead and proposed solutions. 2. Formulate and design human cyber security policies, plans and procedures for organizations. 3. Apply standard security countermeasure tools to sustain human relationships and nature.es. 4. Recognize the necessity of human values and relationship. 5. Demonstrate the learning in their real life.

Prerequisites: Nil

CO, PO AND PSO MAPPING

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

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

MODULE 1: Introduction **3L+6L=9**

Need, Basic Guidelines, Content and Process for Value Education Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels. **Practical component:** Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co existence) rather than as arbitrariness in choice based on liking-disliking	**CO-1** **BTL-2**

Suggested Readings: Evolution of cyber security	
MODULE 2: Understanding Harmony in the Human Being	**(3L+6L=9)**
Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health. **Practical component:** Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease	**CO-2** **BTL-2**
MODULE 3: Understanding Harmony in the Family and Society	**(3L+6L=9)**
Harmony in Human-Human Relationship Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship Understanding the meaning of Trust; Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals **Practical component:** Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives	**CO-3** **BTL-3**
MODULE 4: Understanding Harmony in the Nature and Existence	**(3L+6L=9)**

Whole existence as Coexistence - Understanding the harmony in the Nature - Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and selfregulation in nature -Understanding Existence as Co-existence of mutually interacting units in all-pervasive space -Holistic perception of harmony at all levels of existence. **Practical component:** Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	**CO-4** **BTL-2**
MODULE 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics	**(3L+6L=9)**
Natural acceptance of human values, Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order -Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. -Case studies of typical holistic technologies, management models and production systems-Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations. Sum up. **Practical component:** Include practice exercises and case studies to discuss the conduct as an engineer or scientist etc.	**CO-5** **BTL-2**

TEXT BOOKS	
1. P.R Gaur, R Asthana, G.P Bagaria, Human Values and Professional Ethics (2nd revised edition) Excel Books, New Delhi, 2019 2. A Nagaraj, Jeevan Vidya: Ek Parichaya, Jeevan Vidya Prakashan, Amarkantak, 1999. 3. A. N Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004. Lawrence, C. (2016). *Cyber security for Dummies*, John Wiley & Sons Inc., 2nd Edition, pp.213--432.	
REFERENCE BOOKS	
1.	AICTE STUDENT INDUCTION PROGRAM HANDBOOK - https://fdp-si.aicte-india.org/download/Guidelines/G012%20SIP%20Hand%20Book%20v2.pdf
E BOOKS	
1.	https://fdp-si.aicte-india.org/download.php#1