Hindusthan College of Engineering and Technology

Approved by AICTE, New Delhi and Accredited with 'A' Grade by NAAC

(An Autonomous Institution, Affiliated to Anna University, Chennai)

Othakalmandapam Post, Coimbatore

VISION OF THE DEPARTMENT
To evolve as a centre of excellence in Electronics and Communication Engineering, to cater the global industrial needs.

MISSION OF THE DEPARTMENT
1. To expand frontiers of knowledge through the provision of inspiring learning environment. 2. To develop the intellectual skills towards employability by fostering innovation, and creativity in learning. 3. To provide a quality system for wholesome learning to achieve progress and prosperity in life along with moral values

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PROGRAMME OUTCOMES

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, review 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 considerations for the public health and safety, and the cultural, societal and environmental consideration.

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 modelling 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 TEAM WORK**: 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 environment.

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.

PROGRAMME SPECIFIC OUTCOMES

PSO 1: Graduates will be able to disseminate the knowledge in Communication Engineering towards Technical Incubation.

PSO 2: Graduates will have the perseverance to learn the modern design tools for

Electronic system design and analysis.

PROGRAMME EDUCATIONAL OBJECTIVES

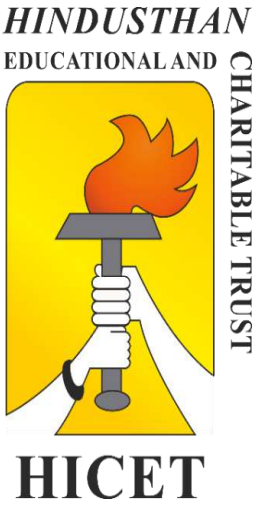
PEO1: Exhibit their technical skills and knowledge in their working environment, higher studies and research.

PEO2: Succeed in multidisciplinary dimensions by excelling through life-long learning.

PEO3: Become leaders and innovators by devising engineering solutions for social issues and problems.

Chairman - RoS
ECE - HiCET

Dean (Academics)
HiCET



HINDUSTHAN

COLLEGE OF ENGINEERING ANDTECHNOLOGY

(An Autonomous Institution)

Coimbatore– 641032

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

CURRICULUM & SEMESTER SYLLABUS
(Academic Council Meeting Held on 03.03.2023)

AY 2022-2023

REGULATIONS 2022

REGULATION – 2022

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER I

S. NO	COURSE CODE	COURSE TITLE	COURSE CATEGORY	L	T	P	C	TCP	CIA	ESE	TOTAL
THEORY											
1	22MA1101	MATRICES AND CALCULUS	BSC	3	1	0	4	4	40	60	100
THEORY WITH LAB COMPONENT											
2	22CY1151	CHEMISTRY FOR CIRCUIT ENGINEERING	BSC	2	0	2	3	4	50	50	100
3	22HE1151	ENGLISH FOR ENGINEERS	HSC	2	0	2	3	4	50	50	100
4	22EC1151	ELECTRON DEVICES	ESC	2	0	2	3	4	50	50	100
5	22IT1151/ 22CS1152	PYTHON PROGRAMMING AND PRACTICES/ OBJECT ORIENTED PROGRAMMING USING PYTHON(IBM STUDENTS ONLY)	ESC/ICC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
6	22HE1071	UHV	AEC	2	0	0	2	3	40	60	100
7	22HE1072	ENTREPRENEURSHIP & INNOVATION	AEC	1	0	0	1	1	100	0	100
MANDATORY COURSE											
8	22MC1091/ 22MC1092	**அறிவியல்தமிழ்**/ Indian Constitution	MC	2	0	0	0	2	100	0	100
TOTAL CREDITS				**16**	**1**	**8**	**19**	**26**	**480**	**320**	**800**

REGULATION – 2022

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER II

S. NO	COURSE CODE	COURSE TITLE	COURSE CATEGORY	L	T	P	C	TCP	CIA	ESE	TOTAL
THEORY											
1	22MA2102	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM	BSC	3	1	0	4	4	40	60	100
2	22CY2101	ENVIRONMENTAL STUDIES	ESC	2	0	0	2	3	40	60	100
3	22PH2101	BASICS OF MATERIAL SCIENCE	BSC	2	0	0	2	3	40	60	100
THEORY WITH LAB COMPONENT											
4	22PH2151	PHYSICS FOR CIRCUIT ENGINEERING PROGRAMME	BSC	2	0	2	3	4	50	50	100
5	22HE2151	EFFECTIVE TECHNICAL COMMUNICATION	HSC	2	0	2	3	4	50	50	100
6	22CS2255 /22CS2253	PROGRAMMING USING C++ / JAVA FUNDAMENTALS (IBM STUDENTS ONLY)	PCC/ICC	2	0	2	3	4	50	50	100
PRACTICAL											
7	22ME2001	ENGINEERING PRACTICES	ESC	0	0	4	2	2	60	40	100
EEC COURSES (SE/AE)											

8	22HE2071	DESIGN THINKING	AEC	1	0	2	2	2	100	0	100
9	22HE2072	SOFT SKILLSAND APTITUDE -1	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
10	22MC2091 22MC2092	தமிழர்மரபு/ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	MC	2	0	0	0	2	100	0	100
11	22MC2093	NCC */NSS / YRC / SPORTS / CLUBS / SOCIETY SERVICE - ENROLLMENT (COMMON)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							
TOTAL CREDITS				**17**	**1**	**12**	**22**	**29**	**630**	**370**	**1000**

SEMESTER III

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21MA3102	Fourier analysis and transforms	BS	3	1	0	4	40	60	100
2	21EC3201	Digital Electronics	PC	3	0	0	3	40	60	100
3	21EC3202	Signals and Systems	PC	3	1	0	4	40	60	100
4	21EC3203	Electronic Circuits	PC	3	0	0	3	40	60	100
THEORY WITH LAB COMPONENT										
5	21CS3252/ 21IT3252	Oops using Java/ Relational Database Management System(IBM)	PC	2	0	2	3	50	50	100
PRACTICAL										
6	21EC3001	Electronic circuits lab	PC	0	0	3	1.5	50	50	100
7	21EC3002	Digital Electronics Lab	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8	21MC3191	Indian Constitution	MC	2	0	0	0	100	0	100
9	21HE3072	**Career Guidance Level – III** Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10	21HE3073	Leadership Management Skills	EEC	1	0	0	0	100	0	100
		Total		**19**	**2**	**8**	**20**	**550**	**450**	**1000**

SEMESTER IV

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21MA4104	Probability and Random Processes	BS	3	1	0	4	40	60	100
2	21EC4201	Electro Magnetic Fields and waves	PC	3	1	0	4	40	60	100
3	21EC4202	Analog Communication	PC	3	1	0	4	40	60	100
4	21EC4203	Linear Integrated Circuits	PC	3	0	0	3	40	60	100
THEORY WITH LAB COMPONENT										
5	21EC4251/ 21EC4252	Control Systems/ Design Thinking-An Introduction(IBM)	PC	2	0	2	3	50	50	100
PRACTICAL										
6	21EC4001	Linear Integrated Circuits Lab	PC	0	0	3	1.5	50	50	100

7	21EC4002	Analog communication Lab	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8	21MC4191	Essence of Indian tradition knowledge/Value Education	MC	2	0	0	0	100	0	100
9	21HE4072	**Career Guidance Level – IV** Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10	21HE4073	Ideation Skills	EEC	2	0	0	0	100	0	100
			Total	**20**	**3**	**8**	**21**	**550**	**450**	**1000**

SEMESTER V

S.No.	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	19EC5201	Microprocessor and Microcontroller	PC	3	0	0	3	25	75	100
2	19EC5202	Transmission lines and WaveGuides	PC	3	1	0	4	25	75	100
3	19EC5203	VLSI Design	PC	3	0	0	3	25	75	100
4	19EC53XX /19CS5331	**Professional Elective -I/** Angular JS(IBM)	PE	3	0	0	3	25	75	100
THEORY WITH LAB COMPONENT										
5	19EC5251	Data Communication and Networks	PC	2	0	2	3	50	50	100
6	19EC5252	Digital Signal Processing	PC	2	0	2	3	50	50	100
PRACTICALS										
7	19EC5001	VLSI Design Lab	PC	0	0	3	1.5	50	50	100
8	19EC5002	Microprocessors and Microcontrollers Lab	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
9	19HE5071	Soft Skills - I	EEC	1	0	0	1	100	0	100
10	19HE5072	Design Thinking	EEC	1	0	0	1	100	0	100
			Total	**18**	**1**	**10**	**24**	**500**	**500**	**1000**

SEMESTER VI

S.No.	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	19EC6202	Antenna and Wave Propagation	PC	3	1	0	4	25	75	100
2	19EC6181	Principles of Management	HS	3	0	0	3	25	75	100
3	19EC63XX /19CS6351	**Professional Elective – II/ Node JS and Microservices(IBM)**	PE	3	0	0	3	25	75	100
4	19XX64XX	**Open Elective– I**	OE	3	0	0	3	25	75	100
THEORY WITH LAB COMPONENTS										
5	19EC6251 /19CS6255	**Embedded Systems and IOT/** IoT and Spring	PC	2	0	3	3.5	50	50	100

		Framework(IBM)								
6	19EC6253	Digital Communication	PC	2	0	3	3.5	50	50	100
PRACTICALS										
7	19IT6003	Project based Learning	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8	19EC6701	Internship	EEC	-	-	-	1	100	0	100
9	19HE6071	Soft Skills - II	EEC	1	0	0	1	100	0	100
10	19HE6072	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
			Total	**19**	**1**	**6**	**24**	**550**	**450**	**1000**

SEMESTER VII

S.No.	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	19EC7201	Digital Image Processing	PC	3	0	0	3	25	75	100
2	19EC7202	Optical and Microwave Engineering	PC	3	0	0	3	25	75	100
3	19EC73XX /19EC7331	**Professional Elective-III/** Blockchain	PE	3	0	0	3	25	75	100
4	19XX74XX	**Open Elective – II**	OE	3	0	0	3	25	75	100
THEORY WITH LAB COMPONENTS										
5	19EC7251	Wireless Communication	PC	2	0	2	3	50	50	100
PRACTICALS										
6	19EC7001	Digital Image processing Lab	PC	0	0	3	1.5	50	50	100
7	19EC7002	Optical Communication andMicrowave Lab	PC	0	0	3	1.5	50	50	100
PROJECT WORK										
8	19EC7901	Project Work – Phase I	EEC	0	0	4	2	50	50	100
			Total	**14**	**0**	**12**	**20**	**300**	**500**	**800**

SEMESTER VIII

S.No.	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	19EC83XX	**Professional Elective –IV**	PE	3	0	0	3	25	75	100
2	19EC83XX	**Professional Elective- V**	PE	3	0	0	3	25	75	100
PROJECT WORK										
3	19CH8901	Project Work – Phase II	EEC	0	0	16	8	100	100	200
			Total	**6**	**0**	**16**	**14**	**150**	**250**	**400**

TOTAL NO OF CREDITS: 165

LIST OF PROFESSIONAL ELECTIVES

S.No.	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE I										
1	19EC5301	Measurements and Instrumentation	PE	3	0	0	3	25	75	100
2	19EC5302	PCB Design	PE	3	0	0	3	25	75	100

3	19EC5303	RF System Design	PE	3	0	0	3	25	75	100
4	19EC5304	Network Security	PE	3	0	0	3	25	75	100
5	19EC5181	Total Quality Management	PE	3	0	0	3	25	75	100
6	19EC5305	Data Science	PE	3	0	0	3	25	75	100
PROFESSIONAL ELECTIVE II										
1	19EC6301	Medical Electronics	PE	3	0	0	3	25	75	100
2	19EC6302	Industrial Automation	PE	3	0	0	3	25	75	100
3	19EC6303	Mobile Communication	PE	3	0	0	3	25	75	100
4	19EC6304	High Speed Networks	PE	3	0	0	3	25	75	100
5	19EC6182	E-Commerce Technology	PE	3	0	0	3	25	75	100
6	19EC6305	Virtual Reality And Augmented Reality	PE	3	0	0	3	25	75	100
PROFESSIONAL ELECTIVE III										
1	19EC7301	Robotics	PE	3	0	0	3	25	75	100
2	19EC7302	ASIC Design	PE	3	0	0	3	25	75	100
3	19EC7303	Global Positioning Systems	PE	3	0	0	3	25	75	100
4	19EC7181	Entrepreneurship Development	PE	3	0	0	3	25	75	100
5	19EC7305	Cyber Forensics	PE	3	0	0	3	25	75	100
6	19EC7306	Embedded Controllers	PE	3	0	0	3	25	75	100
PROFESSIONAL ELECTIVE IV										
1	19EC8301	Neural networks and Deep learning	PE	3	0	0	3	25	75	100
2	19EC8303	Satellite Communication	PE	3	0	0	3	25	75	100
3	19EC8304	Wireless Sensors and Networks	PE	3	0	0	3	25	75	100
4	19EC8181	Foundation Skills in Integrated Product Development	PE	3	0	0	3	25	75	100
5	19EC8305	Medical Image Processing	PE	3	0	0	3	25	75	100
6	19EC8311	Computer Communication and Internet Protocol	PE	3	0	0	3	25	75	100
7.	19EC8312	Cloud Computing	PE	3	0	0	3	25	75	100
PROFESSIONAL ELECTIVE V										
1	19EC8306	Artificial Intelligence	PE	3	0	0	3	25	75	100
2	19EC8307	Low Power VLSI	PE	3	0	0	3	25	75	100
3	19EC8308	Software Defined Radio	PE	3	0	0	3	25	75	100
4	19EC8309	Photonic Networks	PE	3	0	0	3	25	75	100
5	19EC8182	Intellectual Property Rights and Innovations	PE	3	0	0	3	25	75	100
6	19EC8310	Fundamentals of NanoScience	PE	3	0	0	3	25	75	100

LIST OF OPEN ELECTIVES

ELECTRONICS AND COMMUNICATION ENGINEERING										
S.No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
1	19EC6401	Consumer Electronics	OE	3	0	0	3	25	75	100
2	19EC7401	Introduction to IOT	OE	3	0	0	3	25	75	100
LIFE SKILL COURSES										
3	19LSZ401	General Studies for Competitive Examinations	OE	3	0	0	3	25	75	100
4	19LSZ402	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	25	75	100
5	19LSZ403	Indian Ethos and Human Values	OE	3	0	0	3	25	75	100
6	19LSZ404	Indian Constitution and Political System	OE	3	0	0	3	25	75	100
7	19LSZ405	Yoga for Human Excellence	OE	3	0	0	3	25	75	100

(Note: Z Stands for semester, students can't choose twice the course)

LIST OF INDUSTRIAL CORE COURSES

S.No.	CODE	Courses	CAT	L	T	P	C	CIA	ESE	TOTAL
1	19CS1152	Object Oriented Programming using Python	IC	2	0	2	3	50	50	100
2	19CS2153	Java Fundamentals	IC	2	0	2	3	50	50	100
3	19IT3252	Relational Database Management System	IC	2	0	2	3	50	50	100
4	19EC4252	Design Thinking-An Introduction	IC	2	0	2	3	50	50	100
5	19CS5331	Angular JS	IC	2	0	2	3	50	50	100
6	19CS6351	Node JS and Micro services	IC	2	0	2	3	50	50	100
7	19CS6255	IoT and Spring Framework	IC	2	0	2	3	50	50	100
8	19EC7331	Blockchain	IC	2	0	2	3	50	50	100

CREDIT DISTRIBUTION

Semester	I	II	III	IV	V	VI	VII	VIII	**Total**
Credits	20	22	20	21	24	24	20	14	**165**

*** Student can earn extra credit 35 over and above the total credits**

Service subjects										
S.No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
IT/CSE										
1	19EC1154	Basics of Electron Devices and Electric Circuits	PC	2	0	2	3	50	50	100

Chairman - BoS
ECE - HiCET

Chairman

Dean (Academics)
HiCET

Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	**22MA1101**	**MATRICES AND CALCULUS (Common to all Branches)**	3	1	0	4

The learner should be able to

Course Objective

1. Construct the characteristic polynomial of a matrix and use it to identify eigenvalues and Eigenvectors
2. Impart the knowledge of sequences and series.
3. Analyseanddiscussthemaximaandminimaofthefunctionsofseveralvariables.
4. Evaluate the multiple integrals and apply in solving problems.
5. Apply vector differential operator for vector function and theorems to solve engineering problems.

Unit	Description	Instructional Hours
I	**Matrices** Eigen values and Eigen vectors – Properties of Eigen values and Eigen vectors (without proof) - Cayley - Hamilton Theorem (excluding proof) - Reduction of a quadratic form to canonical form by orthogonal transformation.	12
II	**Single Variate Calculus** Rolle's Theorem–Lagrange's Mean Value Theorem-Maxima and Minima–Taylor's and Maclaurin's Series.	12
III	**Functions of Several Variables** Partial derivatives-Total derivative, Jacobian, Maxima, minima and saddle points; Method of Lagrange multipliers	12
IV	**Integral Calculus** Double integrals in Cartesian coordinates–Area enclosed by plane curves (excluding surface area)– Triple integrals in Cartesian co-ordinates – Volume of solids (Sphere, Ellipsoid , Tetrahedron) using Cartesian co-ordinates.	12
V	**Vector Calculus** Gradient, divergence and curl; Green's theorem, Stoke's and Gauss divergence theorem (statement only) for cubes only.	12
	Total Instructional Hours	**60**

Course Outcome

At the end of the course, the learner will be able to

CO1: Compute Eigen values and Eigen vectors of the given matrix and transform given quadratic form into canonical form.

CO2: Apply the concept of differentiation to identify the maximum and minimum values of curve.

CO3: Compute partial derivatives of function of several variables and write Taylor's series for functions with two variables.

CO4: Evaluate multiple integral and its applications in finding area, volume.

CO5: Apply the concept of vector calculus in two and three dimensional spaces.

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TEXTBOOKS:

T1:G.B.ThomasandR.L.Finney,"CalculusandAnalyticalGeometry",9thEditionAddisonWesleyPublishing Company,2016.

T2:ErwinKreyszig,"AdvancedEngineeringMathematics",JohnWiley&Sons,2019.

T3:K.P.UmaandS.Padma,"EngineeringMathematicsI(MatricesandCalculus) ",PearsonLtd,2022.

REFERENCEBOOKS:

R1-JerroldE.Marsden,AnthonyTromba,"VectorCalculus",W.H.Freeman,2003

R2-StraussM.J,G.L.BradleyandK.J.Smith,"Multivariablecalculus",PrenticeHall,2002.

R3-VeerarajanT,"EngineeringMathematics",McGrawHillEducation(India)PvtLtd,NewDelhi,2016.

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ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme /Sem	Course Code	Name of the Course	L	T	P	C
B.E/B.Tech/ I	**22CY1151**	**Chemistry for Circuit Engineering** **(ECE, EEE, EIE, BME,CSE, IT, AIML)**	2	0	2	3

The learner should be able to

Course Objective

1. Acquire knowledge on the concepts of chemistry involved in day today life.
2. Identify the water related problems and water treatment techniques.
3. Enhance the fundamental knowledge on electrochemistry and the mechanism of corrosion and its control.
4. Gain knowledge on the nuclear energy source and batteries.
5. Extend the knowledge on the concepts of spectroscopy and its applications.

Unit	Description	Instructional Hours
I	**CHEMISTRY IN EVERYDAY LIFE** Chemicals in food – Food colors – Artificial sweeteners – Food preservatives. Soaps and Detergents – Soaps – Types of Soap – Detergents – Types of detergents. Drugs – Classification of drugs - Therapeutic Action of Different Classes of Drugs. Chemicals in Cosmetics – Creams – Talcum powders- Deodorants – Perfumes. Plastics – Thermoplastics- Preparation, properties and uses of PVC, Teflon and Thermosetting plastics - Preparation, properties and uses of Polyester and Polyurethane.	6
II	**WATER TECHNOLOGY** Impurities in Water, Hardness of Water, Boiler feed Water – Boiler troubles -Sludge and scale formation, Caustic embrittlement, priming and foaming, boiler corrosion- - Softening Methods (Zeolite & Ion-Exchange Methods)- Desalination of Brackish Water - Reverse Osmosis, Potable water and treatment. **Estimation of total, permanent and temporary hardness of water by EDTA. Determination of Dissolved Oxygen in sewage water by Winkler's method. Estimation of alkalinity of water sample by indicator method.**	6+9
III	**ELECTROCHEMISTRY AND CORROSION** Electrochemical cells – reversible and irreversible cells - EMF- Single electrode potential – Nernst equation (derivation only) – Conductometric titrations. Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types –galvanic corrosion – differential aeration corrosion – corrosion control – sacrificial anode and impressed cathodic current methods. **Conductometric titration of strong acid vs strong base (HClvsNaOH). Estimation of Ferrous iron by Potentiometry.**	6+6
IV	**ENERGY SOURCES AND STORAGE DEVICES** Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- lithium ion battery- fuel cell H_2 -O_2 fuel cell applications.	6
V	**SPECTROSCOPY** Beer-Lambert's law – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) - applications – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) –	6

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Chairman

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Estimation of nickel by atomic absorption spectroscopy.

Total Instructional Hours 45

Course Outcome

At the end of the course, the learner will be able to

CO1: List out the chemicals used in food, soaps and detergents, drugs, cosmetics and plastics

CO2: Differentiate hard and soft water and solve the related problems on water purification in domestic as well as in industries.

CO3: Develop knowledge on the basic principles of electrochemistry and understand the causes of corrosion, its consequences to minimize corrosion to improve industrial design

CO4: Develop knowledge about the renewable energy resources and batteries along with the need of new materials to improve energy storage capabilities

CO5: List out the applications of spectroscopic techniques in various engineering fields.

TEXT BOOKS

T1 - P.C.Jain& Monica Jain, "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi (2018).

T2 -O.G.Palanna, "Engineering chemistry" McGraw Hill Education India (2017).

REFERENCES

R1 - ShikhaAgarwal "Engineering Chemistry -Fundamentals and Applications, Cambridge University Press, Delhi, 2019

R2 - S.S.Dara "A Text book of Engineering Chemistry" S.Chand& Co. Ltd., New Delhi (2018).

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rogramme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	22HE1071	UNIVERSAL HUMAN VALUES (COMMON TO ALL BRANCHES)	2	0	0	2

Course Objectives

Thestudentshould bemade

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. TofacilitatethedevelopmentofaHolisticperspectiveamongstudentstowardslifeandprofession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. TohighlightplausibleimplicationsofsuchaHolisticunderstanding Intermsofethicalhumanconduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Unit	Description	Instructional Hours
I	**Introduction to Value Education** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)-Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations	6
II	**Harmony in the Human Being and Harmony in the Family** Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body - The Body as an Instrument of the Self - Understanding Harmony in the Self- Harmony of the Self with the Body - Programme to ensure self-regulation and Health	6
III	**Harmony in the Family and Society** Harmony in the Family – the Basic Unit of Human Interaction.Values in Human to Human Relationship'Trust' – the Foundational Value in Relationship Values in Human to Human Relationship'Respect' – as the RightEvaluation Understanding Harmony in the Society	6
IV	**Harmony in the Nature / Existence** Understanding Harmony in the Nature.Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature- Understanding Existence as Co-existence of mutually interacting units in all pervasivespace Realizing Existence as Co-existence at All Levels The Holistic Perception of Harmony in Existence. Vision for the Universal Human Order	6
V	**Implications of the Holistic Understanding – a Look at Professional Ethics** Natural Acceptance of Human Values Definitiveness of (Ethical) Human Conduct A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical CaseStudiesStrategies for Transition towards Value-based Life and Profession	6
	Total Instructional Hours	**30**

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Course Outcome	At the end of the course, the learner will be able CO1: To become more aware of holistic vision of life - themselves and their surroundings. CO2: To become more responsible in life, in the Society and in handling problems with sustainable Solutions. CO3: To sensitive towards their commitment towards what they understood towards environment and Socially responsible behavior. CO4: To able to apply what have learnt to their own self in different day-to-day settings in real life and In handling problems with sustainable solutions. CO5: To develop competence and capabilities for maintaining Health and Hygiene.

Reference Books:

R1.A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

R2.Teachers'ManualforAFoundationCourseinHumanValuesandProfessionalEthics,RRGaur, R Asthana,G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-53-2

R3.JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak,1999.

R4.Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

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Programme/Sem	Course Code	Name of the Course	L	T	P	C
B.E./II	22MA2102	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM (ECE, EEE &EIE)	3	1	0	4

Course Objective

The learner should be able to

1. Describe some methods to solve different types of first order differential equations.
2. Understand the various approach to find general solution of the ordinary differential equations
3. Evaluate the various types of Partial differential equations and methods to find solution.
4. Analyze the techniques of Laplace transform.
5. Analyze the techniques of Inverse Laplace transform.

Unit	Description	Instructional Hours
I	**ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER** Basic concepts, separable differential equations, exact differential equations, integrating factors, linear differential equations, Bernoulli equation.	12
II	**LINEAR DIFFERENTIAL EQUATIONS OF SECOND ORDER** Second order linear differential equations with constant with RHS of the form e^{ax} , x^n , sinax, cosax- – Cauchy's linear equations– Method of variation of parameters.	12
III	**PARTIAL DIFFERENTIAL EQUATIONS** Formation of partial differential equations by eliminating arbitrary constants and functions – Solution of first order partial differential equations of the form f(p,q)=0, Clairaut's equation – Lagrange's equation.	12
IV	**LAPLACE TRANSFORM** Laplace transform–Basic properties –Transforms of derivatives and integrals of functions-Periodicfunctions - Unit step function - Dirac delta function.	12
V	**INVERSE LAPLACE TRANSFORM** **I**nverse Laplace transform-Convolution theorem (with out proof) –Solution of linear ODE of second order with constant coefficients using Laplace transforms..	12
	Total Instructional Hours	**60**

Course Outcome

At the end of the course, the learner will be able to

CO1: Apply few methods to solve different types of first order differential equations.
CO2: Evaluate the solutions of higher order ordinary differential equations and its properties.
CO3: Compute the solution of first order partial differential equations.
CO4: Apply Laplace transform and its properties to solve periodic functions.
CO5: Solve certain linear differential equations using inverse Laplace Transform.

TEXT BOOKS:

T1 - Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India Private Ltd., New Delhi, 2018
T2 - Bali. N.P and Manish Goyal & Watkins, "Advanced Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007

REFERENCE BOOKS :

R1- Thomas & Finney " Calculus and Analytic Geometry" , Sixth Edition,,Narosa Publishing House, New Delhi.
R2 - Weir,M.D and Joel Hass, ' Thomas Calculus" 12thEdition,Pearson India 2016.
R3 - Grewal B.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E/ II	22CY2101	ENVIRONMENTAL STUDIES (common to all branches except CSE,IT & AIML)	3	0	0	2

Course Objective

The learner should be able to

1. Grasp the importance and issues related to ecosystem and biodiversity and their protection.
2. Acquire knowledge about environmental pollution – sources, effects and control measures of environmental pollution.
3. Identify the various natural resources, exploitation and its conservation
4. Gain knowledge on the scientific, technological, economic and political solutions to environmental problems.
5. Become aware on the national and international concern for environment and its protection

Unit	Description	Instructional Hours
I	**ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY** Main objectives and scope of environmental studies-Importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – food chain, food web and ecological pyramids - energy flow in the ecosystem – ecological succession processes - Introduction, types, characteristic features, structure and function of the forest and ponds ecosystem – Introduction to biodiversity definition: types and value of biodiversity – hot-spots of biodiversity – threats to biodiversity– endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.	9
II	**NATURAL RESOURCES** Renewable and Non renewable resources - Forest resources: Use and over-exploitation, deforestation, timber extraction, mining, dams and their effects on forests and tribal people - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture – Energy resources: Renewable and non renewable energy sources – Solar energy and wind energy - role of an individual in conservation of natural resources.	9
III	**ENVIRONMENTAL POLLUTION** Definition – causes, effects and control measures of: Air pollution- Water pollution – Water quality parameters- Soil pollution - Noise pollution- Nuclear hazards – role of an individual in prevention of pollution.	9
IV	**SOCIAL ISSUES AND THE ENVIRONMENT** From unsustainable to sustainable development – urban problems related to energy-environmental ethics: Issues and possible solutions – 12 Principles of green chemistry-Municipal solid waste management. Global issues – Climatic change, acid rain, greenhouse effect and ozone layer depletion – Disaster Management – Tsunami and cyclones.	9
V	**HUMAN POPULATION AND THE ENVIRONMENT** Population growth, variation among nations – population explosion – family welfare programme – environment and human health – effect of heavy metals – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- GIS-remote sensing-role of information technology in environment and human health.	9

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Total Instructional Hours 45

At the end of the course, the learner will be able to

Course Outcome

CO1: Discuss the importance of ecosystem and biodiversity for maintaining ecological balance.

CO2: Identify the causes of environmental pollution and hazards due to manmade activities.

CO3: Develop an understanding of different natural resources including renewable resources.

CO4: Demonstrate an appreciation for need for sustainable development and understand the various social issues and solutions to solve the issues.

CO5: Describe about the importance of women and child education, existing technology to protect environment.

TEXT BOOKS:

T1 – S.Annadurai and P.N. Magudeswaran, "Environmental studies", Cengage Learning India Pvt.Ltd, Delhi, 2020

T2 - Anubha Kaushik and C. P. Kaushik, "Perspectives in Environmental studies", Sixth edition, New Age International Publishers,
New Delhi, 2019.

REFERENCE BOOKS:

R1 - Erach Bharucha, "Textbook of environmental studies" University Press (I) Pvt.ltd, Hyderabad, 2015

R2 - G.Tyler Miller, Jr and Scott E. Spoolman"Environmental Science" Thirteenth Edition, Cengage Learning, 2010.

R3 – Gilbert M. Masters and Wendell P. Ela "Introduction to Environmental Engineering and Science", 3rd edition, Pearson
Education, 2013.

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ II	22HE2151	EFFECTIVE TECHNICAL COMMUNICATION (Common to all Branches)	2	0	2	3

Course Objective

The learner should be able

1. To improve essential business communication skills.
2. To enrich employability knowledge.
3. To acquire the crucial organizing ability in official forum.
4. To impart important business writings.
5. To make effective presentation with essential etiquette.

Unit	Description	Instructional Hours
I	Language Proficiency: Types of sentences in English according to structure Writing: writing definitions, Describing product, work place and service (purpose, appearance, function) Vocabulary – words on nature **Practical Component: Listening- Watching and interpreting advertisements/short films Speaking- Extempore speech**	9
II	Language Proficiency: Direct and Indirect speech. Writing: Formal memos, Job application and resume preparation Vocabulary - words on offense and ethics**Practical Component: Listening- Comprehensions based on telephonic conversation Speaking- Vote of thanks& welcome address**	9
III	Language Proficiency: Homophones and Homonyms, Writing: Preparing a detail plan for an official visit, schedule and Itinerary, reading comprehension, Vocabulary– words on society **Practical Component: Listening- Listening- paraphrasing the listened content Speaking- Group Discussion with preparation**	9
IV	Language Proficiency: Idioms Writing: Report writing (marketing, investigating) Vocabulary-words involved in business **Practical Component: Listening- Watching technical discussions and preparing MoM Speaking- On the spot Group Discussion**	9
V	Language Proficiency: spotting errors Writing: making /interpreting chart, sequencing of sentences Vocabulary- words involved in finance **Practical Component: Listening- Comprehensions based on announcements Speaking- Presentation on a technical topic with ppt.**	9
	Total Instructional Hours	**45**

Course Outcome

At the end of the course, learners will be able

CO1: To the business procedure and promotion skills.
CO2: To make oral and written presentation in corporate forum.
CO3: To schedule official events and participate in official discussions without reluctance.
CO4: To take an effective role and manage in an organizational sector.
CO5:To prepare and demonstrate a professional presentation

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TEXT BOOKS:

T1 - Norman Whitby, "Business Benchmark-Pre-intermediate to Intermediate",Cambridge University Press, 2016.

T2- Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press 2015.

REFERENCE BOOKS :

R1 -Michael Mc Carthy, "Grammar for Business", Cambridge University Press, 2009.

R2- Bill Mascull, "Business Vocabulary in use: Advanced 2nd Edition", Cambridge University Press, 2009.

R3-Frederick T. Wood, "Remedial English Grammar For Foreign Students", Macmillan publishers, 2001.

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
BE/B.Tech II	22PH2101	BASICS OF MATERIAL SCIENCE (Common to all branches except MCT)	2	0	0	2

Course Objective

The student should be able to

1.Gain knowledge about Crystal systems and crystal structures
2. Understand the knowledge about electrical properties of materials
3. Enhance the fundamental knowledge in semiconducting materials.
4. Gain knowledge about magnetic materials
5. Acquire fundamental knowledge new engineering materials which is related to the engineering program

Unit	Description	Instructional Hours
	CRYSTAL PHYSICS	
I	Crystal systems - Bravais lattice - Lattice planes - Miller indices – Inter planar spacing in cubic lattice - Atomic radius, Coordination number and Packing factor for SC, BCC and FCC crystal structures.	6
	ELECTRICAL PROPERTIES OF MATERIALS	
II	Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression – Widemann - Franz law – Success and failures -– Fermi- Dirac statistics – Density of energy states .	6
	SEMICONDUCTING MATERIALS	
III	Introduction – Compound and elemental semiconductor - direct and indirect band gap of semiconductors. Intrinsic semiconductor — electrical conductivity – band gap determination. - Extrinsic semiconductor – n type and p type semiconductor –Light Emitting Diode.	6
	MAGNETIC MATERIALS	
IV	Origin of magnetic moment – Bohr magnetron – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti ferromagnetic materials – Ferrites and its applications.	6
	NEW ENGINEERING MATERIALS	
V	Metallic glasses: melt spinning process, Preparation and applications - shape memory alloys: phases, shape memory effect - Characteristics of SMA : Pseudoelastic effect, Super elasticity and Hystersis. Applications of SMA. Nanomaterials preparation (bottom up and top down approaches) – various techniques - pulsed laser deposition - Chemical vapor deposition	6
	Total Instructional Hours	**30**

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Course Outcome

After completion of the course the learner will be able to

CO1: Understand the Crystal systems and crystal structures in the field of Engineering

CO2: Illustrate the fundamental of electrical properties of materials

CO3: Discuss concept of acceptor or donor levels and the band gap of a semiconducting materials

CO4: Develop the technology of the magnetic materials and its applications in engineering field

CO5: Understand the advanced technology of new engineering materials in the field of Engineering

TEXT BOOKS:

T1 - Rajendran V, "Materials Science", Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

T2- M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand and Company ltd., New Delhi 2022

REFERENCE BOOKS:

R1 – Charles Kittel "Introduction to Solid State Physics". Wiley., New Delhi 2017

R2 - Dr. M.Arumugam "Materials Science " Anuradha publications., 2019

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
BE/B.Tech / II	22PH2151	**PHYSICS FOR CIRCUIT ENGINEERING PROGRAMME (AIML,CSE,ECE,EEE,EIE,IT & BME)**	2	0	2	3

Course Objective

The student should be able to

1. Gain knowledge about laser, their applications , become conversant with principles of optical fiber and its applications
2. Enhance his fundamental knowledge about properties of matter
3. Understand the concept of wave optics
4. Gain knowledge about quantum mechanics to explore the behavior of sub atomic particles
5. Acquire fundamental knowledge of Ultrasonics and their applications.

Unit	Description	Instructional Theory Hours
	LASER AND FIBER OPTICS	
I	Spontaneous emission and stimulated emission –Type of lasers – Nd:YAG laser - Laser Applications – Holography – Construction and reconstruction of images. Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index and modes) – Fiber optical communication link. **Determination of Wavelength and particle size using Laser**	**6**
	PROPERTIES OF MATTER	
II	Elasticity – Hooke's law – Poisson's ratio – Bending moment – Depression of a cantilever – Determination of Young's modulus of the material of the beam by Uniform bending theory and experiment. Twisting couple - torsion pendulum: theory and experiment **Determination of Young's modulus by uniform bending method** **Determination of Rigidity modulus – Torsion pendulum**	**6**
	WAVE OPTICS	
III	Interference of light – air wedge –Thickness of thin paper(Testing of thickness of surface) -Michelson interferometer - Diffraction of light – Fraunhofer diffraction at single slit – Diffraction grating - Plane Diffraction grating – Rayleigh's criterion of resolution power - resolving power of grating. **Determination of wavelength of mercury spectrum – spectrometer grating** **Determination of thickness of a thin wire – Air wedge method**	**6**
	QUANTUM PHYSICS	
IV	Black body radiation –Compton effect: theory and experimental verification – wave particle duality –concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box .	**6**

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ULTRASONICS

V	Production – Piezoelectric generator – Properties of Ultrasonic waves. Determination of velocity using acoustic grating – Cavitation. Industrial applications – Drilling and welding – Non destructive testing (pulse echo system). Medical applications – Ultrasound Scanner – A – mode – B- mode and C –mode.	**6**
	Total Instructional Hours	**30**
	Total Lab Instructional Hours	**30**

After completion of the course the learner will be able to

Course Outcome

CO1: Understand the advanced technology of LASER and optical communication in the field of engineering

CO2: Illustrate the fundamental properties of matter

CO3: Discuss the Oscillatory motions of particles

CO4: Understand the dual nature of matter and the Necessity of quantum mechanics.

CO5: Develop the Ultrasonics technology and its applications in NDT.

TEXT BOOKS:

T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

REFERENCE BOOKS:

R1 - M.N Avadhanulu and PG Kshirsagar"A Text Book of Engineering physics"S.Chand and Company ltd., NewDelhi 2016

R2 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2021

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	22IT1151	PYTHON PROGRAMMING AND PRACTICES AGRI, CHEM,FT,AERO, AUTO, CIVIL,MECH, MECT,ECE,BME)	2	0	2	3

Course Objective

The learner should be able

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs
3. To develop Python programs with conditionals and loops and to define Python functions and call them
4. To use Python data structures –- lists, tuples, dictionaries
5. To do input/output with files in Python

Unit	Description	Instructional Hours
I	**ALGORITHMIC PROBLEM SOLVING** Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). **Illustrative problems: To find the Greatest Common Divisor (GCD)oftwo numbers, Fahrenheit to Celsius, Perform Matrix addition.**	5+4
II	**DATA, STATEMENTS,CONTROL FLOW** Data Types, Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if –elif-else); Iteration: state, while, for, break, continue, pass; **Simple algorithms and programs: Area of the circle, check the given year is Leap year or not, Factorial of a Number.**	5+4
III	**FUNCTIONS, STRINGS** Functions, parameters and arguments; Fruitful functions: return values, local and global scope, function composition, recursive functions. Strings: string slices, immutability, string functions and methods, string module. **Illustrative programs: Perform Linear Search, Selection sort, Sum of all elements in a List, Pattern Programs**	5+4
IV	**LISTS, TUPLES, DICTIONARIES** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, listparameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations andmethods; advanced list processing - list comprehension. **Illustrative programs: List Manipulation, Finding Maximum in a List, String processing.**	5+4
V	**FILES, MODULES, PACKAGES** Files and exception: text files, reading and writing files, errors and exceptions, handling exceptions, modules, packages **Illustrative programs: Reading writing in a file, word count, Handling Exceptions**	9
	Total Instructional Hours	**45**

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Course Outcome	At the end of the course, the learner will be able to CO1: Develop algorithmic solutions to simple computational problems CO2: Read, write, execute by hand simple Python programs CO3: Structure simple Python programs for solving problems and Decompose a Python program into functions CO4: Represent compound data using Python lists, tuples, dictionaries CO5: Read and write data from/to files in Python Programs.

TEXT BOOKS:

T1: Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.6.2, Shroff Publishers, First edition (2017).

T2:S. Annadurai, S.Shankar, I.Jasmine, M.Revathi, Fundamentals of Python Programming, Mc-Graw Hill Education (India) Private Ltd, 2019.

REFERENCE BOOKS:

R1:CharlesDierbach, ―Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition,2013.

R2:Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015

R3:Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech / I	22CS1152	**OBJECT ORIENTED PROGRAMMING USING PYTHON (CSE, IT, ECE & AIML)**	2	0	2	3

The learner should be able

Course Objective

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To understand OOP concepts and write programs using classes and objects.
5. To do input/output with files in Python.

Unit	Description	Instructional Hours
I	**INTRODUCTION TO PYTHON** What is Python - Advantages and Disadvantages, Benefits and Limitation-Downloading and Python-installation-Python Versions-Running Python Scripts, Executing scripts with python launcher-Using interpreter interactively- Using variables-String types: normal, raw and Unicode-String operations and functions-Math operator and functions.Illustrative program: find minimum in a list, insert acard in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.	7+2
II	**DATA TYPES, STATEMENTS,CONTROL FLOW** Data Types(List,Tuple,string,dicionary,set)-Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if –elif-else); Iteration: state, while, for, break, continue, pass. Illustrative programs:Find the square root of a number, To find the given number is Prime or not, Write aPython program which accepts a sequence of comma-separated numbers from user, generate a list and find the sum and average of the numbers.	5+4
III	**PYTHON FUNCTIONS** Introduction to functions-Global and local variable in python-Decorators in python-Python lamda functions-Exception handling in python. Illustrative programs:Square root, GCD,exponentiation, linear search, binary search, Write a menu driven program to perform the following task:a) A function Sum_DigN( ) to find the s um of the digits of a given n umber, b) A recursive function Sum_DigR( ) to find the same.	5+4
IV	**PYTHON OOPS** Introduction to oops concept-Python class and objects-Constructor in python-Inheritance-Types of inheritance-Encapsulation in python-Polymorphism in python. Illustrative programs:Write a Python program using class for the calculation of telephone bill. Thecharges for the calls are fixed as follows: Unit Call Cost/unit Below 100 calls No Charge, only rental amount Rs. 250 100-150 calls Rs. 1.00 151-300 calls Rs. 2.50 301-600 calls Rs. 4.50 Above 600 Rs. 6.00	5+4
V	**FILES, PACKAGES** File handling in python-Open a file in python-How to read from a file in python-	5+4

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writing to file in python-Python numpy-Python pandas. Illustrative programs:How to display the contents of text file in reverse order? Write the code for thesame, not exceeding 10 lines of code, Creating Modules and Packages for arithmetic Operations.

Total Instructional Hours 45

Course Outcome

At the end of the course, the learner will be able to

CO1: Understanding the basic concepts to read, write and execute simple python programs.

CO2: Apply the conditional and looping concepts for solving problems.

CO3: Apply functions to decompose larger complex programs.

CO4: Understanding the OOPS concepts and writing programs using classes and objects

CO5: Understand to read and write data from/to files in Python Programs.

TEXT BOOKS:

T1: Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised andupdated for Python 3.2, Network Theory Ltd., 2011.

REFERENCE BOOKS:

R1: Charles Dierbach, ―Introduction to Computer Science using Python: A ComputationalProblem-Solving Focus, Wiley India Edition, 2013.

R2: Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015.

R3: Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming inPython: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016

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Programme/ Sem	CourseCode	NameoftheCourse	L	T	P	C
B.E./B.Tech/ I	22EC1151	ELECTRON DEVICES (ECE)	2	0	2	3

CourseObjectives

The student should be able to

1. Acquire elementary knowledge on PN junction and Zener diode sand their applications
2. Familiarize the BJT Operation, Characteristics and Configurations.
3. Explore the Operation and Characteristic so fJFET and MOSFET
4. Be exposed to the basic operation of special semi conductor devices.
5. Learn the functionality of power and display devices.

Unit	Description	Instructional Hours
I	**SEMICONDUCTORDIODES** TheoryofPNJunctionDiode-ForwardandReverseBiasCharacteristics-DiodeCurrentEquations,Rectifiers:Half-wave Rectifiers,Full Wave Rectifiers and Bridge Rectifiers. Zener Diode:Characteristics-Breakdown in diodes-Zener breakdown and Avalanche Breakdown.Characteristics of PN junction and Zener diode.	6+3
II	**BIPOLARJUNCTIONTRANSISTORS** BJT Construction- NPN and PNP – Transistor Operation-Early Effect, Configurations of BJT:Input and Output Characteristics of CE,CBand CC Configurations, Limits of Operation, Transistor Amplifying Action..Input,Output and Transfer characteristics of CE Amplifier	6+3
III	**FIELDEFFECTTRANSISTOS** JFET- Construction and Operation – Drain and Transfer Characteristics -Comparison of JFET and BJT- MOSFET: Depletion Type MOSFET, Enhancement Type MOSFET - Comparison of JFET and MOSFET.Transfer characteristics ofJ FET.	6+3
IV	**SPECIALSEMICONDUCTORDEVICES** Schottky Barrier Diodes-Varactor Diodes–Power Diodes-Tunnel Diodes-Photo Diodes-PhotoconductiveCells-IREmitters-Light-EmittingDiodes,Liquid-Crystal Displays-Solar cells-Thermistors.Characteristics of Photo Diode.	6+3
V	**POWERDEVICESANDDISPLAYDEVICES** Silicon-Controlled Rectifier-Construction,Operation and Characteristics, Applications-DISC- TRIAC- Unijunction Transistors-Photo Transistors.Characteristics of SCR	6+3
	TotalInstructionalHours	**45**

CourseOutcome

At the end of the course, the learner will be able to

CO1: Explain the structure and working operation of PN junction and Zener diodes.
CO2:DemonstratethecharacteristicsofdifferenttypesofBJTand compare
CO3: Infer and compare the characteristics of JFET and MOSFET
CO4:Understand and relatevariousspecialsemiconductordevices
CO5:Interpret and associate the usage of different power and display devices

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TEXTBOOKS:

T1.Robert Boylestad and Louis Nashelsky,"Electron Devices and Circuit Theory"Prentice Hall,10th edition,July2008.

REFERENCEBOOKS:

R1-R.S.Sedha,—A Text Book of AppliedElectronics S.Chand Publications,2006.

R2-JMillman,C CHalkias,SatyabrataJit,"Electronic Devices & Circuits",Tata McGrawHill,2010.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E/B.Tech	**22ME2001**	**Engineering Practices (Common to all branches)**	**0**	**0**	**4**	**2**

Course Objective: To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical and Electrical Engineering.

Unit **Description of the Experiments**

GROUP A (CIVIL AND MECHANICAL)

1. Preparation of Single pipe line and Double pipe line connection by using valves, taps, couplings, unions, reducers and elbows.
2. Arrangement of bricks using English Bond for one brick thick wall for right angle corner junction and T- junction
3. Arrangement of bricks using English Bond for one and a half brick thick wall for right angle corner and T- junction
4. Preparation of arc welding of Butt joints, Lap joints and Tee joints.
5. Practice on sheet metal Models– Trays and funnels
6. Hands-on-exercise in wood work, joints by sawing, planning and cutting.
7. Practice on simple step turning, taper turning and drilling.
8. Demonstration on Smithy operation.
9. Demonstration on Foundry operation.
10. Demonstration on Power tools.

GROUP B (ELECTRICAL ENGINEERING)

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring.
4. Measurement of Electrical quantities – voltage, current, power & power factor in single phase circuits.
5. Measurement of energy using single phase energy meter.
6. Soldering practice using general purpose PCB.
7. Measurement of Time, Frequency and Peak Value of an Alternating Quantity using CRO and Function Generator.
8. Study of Energy Efficient Equipment's and Measuring Instruments.

Total Instructional Hours 45

Course Outcome

- Fabricate wooden components and pipe connections including plumbing works.
- Fabricate simple weld joints.
- Fabricate different electrical wiring circuits and understand the AC Circuits.

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Programme / Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	22HE1072	**ENTREPRENEURSHIP & INNOVATION (Common for all Branches)**	1	0	0	1

Course Objectives

The student should be made

1. To acquire the knowledge and skills needed to manage the development of innovation.
2. To recognize and evaluate potential opportunities to monetize these innovations.
3. To plan specific and detailed method to exploit these opportunities.
4. To acquire the resources necessary to implement these plans.
5. To make students understand organizational performance and its importance.

Module	Description
1	**Entrepreneurial Thinking**
2	**Innovation Management**
3	**Design Thinking**
4	**Opportunity Spotting / Opportunity Evaluation**
5	**Industry and Market Research**
6	**Innovation Strategy and Business Models**
7	**Financial Forecasting**
8	**Business Plans/ Business Model Canvas**
9	**Entrepreneurial Finance**
10	**Pitching to Resources Providers / Pitch Deck**
11	**Negotiating Deals**
12	**New Venture Creation**
13	**Lean Start-ups**
14	**Entrepreneurial Ecosystem**
15	**Velocity Venture**
	TOTAL INSTRUCTIONAL HOURS **15**

Course Outcome

At the end of the course, the learner will be able to

CO1: Understandthenatureofbusinessopportunities,resources,andindustriesincriticalandcreative aspects.

CO2: Understand the processes by which innovation is fostered, managed, and commercialized.

CO3:Remember effectively and efficiently the potential of new business opportunities.

CO4:Assess the market potential for a new venture, including customer need, competitors, and industry attractiveness..

CO5:Developabusiness model for a new venture, including revenue. Margins, operations, Working capital, and investment

TEXTBOOKS

T1**:**AryaKumar"Entrepreneurship–CreatingandleadinganEntrepreneurialOrganization",Pearson,SecondEdition(2012).
T2:EmrahYayici"DesignThinkingMethodology", Artbiztech,FirstEdition(2016).

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REFERENCEBOOKS

R1: Christopher Golis “Enterprise & Venture Capital”, Allen &Unwin Publication, Fourth Edition (2007).
R2: ThomasLockWood&EdgerPapke“InnovationbyDesign”,Career Press.com,SecondEdition(2017).
R3: Jonathan Wilson “Essentials of Business Research”, Sage Publication, FirstEdition(2010).

WEBRESOURCES

W1:https://blof.forgeforward.in/tagged/startup-lessons
W2:https://blof.forgeforward.in/tagged/entrepreurship
W3:https://blof.forgeforward.in/tagged/minimum-viable-product
W4:https://blof.forgeforward.in/tagged/minimum-viable-product
W5:https://blof.forgeforward.in/tagged/innovation

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Programme/ Sem	CourseCode	Name of the Course	L	T	P	C
B.E./B.Tech/ I	22MC1091	**INDIAN CONSTITUTION (Common for all Branches)**	2	0	0	0

Course Objectives

The student should be made to

1. Sensitization towards self, family (relationship),society and nature
2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals
3. Strengthening of self-reflection
4. Development of commitment and courage to act

Unit	Description	Instructional Hours
	BASIC FEATURES AND FUNDAMENTAL PRINCIPLES	
I	Meaning of the constitution law and constitutionalism–Historical perspective of the constitution of India– salient features and characteristic of the constitution of India.	**6**
	FUNDAMENTAL RIGHTS	
II	Scheme of the fundamental rights–fundamental duties and its legislative status–The directive principles of state policy–its importance and implementation-Federal structure and distribution Of legislative and financial powers between the union and states.	**6**
	PARLIAMENTARY FORM OF GOVERNMENT	
III	The constitution powers and the status of the president in India.–Amendment of the constitutional Powers and procedures–The historical perspective of the constitutional amendment of India– Emergency provisions: National emergency, President rule, Financial emergency.	**6**
	LOCALGOVERNANCE	
IV	Local self-government-Rural Local Government-Panchayath Raj, Elections of Panchayat-State Election Commission- Urban Local Government-Amendment Act, Urban Local Government Structures in India -	**6**
	INDIANSOCIETY	
V	ConstitutionalRemediesforcitizens–PoliticalPartiesandPressureGroups;Right of Women,Childrenand Scheduled Castes and Scheduled Tribes and other Weaker Sections.	**6**
	Total Instructional Hours	**30**

Course Outcome

At the end of the course, the learner will be able to

CO1:Understand the functions of the Indian government.

CO2:Understand and abide the rules of the Indian Constitution

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TEXTBOOKS:

T1: DurgaDasBasu,"IntroductiontotheConstitutionofIndia",PrenticeHallofIndia,NewDelhi,1997.
T2: Agarwal R C.,"Indian Political System", S.Chand and Company, NewDelhi,1997.
T3: MaciverandPage,"Society:AnIntroductionAnalysis",MacMilanIndiaLtd.,NewDelhi.
T4: Sharma K L., "Social Stratification in India: Issues and Themes ",Jawaharlal NehruUniversity,NewDelhi,1997.

REFERENCEBOOKS:

R1-Sharma,Brij Kishore,"Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
R2-GahaiUR.,"IndianPoliticalSystem",NewAcademicPublishingHouse, Jalaendhar.
R3-Sharma R N., "Indian Social Problems",Media Promoters and Publishers Pvt. Ltd.

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	22MC2092	**HERITAGE OF TAMIL**	2	0	0	0

The learner should be able to

Course Objective

1. Introduce students to the great History of Tamil literature.
2. Establish the heritage of various forms of Rock art and Sculpture art.
3. To study and understand the various folk and Martial arts of Tamil culture
4. Introduce students to Ancient Tamil concepts to understand the richness of Tamil literature.
5. To learn about the various influences or impacts of Tamil language in Indian culture.

Unit	Description	Instructional Hours
I	**Language and Literature** Language families in India – Dravidian Languages – Tamil as a classical language – Classical Literature in Tamil- Secular nature of Sangam Literature – Distributive justice in Sangam Literature – Management principles in Thirukural – Tamil epics and impacts of Buddhism & Jainism in Tamil and Bakthi literature of Azhwars and Nayanmars – Forms of minor poetry _ Development of Modern literature in Tamil – Contribution of Bharathiyar and Bharathidasan.	6
II	**Heritage _ Rock Art Paintings to Modern Art – Sculpture** Hero Stone to Modern Sculpture – Bronze icons – Tribes and their handcrafts - Art of temple car making – Massive Terracotta sculptures, Village deities, Thiruvalluvar statue at Kanyakumari, Making of musical instruments – Mridangam, Parai, Yazh and Nadhaswaram - Role of Temples in social and economic life of Tamils.	6
III	**Folk and Martial Arts** Therukoothu, Karagattem, Villupattu, Kaniyan koothu, Oyilattam, Leather puppertry, Silambattam., Valari Tiger dance – Sports and Games of Tamils.	6
IV	**Thinai Concept of Tamils** Flora and Fauna of Tamils – Aham and Puram Concept from Tholkappiyam and Sangam Literature – Aram concept of Tamils – Education and Literacy during Sangam Age - Ancient cities and ports of Sangam age – Exporot and Import during Sangam age – Overseas conquest of Cholas.	6
V	**Contribution of Tamils to Indian National Movement and Indian Culture** Contribution of Tamils to Indian freedom struggle – The cultural influence of Tamils over the other parts of India – Self respect movement – Role of Siddha Medicine in indigenous systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil books**.**	6
	Total Instructional Hours	**30**

At the end of the course, the learner will be able to

Course Outcome

CO1: Learn about the works pertaining to Sangam age
CO2: Aware of our Heritage in art from Stone sculpture to Modern Sculpture.
CO3Appreciate the role of Folk arts in preserving, sustaining and evolution of Tamil culture.
CO4: Appreciate the intricacies of Tamil literature that had existed in the past.
CO5: Understand the contribution of Tamil Literature to Indian Culture

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TEXTBOOKS:

T1: Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

T2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:International Institute of Tamil Studies.

T3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)(Published by: International Institute of Tamil Studies).

REFERENCEBOOKS:

R1-The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies)

R2- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu TextBookand Educational Services Corporation, Tamil Nadu)

R3-Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – ReferenceBook.

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	**22HE1151**	**ENGLISH FOR ENGINEERS (Common to all Branches)**	2	0	2	3

The student should be able

Course Objective

1. To improve the communicative proficiency of learners.To help learners use language effectively in professional writing.
2. To advance the skills of maintaining the suitable one of communication.
3. To introduce the professional life skills.
4. To impart official communication etiquette.

Unit	Description	Instructional Hours
I	**Language Proficiency:** Types of Sentences, Functional Units, Framing question. **Writing:** process description, Writing Checklist.**Vocabulary –** words on environment. **Practical Component: Listening**- Watching short videos and answer the questions, **Speaking**- Self introduction ,formal & semi-formal	7+2
II	**Language Proficiency**: Tenses, Adjectives and adverbs. **Writing:** Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations& acronyms), reading comprehension**. Vocabulary–** words on entertainment. **Practical Component: Listening**-Comprehensions based on TED talks**Speaking-** Narrating a short story or an event happened in their life	7+2
III	**Language Proficiency:** Prepositions, phrasal verbs. **Writing:** Formal thanks giving, Congratulating, warning and apologizing letters, cloze test. **Vocabulary –** words on tools.**PracticalComponent:Listening-** Listentosongsandanswerthequestions**Speaking**-Justaminute	5+4
IV	**Language Proficiency:** Subject verb concord, Prefixes & suffixes. **Writing:**Preparing agenda &minutes, writing an event report. **Vocabulary**– words on engineering process. **Practical Component: Listening**- Comprehensions based on Talk of orators or interview shows **Speaking-**Presentation on a general topic with ppt.	5+4
V	**Language Proficiency:** Modal Auxiliaries, Active & passive voice, **Writing:** Project report (proposal & progress) ,sequencing of sentences **Vocabulary –**words on engineering material **Practical Component: Listening**- Listening- Comprehensions based on Nat Geo/Discovery channel videos **Speaking-** Preparing posters and presenting as a team.	6+3
	Total Instructional Hours	**45**

Course Outcome

After completion of the course the learner will be able

CO1:Tocommunicateinaprofessional forum

CO2:Tospeakorwriteacontentintheproficientlanguage

CO3: To maintain and use appropriate one of the communication.\

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CO4:To read ,write and present in a
professional way.
CO5:To follow the etiquettes in formal communication.

TEXTBOOKS:

T1- Norman Whitby, "Business Benchmark-Pre-intermediate to Intermediate", Cambridge University Press,2016.T2-

Raymond Murphy, "Essential English Grammar", Cambridge UniversityPress,2019.

REFERENCEBOOKS:

R1- Meenakshi Raman and Sangeetha Sharma. "Technical Communication- Principles and Practice", Oxford University Press, 2009.

R2-RaymondMurphy, "English GrammarinUse"-4th editionCambridgeUniversityPress,2004.

R3-KamaleshSadanan"AFoundationCoursefortheSpeakersofTamil-Part-I&II",Orient Blackswan,2010.

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
BE/B.TECH II	22HE2072	SOFT SKILLS AND APPTITUDE I	0	0	0	1

The student should be able to

Course Objective

1. To develop and nurture the soft skills of the students through instruction, knowledge acquisition, demonstration and practice.
2. To enhance the students ability to deal with numerical and quantitative skills.
3. To identify the core skills associated with critical thinking.
4. To develop and integrate the use of English language skills

Unit	Description	Instructional Hours
I	**Lessons on excellence** Skill introspection, Skill acquisition, consistent practice	2
II	**Logical Reasoning** Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning - Sudoku puzzles - Attention to detail	11
III	**Quantitative Aptitude** Addition and Subtraction of bigger numbers - Square and square roots - Cubes and cube roots - Vedic maths techniques - Multiplication Shortcuts - Multiplication of 3 and higher digit numbers – Simplifications - Comparing fractions - Shortcuts to find HCF and LCM - Divisibility tests shortcuts - Algebra and functions	11
IV	**Recruitment Essentials** Resume Building - Impression Management	4
V	**Verbal Ability** Nouns and Pronouns – Verbs - Subject-Verb Agreement - Pronoun-Antecedent – Agreement - Punctuations	4
	Total Instructional Hours	**30**

After completion of the course the learner will be able to

Course Outcome

CO1: Students will analyze interpersonal communication skills. public speaking skills.
CO2: Students will exemplify tautology, contradiction and contingency by logical thinking.
CO3: Students will be able to develop an appropriate integral form to solve all sorts of quantitative problems.
CO4:Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity
CO5: Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar

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REFERENCE BOOKS:

R1 - Quantitative Aptitude – Dr. R S Agarwal

R2 -Speed Mathematics: Secret Skills for Quick Calculation - Bill Handley

R3 -Verbal and Non – Verbal Reasoning – Dr. R S Agarwal

R4- Objective General English – S.P.Bakshi

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Programme/ Sem	Course Code	Name of the Course	L	T	P	C
BE/B.TECH II	22HE2071	**DESIGN THINKING**	2	0	0	2

Course Objective

The student should be able to

1. To expose students to the design process
2. To develop and test innovative ideas through a rapid iteration cycle.
3. To provide an authentic opportunity for students to develop teamwork and leadership skills

Unit	Description	Instructional Hours
I	**DESIGN ABILITY** Asking Designers about what they Do – Deconstructing what Designers Do – Watching what Designers Do – Thinking about what Designers Do – The Natural Intelligence of Design Sources	6
II	**DESIGNING TO WIN** Formula One Designing – Radical Innovations – City Car Design – Learning From Failures – Design Process and Working Methods	5
III	**DESIGN TO PLEASE AND DESIGNING TOGETHER** Background – Product Innovations – Teamwork versus Individual work – Roles and Responsibilities – Avoiding and Resolving Conflicts.	6
IV	**DESIGN EXPERTISE** Design Process – Creative Design - Design Intelligence – Development of Expertise – Novice to Expert. Critical Thinking – Case studies: Brief history of Albert Einstein, Isaac Newton and Nikola Tesla	6
V	**DESIGN THINKING TOOLS AND METHODS** Purposeful Use of Tools and Alignment with Process - Journey Mapping - Value Chain Analysis - Mind Mapping – Brainstorming - Design Thinking Application: Design Thinking Applied to Product Development	7
	Total Instructional Hours	**30**

Course Outcome

After completion of the course the learner will be able to

CO1: Develop a strong understanding of the Design Process
CO2: Learn to develop and test innovative ideas through a rapid iteration cycle.
CO3: Develop teamwork and leadership skills

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TEXT BOOKS:

T1 - 1. Nigel Cross, “Design Thinking”, Kindle Edition.

REFERENCE BOOKS:

R1 - Tom Kelley, “Creative Confidence”, 2013.

R2 - 3. Tim Brown, “Change by Design”, 2009.

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GE3152	தமிழர் மரபு	L T P C 1 0 0 1

அலகு I **மொழி மற்றும் இலக்கியம்**: 3

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II **மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**: 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III **நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**: 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்

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Programme/sem	Course Code	Name of the Course	L	T	P	C
BE/B.TECH/III	**21MA3102**	**FOURIER ANALYSIS AND TRANSFORMS (COMMON TO EEE, ECE, EIE, AGRI, BM & FT)**	3	1	0	4

Course Objective

1. Analyze Fourier series which is central to many applications in engineering.
2. Apply the effective tools for the solutions of one-dimensional boundary value problems.
3. Apply the effective tools for the solutions of two-dimensional heat equations.
4. Apply Fourier transform techniques in various situations.
5. Analyze Z transform techniques for discrete time systems

Unit	Description	Instructional Hours
I	**FOURIER SERIES** Dirichlet's conditions- General Fourier Series – Odd and Even Functions – Half range sine and cosine series – Change of Interval - Parseval's Identity - Harmonic analysis.	12
II	**BOUNDARY VALUE PROBLEMS** Classification of PDE - Solutions of one-dimensional wave equation - One dimensional equation of heat conduction (excluding insulated edges).	12
III	**TWO-DIMENSIONAL HEAT EQUATIONS** Steady state solution of two-dimensional equation of heat conduction in infinite plate and semicircular plate.	12
IV	**FOURIER TRANSFORMS** Fourier Transform Pairs - Fourier sine and cosine transforms – Properties - Transforms of Simple functions – Convolution Theorem (Statement only) – Parseval's identity(Statement only).	12
V	**Z - TRANSFORMS AND DIFFERENCE EQUATIONS** Z- Transforms - Elementary properties – Inverse Z - transform (using partial fraction and residues) – Convolution theorem (excluding proof)– Solution of difference equations using Z – transform.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Understand the principles of Fourier series which helps them to solve physical problems of engineering.
CO2: Employ Fourier series in solving the boundary value problems.
CO3: Understand Fourier series in solving the two dimensional heat equations.
CO4: ApplyFourier transform techniques which extend its applications.
CO5: Illustrate the Z- transforms for analyzing discrete-time signals and systems.

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TEXT BOOKS:

T1 - Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, Wiley India Private Ltd., New Delhi, 2018

T2 - Bali. N.P and Manish Goyal & Watkins, "Advanced Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007

REFERENCE BOOKS :

R1 - Veerarajan. T.,”Transforms and Partial Differential Equations”, Tata McGraw Hill Education Pvt. Ltd., Second reprint, New Delhi, 2012.

R2 - Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi,2018.

R3 -Ramana. B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2018.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC3201	Digital Electronics	3	0	0	3

Course Objective

1. To impart knowledge on different methods used for the simplification of Boolean functions
2. To explain the working of various combinational circuits
3. To gain knowledge about synchronous sequential circuits.

Unit	Description	Instructional Hours
I	**BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATIONS** Boolean operation and expressions- Laws and rules of Boolean algebra - Simplification using Boolean algebra - Sum of Products (SOP) - Product of Sums (POS)- Karnaugh map Minimization- Quine - McCluskey method of minimization- Logic Gates- NAND–NOR implementations.	9
II	**ANALYSIS AND DESIGN OF COMBINATIONAL CIRCUITS** Analysis and design of combinational circuits - Circuits for arithmetic operations: adder, subtractor, Carry look ahead adder-BCD adder-Magnitude comparator- Encoders and Decoders-Multiplexers and Demultiplexers, Parity checker and generators.	9
III	**SYNCHRONOUS SEQUENTIAL CIRCUITS** Latches- Flip-flops- SR, JK, D, T, and Master-Slave - Edge triggering - Level Triggering-Analysis and design of synchronous sequential circuits: State diagram - State table – State minimization - State assignment, Synchronous Up/Down counters, mod n counters, Shift registers, Universal shift registers.	9
IV	**ASYNCHRONOUS SEQUENTIAL CIRCUITS** Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Race-free state assignment – Hazards.	9
V	**MEMORIES and PROGRAMMABLE LOGIC DEVICES** Classification of memories-RAM- RAM organization- Static RAM Cell- Dynamic RAM Cell-ROM-ROM organization-PROM-EPROM-Flash memories-PAL,PLA,FPGA,CPLD.	9
	Total Instructional Hours	**45**

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Course Outcome	CO1: Able to apply the concepts of Boolean theorem to simplify Boolean expressions CO2: Able to understand the working of various combinational circuits. CO3: Able to apply the concepts to in various synchronoussequential circuits. CO4: Able to apply the concepts to in various asynchronoussequential circuits. CO5: Understand the organization of memories and PLDs.

TEXT BOOKS:

T1- M. Morris Mano and Michael D. Ciletti, "Digital Design", 5th Edition, Pearson, 2013.(Unit 1,Unit 2,Unit3,Unit 4, Unit 5)

T2-Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011.

REFERENCE BOOKS:

R1- A.Anandkumar, "Fundamentals of Digital Electronics", fourth edition ,PHI Learning Pvt. Ltd,2016.

R2- S.Salivahanan and S.Arivazhagan, "Digital Circuits and Design" ,Vikas publishing House Pvt. Ltd ,2013

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC3202	Signals and Systems	3	1	0	4

Course Objective

1. To understand the basic signals and their properties.
2. To learn the mathematical tool of Fourier series and transforms.
3. To understand the concept of system analysis using Laplace transforms.
4. To understand the discrete signal analysis using transforms.
5. To know discrete system analysis using Z –transform.

Unit	Description	Instructional Hours
I	**SIGNALS AND SYSTEM REPRESENTATION & CLASSIFICATION** Standard signal representation –continuous and discrete domain. Properties of impulse signal. Mathematical operation on signals, classification of signals and system -analog and discrete.	12
II	**ANALYSIS OF CONTINUOUS TIME (CT) SIGNALS** Fourier series analysis-Trigonometric form, spectrum of continuous time (CT) signals- Fourier and Laplace transform of standard signals-Region of Convergence (ROC).Inverse Fourier and Laplace transform–partial fraction method, Properties.	12
III	**LINEAR TIME INVARIANT- CONTINUOUS TIME (CT) SYSTEMS** Block diagram representation of system- Direct form I & II. Applying Fourier and Laplace transform : Transfer function ,impulse response and Frequency response of CT system , Convolution integrals-Integral & Graphical method.	12
IV	**ANALYSIS OF DISCRETE TIME SIGNALS** DTFT and Inverse DTFT – properties of DTFT - z transform and Inverse z-transform – Region of Convergence, properties of z transform.Convolution sum-Graphical and Matrix method.	12
V	**LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS** Block diagram representation of system- Direct form I & II structure.DTFT and Z transform analysis of systems: Transfer function, impulseresponse, system response and Frequency response, Convolution and de-convolution	12
	Total Instructional Hours	**60**

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Course Outcome	CO1 :Understand the signal and system classification and properties CO2: Understand signal spectrum and apply Fourier series to continuous signal spectrum. CO3: Apply Fourier and Laplace transform in LTI system analysis. CO4: Apply DTFT to understand the properties of discrete time signals. CO5: Apply Z-transform for discrete system analysis.

TEXT BOOKS:

T1 - AllanV.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2007.

T2 - P Ramakrishna Rao, "Signals and System", Tata McGraw-Hill Education,2010.

REFERENCE BOOKS:

R1 - M.J.Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", McGraw Hill, 2017.

R2 - B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.

R3 - RameshBabu.P and Anandanatarajan, "Signals and Systems",Fifthedition,Scitech publications,2017.

R4 - A.NagoorKani, "Signals and Systems,Simplified", McGrawHill Publication, 2018.

R4 - A.NagoorKani, "Signals and Systems,Simplified", McGrawHill Publication, 2018.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC3203	Electronic Circuits	3	0	0	3

Course Objective

1. To learn about biasing of BJT and JFET circuits.
2. To study the behavior of small signal amplifiers using BJT.
3. To provide an insight on the large signal amplifiers and linear wave shaping circuits.
4. To impart knowledge on feedback amplifiers.
5. To discuss the operating principles of oscillators and multivibrators.

Unit	Description	Instructional Hours
I	**BIASING OF BJT AND FET** BJT– Need for biasingDC Load Line and Bias Point – Various biasing methods of BJT – Thermal stability – Stability factors – Bias compensation techniques using Diode, thermistor and sensistor – Biasing BJT Switching Circuits- JFET – DC Load Line and Bias Point – Various biasing methods of JFET – MOSFET Biasing – Biasing FET Switching Circu.	9
II	**SMALL SIGNAL AMPLIFIERS** h-parameter small-signal equivalent circuit –Midband analysis of single stageCE amplifiers - Low frequency response of CE amplifiers - High frequency π model - High frequency response of CE amplifiers, Multistage amplifiers -Darlington Amplifier.	9
III	**LARGE SIGNAL AMPLIFIERS AND LINEAR WAVE SHAPING CIRCUITS** Classification of large signal amplifiers –Class A , Class B amplifier – Cross over Distortion -Push-Pull amplifier – complementary symmetry push-pull amplifier, Tuned amplifiers -Class C tuned amplifier -Integrator- Differentiator- Clippers- Clampers- Diode comparator .	9
IV	**FEEDBACK AMPLIFIERS** Block diagram, Loop gain, Gain with feedback, Effects of negative feedback. Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback. Four types of negative feedback connections - voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback.	9
V	**OSCILLATORS AND MULTIVIBRATORS** Classification of oscillator, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude. General form of an Oscillator, Analysis of Hartley, Colpitt's, RC phase shift and Wien bridge Oscillator- Astablemultivibrator– Monostablemultivibrator and Bistablemultivibrator.	9

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Total Instructional Hours 45

Course Outcome

CO1: Understand various biasing circuit for BJT and JFET amplifiers and apply in solvingthe problems
CO2: Understand the low frequency and high frequency response of BJT amplifiers usingsmall signal equivalent circuit.
CO3: Understand the operation of various types of large signal amplifiers and linearwave shaping circuits
CO4: Understand the different types of feedback amplifiers with examples

CO5:Understand various types of oscillators and multivibrators and their applications

TEXT BOOKS:

T1- S.Salivahanan, N.Suresh Kumar and A.Vallavaraj, "Electronic Devices and Circuits", 3rd Edition,2012, McGraw Hill.(All units)
T2- Donald .A. Neamen, "Electronic Circuit Analysis and Design" ,3 rd edition, Tata McGraw Hill, 2010(Unit IV)

REFERENCE BOOKS:

R1-Robert L.Boylestad, Louis Nasheisky, "Electronic Devices and Circuit Theory", 9th Edition, 2007.
R2- Jacob Millman,Christos C.Halkias,"Electronic Devices and Circuits" McGraw Hill , Edition 1991.
R3- D.Schilling and C.Belove, "Electronic Circuits", 3rd Edition, McGraw Hill, 1989.
R4- David A. Bell, "Electronic Devices and Circuits", fifth edition,Oxford Higher education

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21CS3252	OOPS using Java	2	0	2	3

Course Objective

1. Learn the basics of java programming language
2. Discuss he inheritance, interfaces and exception handling in java
3. Learn packages and multithreading in java
4. Learn I/O streams and collections framework in java
5. Learn Applets,frames and windows in java and its applications.

Unit	Description	Instructional Hours
I	**OVERVIEW OF JAVA PROGRAMMING** Review of Object oriented programming-Introduction to java programming-Features of Java Language, JVM -The Java Environment-Primitive Data types-variables-arrays-control statements- classes and objects-access specifier-methods-constructor-string. **Programs:** 1. Arrange the given character array in ascending order by getting the user input. 2. method overriding 3. add two complex numbers using constructors	7+2(P)
II	**BASIC JAVA FEATURES** Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword Defining an interface-implementing an interface-applying interface-variables in interface-extended interface - Exception Handling-exception types-uncaught exception-multiple catch - nested try – throw and finally - built-in exceptions. **Programs:** 1. Bank Details using Multi-Level Inheritance 2. Student's internal and external Mark statements using Interface with exception handling	7+2(P)
III	**PACKAGES AND MULTITHREAD** Packages-defining package-access protection-importing packages -Multithreaded programming -java thread model-thread priorities-synchronization- thread class and runnable interface-creating multiple threads. **Programs:** 1. Calculate simple interest and compound interest using packages and exception handling. 2. Program to illustrate multi threads.	7+2(P)

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IV	**I/O STREAMS AND COLLECTIONS FRAMEWORK** I/O basics- Streams, Byte streams, Character streams, reading console input-writing console output-reading and writing files. Collections overview –interfaces (Collection, List, Set, SortedSet, NavigableSet)-classes(ArrayList, LinkedList, HashSet, LinkedHashSet, TreeSet)-an iterator. **Programs:** 1. Convert uppercase into lowercase using file I/O. 2. Linked List implementation using collections.	7+2(P)
V	**FRAMES AND WINDOWS** Applet fundamentals-Applet Basics-An Applet Skeleton-Simple Applet Display Methods-The HTML APPLET Tag-Passing Parameters to Applets. Window Fundamentals- Working withFrame Windows-Creating a Frame Window in an Applet-Displaying Information Within a Window-Working with Graphics-Drawing Lines-Drawing Rectangles-Drawing Ellipses and Circles-Working with Color-Working with Fonts. **Programs:** 1. Create simple banner using applet 2. Create an applet using shapes, color and fonts.	7+2(P)
	Total Instructional Hours	**35+10**

Course Outcome	CO1: To Understand the Basics of java Programming CO2: Design program using inheritance, interfaces and exception handling. CO3: Develop applications using packages and multithreading in java CO5: Implement I/O streams classes and collections in real time applications. CO5: Design real time applications using Applet, frames and windows.

TEXT BOOKS:

T1-Herbert Schildt, “The complete reference java 2”,seventh edition, McGraw – Hill 2007.

T2-“Core Java 2”,Vol 2,Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education

REFERENCES BOOKS:

R1-E.Balagurusamy, ”Programming with java A Primer”, fifth edition, McGraw – Hill 2014

R2-H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited,2003

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Programme	Course Code	Name of the Course	L	P	T	C
BE	21EC3001	Electronic Circuits Lab	0	0	3	1.5

Course Objective

1. To introduce methods of biasing transistors.
2. To design and analysis transistor as amplifiers.
3. To analyze and design wave shaping circuits and signal generator.
4. To simulate various electronic circuits using multisim.

Exp.No.	Description of the Experiments
1	Design, construct and test the following biasing circuits and find the transient analysis and frequency response of Single BJT and FET. a) Fixed bias b) Self bias
2	Current series Feedback Amplifiers
3	RC Phase shift oscillator
4	Hartley Oscillator
5	Class C tuned Amplifier
6	Astablemultivibrator
	Simulation Experiments
7	Darlington Amplifier
8	Colpitt's Oscillator
9	Integrator, Differentiator, Clipper and Clamper circuits.
10	Monostable multivibrator

Total Practical Hours 45

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Course Outcome	CO1: Design and analyze the biasing circuits for various amplifier configurations CO2: Construct and analyze the performance of signal generators for a specified frequency. CO3: Analyze the performance of electronic circuits using PSPICE.

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Programme	Course Code	Name of the Course	L	P	T	C
BE	21EC3002	Digital Electronics Lab	0	0	3	1.5

Course Objective

1. Demonstrate the formal procedures for the analysis and design of combinational circuits
2. Use appropriate design technique to design the different sequential circuits.
3. Apply the concepts of Hardware Description Language for designing digital circuits.

Exp.No.	Description of the Experiments
	Design, implement and test the following digital circuits,
1	4-bit binary Adder / Subtractor using IC 7483.
2	BCD adder using IC 7483.
3	Multiplexer and De-multiplexer using logic gates.
4	Encoder and Decoder using logic gates.
5	Parity checker and generator.
6	4 – bit binary ripple counter.
7	3-bit synchronous up / down counter.
8	4 – bit shift register using Flip – flops.
9	Basic combinational digital circuits programs using HDL
10	Basic sequential digital circuits programs using HDL.

Total Practical Hours 45

Course Outcome

CO1: Analyze the performance of various combinational circuits.

CO2: Design and develop various synchronous logic circuits.

CO3: Formulate the design procedure of combinational and sequential digital circuits using Hardware Description Language

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Programme	Course Code	Name of the Course	L	T	P	C
B.E. / B.Tech	21MC3191	Indian Constitution	2	0	0	0

Course Objective

1. Sensitization of student towards self, family (relationship), society and nature.
2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
3. Strengthening of self reflection.
4. Development of commitment and courage to act.

Unit	Description	Instructional Hours
	BASIC FEATURES AND FUNDAMENTAL PRINCIPLES	
I	Meaning of the constitution law and constitutionalism – Historical perspective of the constitution of India – salient features and characteristics of the constitution of India.	4
	FUNDAMENTAL RIGHTS	
II	Scheme of the fundamental rights – fundamental duties and its legislative status – The directive principles of state policy – its importance and implementation - Federal structure and distribution of legislative and financial powers between the union and states.	4
	PARLIAMENTARY FORM OF GOVERNMENT	
III	The constitution powers and the status of the president in India. – Amendment of the constitutional powers and procedures – The historical perspective of the constitutional amendment of India – Emergency provisions: National emergency, President rule, Financial emergency.	4
	LOCAL GOVERNANCE	
IV	Local self government -constitutional scheme of India – Scheme of fundamental right to equality – scheme of fundamental right to certain freedom under article19 – scope of the right to life and personal liberty under article 21.	4
	INDIAN SOCIETY	
V	Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections	4
	Total Instructional Hours	**45**

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Course Outcome	CO1: Understand the functions of the Indian government CO2: Understand and abide the rules of the Indian constitution.

TEXT BOOKS:

T1-Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.

T2-R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.

T3-Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.

T4-K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, NewDelhi.

REFERENCE BOOKS:

R1. Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.

R2. U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar.

R3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.

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Course code	Course title	L	T	P	C
21HE3072	**Career Guidance – Level III** Personality, Aptitude and Career Development	**2**	**0**	**0**	**0**
Pre-requisite	**None**	**Syllabus version**			
		1			

Course Objectives:

- Solve Logical Reasoning questions of easy to intermediate level [SLO 6]
- Solve Quantitative Aptitude questions of easy to intermediate level [SLO 7]
- Solve Verbal Ability questions of easy to intermediate level [SLO 8]
- Display good writing skills while dealing with essays [SLO 12]

Expected Course Outcome:

Enable students to solve Aptitude questions of placement level with ease, as well as write effective essays.

Student Learning Outcomes (SLO): 6, 7, 8, 12

Module:1 Logical Reasoning **6 hours** **SLO:**6

Clocks, calendars, Direction sense and Cubes

- Clocks
- Calendars
- Direction Sense
- Cubes

Data interpretation and Data sufficiency

- Data Interpretation – Tables
- Data Interpretation - Pie Chart
- Data Interpretation - Bar Graph
- Data Sufficiency

Module:2 Quantitative Aptitude **7 hours** **SLO:** 7

Time and work

- Work with different efficiencies
- Pipes and cisterns
- Work equivalence
- Division of wages

Time, Speed and Distance

- Basics of time, speed and distance

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- Relative speed
- Problems based on trains
- Problems based on boats and streams
- Problems based on races

Profit and loss, Partnerships and averages

- Basic terminologies in profit and loss
- Partnership
- Averages
- Weighted average

Module:3 Verbal Ability **5 hours** **SLO:** 8

Sentence Correction

- Subject-Verb Agreement
- Modifiers
- Parallelism
- Pronoun-Antecedent Agreement
- Verb Time Sequences
- Comparisons
- Prepositions
- Determiners

Sentence Completion and Para-jumbles

- Pro-active thinking
- Reactive thinking (signpost words, root words, prefix suffix, sentence structure clues)
- Fixed jumbles
- Anchored jumbles

Module:4 Writing skills for placements **2 hours** **SLO:** 12

Essay writing

- Idea generation for topics
- Best practices
- Practice and feedback

Total Lecture hours: 20 hours

Mode of Evaluation: Assignments, 3 Assessments with End Semester (Computer Based Test)

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Programme	Course Code	Name of the Course	L	T	P	C
BE/BTECH	21HE3073	**Leadership Management Skills**	1	0	0	0

Course Objective`	1. To know about the leadership skills that is to be acquired for success. 2. To become a teamwork expert, real world problem solver, your views will be challenged 3. To gain global perspective and becoming an effective communicator 4. To understand about learning, negotiation and decision making 5: To get first hand information about the skills we possess and to work on improvement.

Module	Description	Instructional Hours
1.	Strategic thinking skills	
2.	Planning and Delivery skills	
3.	People management skills (Delegation)	
4.	Change management and Innovation skills	
5.	Communication skills	
6.	Persuasion and influencing skills	
7.	Learning Agility	
8.	Motivation	
9.	Personality	
10.	Emotions	
11.	Perception	
12.	Negotiation	
13.	Decision making	
14.	Problem solving	
15.	Building trust	
	Total Instructional Hours	**15**

Course Outcome	CO1: To practice essential leadership skills in day to day operations CO2: To work on leadership skills in the study environment CO3: To understand and develop the skills consciously. CO4: To know about the real worth of all the skills for success CO5: To Analyze the real worth of the person and suggestion for improvement

TEXT BOOKS

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T1: A REVIEW OF LEADERSHIP THEORY AND COMPETENCY FRAMEWORKS, Bolden, R., Gosling, J., Marturano, A. and Dennison, P.June 2003
T2: LEADING FROM WITHIN: Building Organizational Leadership Capacity-David R. Kolzow, PhD, 2014

REFERENCE BOOKS

R1: Seven habits of highly effective people – Stephen R.Covey
R2: The Art of Business Leadership: Indian Experiences – G.Balasubramaniam
R3: DEVELOPING the LEADER WITHIN YOU-JOHN C. MAXWELL

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SEMESTER IV

Programme/sem	Course Code	Name of the Course	L	T	P	C
BE/B.TECH/IV	21MA4104	**PROBABILITY AND RANDOM PROCESSES** (ECE)	3	1	0	4

Course Objective

1. Construct a well defined knowledge of random variables.
2. Describe the concept of standard distributions and their applications.
3. Explain the concept of two dimensional random variables and determine covariance.
4. Discuss the concept of stationary process and correlation functions.
5. Describe the autocorrelation function and the power spectral density for an LTI system

Unit	Description	Instructional Hours
I	**PROBABILITY AND RANDOM VARIABLE** Axioms of probability - Conditional probability - Total probability – Baye's theorem. Random variable –Discrete and continuous random variables – Probability mass function - Probability density function – Cumulative distribution functions - Moment generating functions.	12
II	**STANDARD DISTRIBUTION** Discrete Distributions - Binomial, Poisson, Geometric distributions - Continuous Distributions - Uniform, Exponential and Normal distributions.	12
III	**TWO DIMENSIONAL RANDOM VARIABLES** Joint distributions – discrete and continuous random variables – marginal and conditional probability distributions – covariance – correlation.	12
IV	**RANDOM PROCESSES** Classification of Random Processes – Stationary process – Auto correlation functions – Cross correlation functions – Properties - Markov process - Poisson Process.	12
V	**SPECTRAL DENSITIES AND LINEAR SYSTEMS WITH RANDOM INPUTS** Power spectral density – Cross spectral density – Properties- Linear time invariant system – System transfer function – Linear systems with random inputs.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Understand the concepts of random variables.
CO2: Distinguish various discrete and continuous distribution functions.
CO3: Express the phenomenon of two dimensional random variables.
CO4: Apply the fundamental knowledge of the Markov and Poisson processes.
CO5: Apply the concept of Fourier Transform to analyze the response of random inputs to LTI system.

TEXT BOOKS:

T1 - Saeed Ghahramani, "Fundamentals of probability with stochastic processes", Prentice Hall New Jersy, 2016
T2 –Douglas C.Montgomery and George C Runger,"Applied statistics and probability for Engineers",Wiley,Delhi, 2014.

REFERENCE BOOKS :

R1 – Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2010
R2 - Veerarajan, T., "Probability, Statistics and Random Processes", Tata McGraw-Hill,2nd Edition, New Delhi, 2010.
R3 - Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2nd Edition, 2014

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC4201	Electro Magnetic Fields and Waves	3	1	0	4

Course Objective

1. To learn the field and potentials due to static charges
2. To understand the basic laws and concepts of electromagnetism
3. To obtain the electric and magnetic fields for simple configurations under static conditions.
4. To analyze time varying electric and magnetic fields.
5. To understand Maxwell's equation in different forms and different media
6. To understand wave propagation in lossy and lossless media

UNIT I STATIC ELECTRIC FIELDS 12

Vector Algebra, Coordinate Systems, Vector differential operator, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulombs law, Electric field intensity, Point, Line, Surface and Volume charge distributions, Electric flux density, Gauss law, Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations, Electric dipole, Electrostatic Energy and Energy density

UNIT II CONDUCTORS AND DIELECTRICS 12

Current and current density, Ohms Law in Point form, Continuity equation of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Parallel plate, Coaxial and Spherical capacitors, Boundary conditions for perfect dielectric materials, Poisson's equation, Laplace's equation

UNIT III STATIC MAGNETIC FIELDS 12

Biot -Savart Law, Magnetic field Intensity, Estimation of Magnetic field Intensity for straight and circular conductors, Ampere's Circuital Law, Point form of Ampere's Circuital Law, Magnetic flux and magnetic flux density, The Scalar and Vector Magnetic potentials, Force on a moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, Magnetic boundary conditions involving magnetic fields, Inductance, Basic expressions for self and mutual inductances, Inductance and Inductors ,Magnetic Energy – Magnetic forces and Torques.

UNIT IV TIME-VARYING FIELDS AND MAXWELL's EQUATIONS 12

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential Functions, Electromagnetic boundary conditions, Wave equations and solutions, Time Harmonic Fields

UNIT V PLANE ELECTROMAGNETIC WAVES 12

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Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

OUTCOMES:

Upon completion of the course, the students would be able to

- Understand the basic laws of electromagnetism.
- Analyze field potentials due to static charges and static magnetic fields.
- Analyze time varying electric and magnetic fields.
- To understand Maxwell's equation in integral, differential and phasor forms
- Explain Electromagnetic wave propagation in Lossy and Lossless media.

TEXT BOOKS:

1. D.K.Cheng, Field and Wave electromagnetics, 2nd Edition,Pearson(India),2004
2. Willium H Hayt and Jr John A Buck, "Engineering Electromagnetics" Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, 2008

REFERENCES:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi,2009.
3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. E.C.Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems"2nd Edition, Prentice Hall of India, 2006John D Kraus and Daniel A Fleisch, "Electromagnetics with Applications", Mc Graw Hill Book Co, 2005
5. Karl E Longman and Sava V Savov, "Fundamentals of Electromagnetics", Prentice Hall of India, New Delhi, 2006
6. Ashutosh Pramanic, "Electromagnetism", Prentice Hall of India , New Delhi, 2006

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC4202	Analog Communication	3	1	0	4

Course Objective

1. To introduce the concept of Amplitude Modulation and methods to generate and detect AM waves.
2. To introduce the concept of Angle Modulation and methods to generate and detect FMwaves
3. To impart knowledge on the impact of noises in communication systems
4. To impart knowledge on different types of Radio Transmitters and receivers.
5. To understand the concepts of analog pulse modulation techniques.

Unit	Description	Instructional Hours
I	**AMPLITUDE MODULATION SYSTEMS:** Communication system model - Need for modulation -Amplitude Modulation – Modulation index, frequency spectrum, Average power- DSBSC, SSB, VSB– Amplitude modulator circuits- collector modulator, Balanced modulator, Ring modulator–SSB generation- Amplitude Demodulator circuits –Envelope detectors.	12
II	**ANGLE MODULATION SYSTEMS**: Angle modulation –FM and PM –Narrow band, Wideband FM -Spectral analysis of modulated signal – Bandwidth requirements- Carson's Rule - Pre emphasis, De-emphasis - Generation and demodulation of FM waves -Indirect and Direct FM generation, Balanced Frequency Discriminator and PLL demodulator.	12
III	**NOISE IN CONTINUOUS WAVE MODULATION SYSTEMS:** Noise Sources -Noise Figure, Effective Noise Temperature and Noise Bandwidth-Noise in CW Modulation systems- Noise in Linear Receiver using coherent detection, Noise in AM receivers using envelope Detection - Noise in FM receivers	12
IV	**TRANSMITTERS AND RECEIVERS:** AM broadcasting transmitters- Low Level and High Level transmitters - Pilot carrier SSB Transmitter- FM transmitters- Armstrong FM systems. Tuned radio frequency receiver - Super heterodyne receiver - FM receiver – Diversity reception techniques-TDM,FDM	12
V	**ANALOG PULSE MODULATION SYSTEMS** Sampling process –Generation and Detection- Pulse-amplitude modulation – Pulse-Width modulation – Pulse Position Modulation -Bandwidth-noise trade off-Noise consideration in Pulse modulation systems.	12

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Total Instructional Hours 45

Course Outcome

CO1: Apply the concepts in selecting suitable amplitude modulation techniques for various applications
CO2: Apply the concepts in selecting appropriate angle modulation techniques for a message signal.
CO3: Understand the impact of noise on communication systems
CO4: Understand the principle and working of different transmitters and receivers
CO5: Apply the concepts in selecting appropriate analog pulse modulation technique for various applications

TEXT BOOKS:

T1- Dennis Roddy, John Coolen ,"Electronic Communications", 4th edition, Pearson Education, 2009(Unit I,II,III)

T1 - Simon Haykin, "Communication Systems", 4thedition,Wiley Publication, New Delhi, 2011. (Unit IV,V)

REFERENCE BOOKS :

R1 - Wayne Tomasi ," Electronic Communications Systems –Fundamentals through advanced",5th edition, Pearson
Education 2009
R2 - Lathi B P, "Introduction to Communication Systems", BS publications, New Delhi, 2001.
R3 - Kennedy G, "Electronic Communication systems", Tata McGraw Hill, New Delhi, 2009.
R4 - Carlson A B, "Communication systems: An Introduction to signals and noise in electrical communication", McGraw Hill, New Delhi, 2002.
R5 - Taub and Schilling, "Principles of Communication Systems", McGraw Hill, New Delhi, 1996

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC4203	Linear Integrated Circuits	3	0	0	3

Course Objective

1. To study the basic concepts of OPAMP.
2. To impart knowledge on various applications of OPAMP.
3. To know the working of comparators and waveform generators.
4. To impart the design concepts of ADC and DAC.
5. To study the working of PLL and voltage regulators.

Unit	Description	Instructional Hours
	BASICS OF OPERATIONAL AMPLIFIERS	
I	Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages,DC and AC performance characteristics, slew rate, Open and closed loop configurations.	9
	APPLICATIONS OF OPERATIONAL AMPLIFIERS	
II	Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Precision rectifier, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.	9
	COMPARATORS AND WAVEFORM GENERATORS	
III	Comparators, Schmitt trigger, Sine-wave generators, Multivibrators , Multivibrators using IC 555, Frequency to Voltage and Voltage to Frequency converters.	9
	ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS	
IV	D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode -R - 2RLadder types - switches for D/A converters, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type.	9

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V	**PLL AND VOLTAGE REGULATORS** Operation of the basic PLL, Voltage controlled oscillator, Application of PLL for AM detection, FM detection, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators.	9
Total Instructional Hours		**45**

Course Outcome

CO1: To understand the characteristics of opamp.
CO2: To understand the various applications of opamp.
CO3: To understand the various wave generating and shaping circuits.
CO4: To apply ADC and DAC for various applications.
CO5: To understand the concept of PLL and voltage regulators.

TEXT BOOKS:

T1-D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", Wiley Eastern, New Delhi, 2014. (All Units)
T2-Ramakant A. Gayakwad, "OP-AMP and Linear ICs", 4th Edition, Pearson Education, 2015 .(Refer Unit II & IV)

REFERENCE BOOKS:

R1-S.Salivahanan & V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", 2nd edition McGraw Hill, 2014.
R2-Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 3rd Edition, Tata McGraw-Hill, 2007.
R3-Robert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth Edition, PHI, 2001.
R4-B.S.Sonde, "System design using Integrated Circuits" , 2nd Edition, New Age Pub, 2001.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	21EC4251	Control Systems	2	0	2	3

Course Objective

1. To know the concept of modeling of control systems.
2. To gain adequate knowledge in the time response analysis of first and second order systems.
3. To examine the various frequency response plots.
4. To enumerate the concept of different stability analysis techniques.
5. To describe the concept of state variable analysis.

Unit	Description	Instructional Hours
	MATHEMATICAL MODELING OF CONTROL SYSTEMS	
I	Basic components of Control System – Open loop and Closed loop systems – Introduction to Differential equation -Transfer function- Modeling of Electrical and Mechanical systems- Block diagram reduction methods - Signal flow graph. **Experimental study- Digital simulation of linear systems.**	6+3
II	**TIME RESPONSE ANALYSIS** Time response - Order and Type of the Systems – Standard test signals-Unit step Response analysis of first and second order systems – Time domain specifications-Steady state errors – Introduction to P, PI, PD and PID controllers. **Experimental study- Response of Proportional controllers.**	6+3
III	**FREQUENCY RESPONSE ANALYSIS** Frequency Response - Frequency Domain specifications -Bode Plot, Polar Plot – Constant M and N Circles –Introduction to Lead, Lag, and Lead Lag Compensators. **Experimental study- Frequency response analysis of bode plot.**	6+3
IV	**STABILITY ANALYSIS** BIBO Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Application of Root Locus Diagram - Nyquist Stability Criterion. **Experimental study- Stability analysis of linear system using root locus.**	6+3

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V	**STATE VARIABLE ANALYSIS** State space representation of Continuous Time systems – State equations – Physical, Phase and Canonical variable forms-Transfer function from State Variable Representation- Concepts of Controllability and Observability. **Experimental study- State space representation of Continuous Time systems.**	6+3

Total Instructional Hours **30+15**

Course Outcome

CO1: To understand the concept of mathematically modeling of control systems.
CO2: To remember the different time domain specifications and implement in the steady state error concept.
CO3: To interpret the concepts of various frequency response plots.
CO4: To understand the concept of the stability of closed loop control system.
CO5: To retrieve the concepts of mathematical modeling and implement in a state variable approach.

TEXT BOOKS:

T1- J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 6th Edition, 2018.
T2- Benjamin.C.Kuo, "Automatic control systems", Wiley,9th Edition,2014.

REFERENCE BOOKS:

R1- KatsushikoOgata,"ModernControlEngineering",PearsonEducation,5th Edition, 2010.
R2- Schaum's Outline Series, "Feed Back and Control Systems" ,Tata McGraw-Hill, 2nd Edition,2013.
R3- A.Nagoorkani,"Control Systems Engineering",RBAPublications, First edition,2014.
R4- John J.D Azzo&ConstantineH.Houpis, "Linear Control System Analysis and Design", TMH, 1995.

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Programme	Course Code	Name of the Course	L	P	T	C
BE	21EC4001	Linear Integrated Circuits Lab	0	0	3	1.5

Course Objective

1. To apply operational amplifier in linear applications.
2. To apply operational amplifiers in nonlinear applications
3. To use SPICE software for circuit design.

Exp.No.	Description of the Experiments
	Design and Test the following experiments
1	Voltage Follower, Inverting & Non inverting amplifiers using 741 op-amp.
2	Active low-pass, High-pass and band-pass filters using 741 op-amp.
3	Astablemultivibrator, Monostable multivibrator and Schmitt Trigger using 741 op-amp.
4	Phase shift and Wien bridge oscillators using 741 op-amp.
5	Astable and Mono stable multivibrators using NE555 Timer.
6	Function Generator using ICL8038.
	Simulate the following experiments
7	Integrator, Differentiator and Instrumentation Amplifier using SPICE.
8	Astable& Monostable multivibrators with NE555 Timer using SPICE.
9	Phase shift and Wien bridge oscillators with op-amp using SPICE.
10	D/A and A/D converters using SPICE.

Total Practical Hours 45

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Programme	Course Code	Name of the Course	L	P	T	C
B.E	21EC4002	Analog Communication Laboratory	0	0	4	2

Course Objective

1. To understand different modulation and demodulation schemes.
2. To analyze spectral characteristics of modulated signals
3. To understand the concept of multiplexing of signals.

Exp.No.	Description of the Experiments
1	Design and testing of Amplitude Modulation and Demodulation
2	Design and testing of Frequency Modulation and Demodulation.
3	Design and testing of Pre Emphasis - De Emphasis Circuits
4	Design and testing of Mixer Circuit
5	Design and testing of Phase locked loop
6	Pulse Amplitude Width Modulation
7	Time Division Multiplexing.
	Simulation Experiments
8	DSB SC Modulation and Demodulation.
9	Pulse Width and Pulse Position modulation
10	Spectral Characteristics of AM & FM

Total Practical Hours 45

Course Outcome

CO1: Analyze the performance of various modulation and demodulation methods.

CO2: Able to interpret the spectral characteristics of the modulated signals

CO3: Able to analyze multiplexing techniques in signal reception

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Programme	Course Code	Name of the Course	L	T	P	C
BE	**21MC4191**	**ESSENCE OF INDIANTRADITIONALKNOWLEDGE**	2	0	0	0

Course Objective

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system
2. Tomakethestudentsunderstandthetraditionalknowledgeandanalyzeitand apply it to their day to day life
3. ToimpartbasicprinciplesofthoughtprocessItihasandDharmaShastraand connecting society and nature
4. TounderstandtheconceptofIntellectualandintellectualpropertyrightswith specialreference.
5. TofocusonintroductiontoIndianKnowledgeSystem,Indianperspectiveof modern scientific world-view and basic principles of Yoga and Indianphilosopy

Unit	Description	Instructional Hours
I	**Introduction to traditional knowledge** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge(IK), characteristics, traditional knowledge vs indigenous knowledge, traditional knowledge vs western knowledge.	6
II	Protection of traditional knowledge The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness	6
III	Itihas and Dharma-Shastra **Itihas:** The Mahabharata - The Puranas -TheRamayana. Dharma-Shastra: Manu Needhi-The Tirukkural – Thiruarutpa	6
IV	Traditional knowledge and intellectual property Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents andtraditionalknowledge, Strategies to increase protection of traditional knowledge	6
V	Indian philosophy Jain–Buddhist –Charvaka– Samkhya-Yoga-Nyaya–Vaisheshika-Saiva Siddhanta	6
	Total Instructional Hours	**45**

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Course Outcome	CO1: Identify the concept of Traditional knowledge and its importance CO2: Explain the need and importance of protecting traditional knowledge. CO3: Explain the need and importance of Itihas and Dharma Shastra. CO4: Interpret the concepts of Intellectual property to protect the traditional knowledge. CO5: Interpret the concepts of indian philosophy to protect the traditional knowledge

REFERENCE BOOKS:

1. Traditional Knowledge System in India, by Amit Jha,2009.
2. Traditional Knowledge System in India by Amit Jha Atlantic publishers,2002.
3. "Knowledge Traditions and Practices of India" Kapil Kapoor1, MichelDanino2.
4. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, BharatiyaVidya Bhavan, Mumbai, 5th Edition,2014.
5. VNJha(Eng.Trans,), Tarkasangraha of Annam Bhatta ,Inernational Chinmay Foundation, Velliarnad, Amaku,am.

Course code	**Course title**	**L T P C**
21HE4072	**Career Guidance – Level IV** Personality, Aptitude and Career Development	**2 0 0 0**
Pre-requisite	**None**	**Syllabus version** 1

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Course Objectives:

- Solve Logical Reasoning questions of easy to intermediate level [SLO 6]
- Solve Quantitative Aptitude questions of easy to intermediate level [SLO 7]
- Solve Verbal Ability questions of easy to intermediate level [SLO 8]
- Crack mock interviews with ease [SLO 13]
- Be introduced to problem-solving techniques and algorithms [SLO 14]

Expected Course Outcome:

Enable students to solve Aptitude questions of placement level with ease, as well as write effective essays.

Student Learning Outcomes (SLO): 6, 7, 8, 13, 14

Module:1 Logical Reasoning **3 hours** **SLO:**6

Logical connectives, Syllogism and Venn diagrams

- Logical Connectives
- Syllogisms
- Venn Diagrams – Interpretation
- Venn Diagrams - Solving

Module:2 Quantitative Aptitude **6 hours** **SLO:** 7

Logarithms, Progressions, Geometry and Quadratic equations

- Logarithm
- Arithmetic Progression
- Geometric Progression
- Geometry
- Mensuration
- Coded inequalities
- Quadratic Equations

Permutation, Combination and Probability

- Fundamental Counting Principle
- Permutation and Combination
- Computation of Permutation
- Circular Permutations
- Computation of Combination
- Probability

Module:3 Verbal Ability **2 hours** **SLO:** 8

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Critical Reasoning

- Argument – Identifying the Different Parts (Premise, assumption, conclusion)
- Strengthening statement
- Weakening statement
- Mimic the pattern

Module:4 Recruitment Essentials 1 hour SLO: 12

Cracking interviews - demonstration through a few mocks

Sample mock interviews to demonstrate how to crack the:

- HR interview
- MR interview
- Technical interview

Cracking other kinds of interviews

- Skype/ Telephonic interviews
- Panel interviews
- Stress interviews

Resume building – workshop

A workshop to make students write an accurate resume

Module:5 Problem solving and Algorithmic skills 8 hours SLO: 12

- Logical methods to solve problem statements in Programming
- Basic algorithms introduced

Total Lecture hours: 20 hours

Mode of Evaluation: Assignments, Mock interviews, 3 Assessments with End Semester (Computer Based Test)

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC5201	MICROPROCESSOR AND MICRO CONTROLLER	3	0	0	3

Course Objective

1. Study the Architecture of 8085 and 8086 microprocessor.
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. Study about communication and bus interfacing.
4. Study the Architecture of 8051 microcontroller
5. Study the concepts of microcontroller interfacing

Unit	Description	Instructional Hours
I	**THE 8085 AND 8086 MICROPROCESSOR** **9**Introduction to 8085 – Microprocessor architecture – Addressing modes - Instruction set -Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set- Assembly language programming – Modular Programming - Interrupts and interrupt service routines.	9
II	**8086 SYSTEM BUS STRUCTURE** 8086 signals – Basic configurations – System bus timing –System design using 8086 – Introduction to Multiprogramming – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors	9
III	**I/O INTERFACING** Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer Interface – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display.	9
IV	**MICROCONTROLLER AND INTERFACING MICROCONTROLLER** Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits – Instruction set - Addressing modes - Assembly language programming. Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - Stepper Motor	**9**
V	**ARM PROCESSOR 9** Arcon RISC Machine – Architectural Inheritance – Core & Architectures - Registers – Pipeline - Interrupts – ARM organization - ARM processor family – Co-processors - ARM instruction set- Thumb Instruction set - Instruction cycle timings - The ARM Programmer‟s model- ARM Assembly Language Programming	**9**
	Total Instructional Hours	**45**

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Course Outcome	CO1: Design and implement programs on 8086 microprocessor. CO2: Design I/O circuits. CO3: Design Memory Interfacing circuits. CO4: Design and implement 8051 microcontroller based systems. CO5: Design various interfacing and its programming methodologies

TEXT BOOKS:

T1-Ramesh S. Goankar, "Microprocessor Architecture, Programming and Applications with 8085", 5th Edition, Prentice Hall (Unit 1)

T2- Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture,
Programming and Design", Prentice Hall of India, 2011. (Unit 1, 2, 3)

T3- Mohamed Ali Mazidi, Janice GillispieMazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded
Systems: Using Assembly and C", Second Edition, Pearson education, 2011 (Unit 4, 5)

REFERENCE BOOKS:

R1 - DoughlasV.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012

R2- Krishna Kant , "Microprocessors and microcontrollers architecture programming and system design 8085 8086 8051 8096 PHI Learning Private Limited", 2014

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC5202	Transmission Lines and Wave Guides	3	0	0	3

Course Objective

1.To teach general theory on transmission lines and its characteristics
2. To give thorough understanding about high frequency line, power and impedance measurements
3 .To impart technical knowledge in impedance matching using smith chart
4. To study the behavior of guided waves between parallel planes
5. To provide an insight on the characteristics of guided waves in in rectangular and circular waveguides

Unit	Description	Instructional Hours
	TRANSMISSION LINE THEORY	
I	General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion – Distortion less line - Loading and different methods of loading - Line not terminated in Z_0 - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines - reflection factor and reflection loss	12
	HIGH FREQUENCY TRANSMISSION LINES	
II	Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short circuited lines - Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength.	12
	IMPEDANCE MATCHING IN HIGH FREQUENCY LINES	
III	Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of problems using Smith chart - Single and double stub matching using Smith chart.	12
	GUIDED WAVES	
IV	Waves between parallel planes-Transverse Electric Waves-Transverse Magnetic Waves- Characteristics of TE and TM waves-Transverse Electromagnetic waves-Velocity of propagation-Attenuation in parallel plane guides- Wave Impedances	12

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WAVEGUIDES

V	Rectangular Waveguides - TM Waves in Rectangular guides -TE Waves in Rectangular Waveguides - Impossibility of TEM waves in waveguides -Bessel functions -TM and TE waves in Circular waveguides -Wave Impedance and Characteristic Impedances.	12
	Total Instructional Hours	**60**

Course Outcome

After completion of the course the learner will be able to

lerstand the characteristics of transmission lines and its losses

CO2: Understand the standing wave ratio and input impedance in high frequency

ionlines

lerstand impedance matching for high frequency lines using smith charts

lerstand the behavior of guided waves between parallel planes

CO5:Understand the Characteristics of guided waves in rectangular and circular waveguides

TEXT BOOKS:

T1-John D Ryder, "Networks, Lines and Fields", 2nd Edition, Prentice Hall India, 2015. (UNIT I to III)

T2-E.C.Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems"2nd Edition, Prentice Hall of India, 2006. (UNIT IV & V)

REFERENCE BOOKS:

R1-Reinhold Ludwig and Powel Bretchko,‖ RF Circuit Design – Theory and Applications‖, Pearson Education Asia, First Edition,2001.

R2 - D. K. Misra, ―Radio Frequency and Microwave Communication Circuits- Analysis and Design‖, John Wiley & Sons, 2004.

R3 - Mathew M. Radmanesh, ―Radio Frequency &Microwave Electronics‖, Pearson Education Asia, Second Edition,2002.

R4 - G.S.N Raju, "Electromagnetic Field Theory and Transmission Lines Pearson Education, First edition 2005.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC5203	VLSI Design	3	0	0	3

Course Objective

1. To learn the fundamentals of CMOS and MOS design
2. To understand silicon processing
3. To familiarize with VLSI combinational logic and sequential logic circuits design

Unit	Description	Instructional Hours
I	**INTRODUCTION TO CMOS CIRCUITS AND MOS TRANSISTOR THEORY** MOS transistors – CMOS logic – Circuits and System Representation – An example – Introduction to nMOS, pMOS enhancement transistor – MOS device design equation – Basic DC equation, second order effects – Complementary CMOS inverter – DC characteristics	9
II	**CMOS PROCESSING, CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION** Silicon semiconductor technology: An overview – Basic CMOS technology –CMOS process enhancement –Reistance estimation – Capicatence estimation – Switching characteristics – Analytical delay models, Gate delays – Power dissipation.	9
III	**CMOS CIRCUITS AND LOGIC DESIGN** CMOS logic gate design –physical design of simple logic gates – INVERTER, NAND and NOR gates, Complex logic gateslayout, CMOS standard cell design – CMOS logic structures – Pseudo nMOS logic, Dynamic CMOS logic, Clocked CMOS logic, Pass transistor logic – Clocking strategies – Clocked system, latches and registers, system timing, setup and hold time, single phase memory structure PLL clock technique, two phase clocking	9
IV	**INTRODUCTION TO GaAs TECHNOLOGY &ARITHMETIC BUILDING BLOC** Ultra-fast systems – Gallium arsenide crystal structure – Technology development – Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers	9
V	**VERILOG PROGRAMMING INTRODUCTION** Hierarchical modelling concepts – Basic concepts – Modules and ports – Gate level modelling – Behavioural modelling – Data flow modelling: An introduction.	9
	Total Instructional Hours	**45**

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Course Outcome	After completion of the course the learner will be able to CO1: Ability to analyze CMOS and MOS transistors. CO2: Ability to analyse passive components required for physical design. CO3: Ability to analyze timing issues of sequential logic CO4: Ability to understand advanced semiconductor processing materials and data processing architecture CO5: Ability to write [illegible] efficient model for digital circuits

TEXT BOOKS:

T1-- Neil H E Weste and Kamran Eshranghian, "Principles of CMOS VLSI Design: A system Perspective", Second ın, Pearson education Asia.

T2- Douglas A Pucknell and Kamran Eshranghian, "Basic VLSI Design", Third edition, Prentice Hall of India.

REFERENCE BOOKS:

R1- -Samir Palnitkar, "Verilog HDL – A guide top Digital Design and Synthesis", Second edition, Pearson education.

R2 - Neil H E Weste and David money Haris, "CMOS VLSI Design: A circuits and systems Perspective",Addison Wesley, New Delhi, 2010.

R3 - Sung-Mo Kanga and Yusuf Leblebici, "CMOS Digital Integrated Circuits- Analysis and Design", Tata McGraw New Delhi, 2004.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC5251	Data Communication and Networks	2	0	2	3

Course Objective

1. To understand the state-of-the-art in network models
2. To analyze the flow control and error control algorithms in a network.
3. To familiarize the various aspects of routing algorithms.
4. Be exposed to the required functionality of each network application.
5. To familiarize with various wide area network.

Unit	Description	Instructional Hours
I	**PHYSICAL LAYER** OSI reference model , TCP/IP Protocol suite.Line Configuration, Encoding and Decoding, Multiplexing-transmission media - Circuit Switching, Packet Switching, Message Switching. **Simulation of Network Topology – Star, Bus and Ring**	6+5
II	**LINK LAYER ALGORITHMS AND PROTOCOLS** Flow control and error control, stop and wait, Sliding windows ,Local Area Networks - IEEE 802 standards, LLC, MAC layer protocols – CSMA/CD Ethernet, Token Ring,FDDI. **Study And Compare the performance of Stop And Wait Protocol,Study And Compare the performance of Selective Repeat Protocol,Go Back N Protocol**	6+5
III	**ROUTING ALGORITHMS AND PROTOCOLS** Routing Algorithms- RIP, OSPF, BGP, multicast routing (DVMRP, PIM)- IPv4 -IPv6. UDP-TCP-congestion Control Algorithmswirele	6+5
IV	**APPLICATION LAYER** Domain Name system – Remote logging, Electronic Mail, File Transfer - WWW and HTTP- Simple Network Management Protocol – Data Security.	6
V	**WIDE AREA NETWORKS** Integrated Services Digital Network (ISDN), *B-ISDN*, Frame delay and Asynchronous Transfer Mode (ATM) Protocol	6
	Total Instructional Hours	**30+15=45**

Course Outcome

After completion of the course the learner will be able to
CO1: Demonstrate the networking strategies.
CO2: Identify the technical issues related to networking technologies.
CO3: Discriminate various routing techniques.
CO4: Illustrate the web applications
CO5: Implement various network algorithms and protocols

TEXT BOOKS:

T1 - Behrouz A Forouzan , “Data Communication and Networking”, McGraw-Hill, New Delhi, 2012.

T2 - Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, MorganKaufmann Publishers, 2011

REFERENCE BOOKS:

R1 - Andrew S Tanenbaum, “Computer networks”, Prentice Hall of India, New Delhi, 2010.

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R2 - William Stallings, “Data and Computer Communication”, Prentice Hall of India, New Delhi, 2007

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Programme	Course code	Name of the course	L	T	P	C
BE	19EC5202	Digital Signal Processing	2	0	2	3

Course Objective

1. To learn discrete Fourier transform and its properties.
2. To know the characteristics of IIR filters.
3. To learn the design of Finite Impulse Response filters.
4. To understand Finite word length effects.
5. To study the concept of MultirateSignal Processing.

Unit	Description	Instructional Hours
I	**DISCRETE FOURIER TRANSFORM** Introduction to DFT–FFT Algorithms –Radix 2 FFT algorithms, Decimation in time Algorithms, Decimation in frequency Algorithms, Inverse DFT using FFT	7
II	**IIR FILTER DESIGN** IIR filter design: Butterworth approximation using Impulse Invariance Transform and Bilinear transformation, Chebyshev approximation using Impulse Invariance Transform and Bilinear transformation .(LPF)	7
III	**FIR FILTER DESIGN** Linear phase realization of FIR filters-Design of linear phase FIR filters using Windows (Rectangular Window, Hamming Window, Hanning Window)- FIR filter Design using Frequency sampling method.	7
IV	**FINITE WORDLENGTH EFFECTS** Quantization by Truncation and Rounding – Quantization of filter coefficients – Product quantization error - Limit cycle oscillations in recursive systems: Zero input limit cycle oscillation, Overflow limit cycle oscillation – Scaling to prevent Overflow.	7
V	**MULTI RATE DIGITAL SIGNAL PROCESSING** Decimation, Interpolation, Sampling rate conversion by a rational factor, Applications of Multirate Signal Processing:Subband Coding of Speech signals.	7
	List of Experiments 1. Spectral analysis using FFT algorithms. 2. Filtering very long sequence using sectioned convolution. 3. Design of FIR filters using Rectangular, Hamming and Hanningwindows. 4. Design of Digital IIR filters using Bilinear and Impulse Invariant Transforms. 5. Analysis of limit cycle oscillations in recursive digital filters due to quantization.	10
Total Instructional Hours		45

On the completion of the course the students could able to:

Course Outcome

CO1: Apply DFT for the analysis of digital signals & systems.
CO2: Design IIR Butterworth and Chebyshev filters
CO3:Design FIR filters.
CO4: Illustrate Finite word length effect on filters.
CO5: Design and Implement MultirateFilters .

TEXT BOOKS

1. John G. Proakis& Dimitris G.Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Fourth Edition, Pearson Education / Prentice Hall, 2007. (Unit I, II, III,IV)
2. A .NagoorKani, "Digital Signal Processing", 2010 Edition,Mc Graw Hill Education (India) Pvt. Ltd (Unit V)

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REFERENCE BOOK

1. Emmanuel C..Ifeachor, &Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002
2. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Mc Graw Hill, 2007
3. Andreas Antoniou, "Digital Signal Processing", Mc Graw Hill, 2006
4. A.V.Oppenheim, R.W. Schafer and J.R. Buck, "Discrete-Time Signal Processing", 8th Indian Reprint, Pearson,2004

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Programme	Course code	Name of the course	L	T	P	C
BE	19EC5001	VLSI Design Lab	0	0	3	1.5

Course Objective

1. To learn Hardware Descriptive Language(Verilog).
2. To learn fusing of logical modules on FPGAs.
3. To learn the fundamental principles of VLSI circuit design in digital and analog domain.

Expt.No.	Description of the Experiments
1	Write Verilog Code for the following circuits and their Test Bench for verification, do the initial timing verification and observe the waveform. 1. Basic logical gates. 2.Half and full adder 3.8-bit adder. 4.Flip flop -RS, D and JK 5.4 bit up/down counter 6.Multiplier minimum 4 bit
2	Synthesize and implement 8 bit adder, 4 bit up/down counter and multiplier (minimum 4 bit) in a FPGA.
3	Design an Inverterusing CMOS and complete the design flow mentioned below: i. Draw the schematic and verify the DC Analysis and Transient Analysis ii.Draw the Layout and verify the Design Rule Check and ERC iii. Check for Layout verses schematic iv. Extract RC and back annotate the same and verify the Design v. Verify for Time, Power and Area.
	Total Instructional Hours 45

Course Outcome

CO1: Write HDL code for basic as well as advanced digital integrated circuits.

CO2: Import the logic modules into FPGA Boards and Synthesize digital logics on FPGA

CO3: Design the layouts of Analog IC Blocks using EDA tools.

CO4: Simulate the layouts of Analog IC Blocks using EDA tools.

CO5: Extract the layouts of Analog IC Blocks using EDA tools.

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Programme	Course code	Name of the course	L	T	P	C
BE	19EC5002	Microprocessor and Micro Controller Lab	0	0	3	1.5

Course Objective

1.Introduce ALP concepts and features
2. Write ALP for arithmetic and logical operations in 8086 and 8051
3. Differentiate Serial and Parallel Interface
4. Interface different I/Os with Microprocessors
5. Be familiar with MASM

Expt.No.	Description of the Experiments
	Using 8086 Micro processor and MASM software
1.	Basic arithmetic and Logical operations.
2.	Code conversion and decimal arithmetic
3.	Matrix operations
4.	Searching
5.	Sorting
	Using 8086 Micro processor and Interfacing
6.	Parallel interface
7.	Key board and Display interface
8.	Serial interface
9.	A/D and D/A interface
	Using 8051 Micro controller
10.	Basic arithmetic and Logical operations
11.	Square and Cube program, Find 2's complement of a number
12.	Stepper motor control interface

Total Instructional Hours **45**

Course Outcome

CO1: Write ALP Programmes for fixed and Floating Point and Arithmetic
CO2: Interface different I/Os with processor
CO3: Generate waveforms using Microprocessors
CO4: Execute Programs in 8051
CO5: Explain the difference between simulator and Emulator

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Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	19HE5071	Soft Skills - I	1	0	0	1

Course Objectives:

1.To employ soft skills to enhance employability and ensure workplace and career success.
2.Toenrich students' numerical ability of an individual and is available in technical flavor.
3.To interpret things objectively, to be able to perceive and interpret trends to make generalizations and be able to analyze assumptions behind an argument/statement.

Unit	Description	Instructional Hours
I	**Introduction to Soft Skills:** Introduction- Objective -Hard vs Soft Skills - Measuring Soft Skills- Structure of the Soft Skills -Self Management-Critical Thinking-Reflective thinking and writing- p2p Interaction	3
II	**Art of Communication:** Verbal Communication - Effective Communication - Active listening –Paraphrasing - Feedback - Non-Verbal Communication – Roles-Types- How nonverbal communication can go wrong- How to Improve nonverbal Communication - Importance of feelings in communication - dealing with feelings in communication.	4
III	**World of Teams:** Self Enhancement - importance of developing assertive skills- developing self-confidence – developing emotional intelligence - Importance of Team work – Team vs. Group - Attributes of a successful team – Barriers involved - Working with Groups – Dealing with People- Group Decision Making.	3
IV	**Quantitative Aptitude:** Averages - Profit and loss - Partnerships - Time and work - Time, Speed and Distance - Problems based on trains - Problems based on boats and streams	3
V	**Logical Reasoning:** Clocks - Calendars - Direction Sense - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	2

Course Outcome:

CO1:	Students will have clarity on their career exploration process and to match their skills and interests with a chosen career path.
CO2:	Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others
CO3:	Students will understand how teamwork can support leadership skills
CO4:	Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
CO5:	Students will demonstrate an enhanced ability to draw logical conclusions and implications to solve logical problems.

REFERENCE BOOKS:

R1: Soft Skills Training: A Workbook to Develop Skills for Employment - Frederick H. Wentz

R2: How to prepare for data interpretation for CAT by Arun Sharma.

R3: How to Crack TEST OF REASONING in all competitive examinations by Jaikishan and Premkishan.

R4: A New Approach To Reasoning Verbal & Non-Verbal By B.S. Sijwali

R5: Quantitative Aptitude for Competitive Examinations - Dr. R.S. Aggarwal, S. Chand

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Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech.	19HE5072	**DESIGN THINKING**	1	0	0	1

Course Objective

OBJECTIVES:

- To expose students to the design process
- To develop and test innovative ideas through a rapid iteration cycle.
- To provide an authentic opportunity for students to develop teamwork and leadership skills

Unit	Description	Instructional Hours
I	**DESIGN ABILITY** Asking Designers about what they Do – Deconstructing what Designers Do – Watching what Designers Do – Thinking about what Designers Do – The Natural Intelligence of Design Sources	**4**
II	**DESIGNING TO WIN** Formula One Designing – Radical Innovations – City Car Design – Learning From Failures – Design Process and Working Methods	**4**
III	**DESIGN TO PLEASE AND DESIGNING TOGETHER** Background – Product Innovations – Teamwork versus Individual work – Roles and Responsibilities – Avoiding and Resolving Conflicts.	**4**
IV	**DESIGN EXPERTISE** Design Process – Creative Design - Design Intelligence – Development of Expertise – Novice to Expert. Critical Thinking – Case studies: Brief history of Albert Einstein, Isaac Newton and Nikola Tesla	**3**
	Total Instructional Hours	**15**

Course Outcome

Upon completion of the course, students will be able to

CO1: Develop a strong understanding of the Design Process

CO2: Learn to develop and test innovative ideas through a rapid iteration cycle.

CO3: Develop teamwork and leadership skills

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TEXT BOOKS:

T1 - 1. Nigel Cross, “Design Thinking”, Kindle Edition.

REFERENCE BOOKS:

R1 - Tom Kelley, “Creative Confidence”, 2013.

R2 - 3. Tim Brown, “Change by Design”, 2009.

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VI SEMESTER

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC6202	Antenna and Wave Propagation	3	1	0	4

Course Objective

1. To provide an insight of the radiation phenomena and the antenna parameters
2. To teach the radiation characteristics of different types of aperture and slot antennas
3. To study the radiation mechanism of array antennas
4. To impart knowledge on special antennas and antenna measurements
5. To understand the propagation of radio waves and various types of wave propagation

Unit	Description	Instructional Hours
I	**FUNDAMENTALS OF RADIATION:** Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from Oscillating dipole, Half-wave dipole, Folded dipole, Yagi array	12
II	**APERTURE AND SLOT ANTENNAS:** Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna, Reflector antenna, Aperture blockage, Feeding structures, Slot antennas, Microstrip antennas – Radiation mechanism – Applications	12
III	**ANTENNA ARRAYS:** Point Source, Array of Two-point sources, N -Element Uniform Linear Array, Broad-Side array, End-Fire Array, Pattern multiplication, Concept of Phased arrays, Adaptive array, Antenna synthesis-Binomial array.	12
IV	**SPECIAL ANTENNAS:** Frequency independent antennas –Spiral antenna, Helical antenna, Log periodic Antenna. Modern antennas- Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR	12
V	**PROPAGATION OF RADIO WAVES:** Modes of propagation , Structure of atmosphere , Ground wave propagation, Tropospheric propagation , Duct propagation, Troposcatter propagation , Flat earth and Curved earth concept, Sky wave propagation – Virtual height, critical frequency, Maximum usable frequency – Skip distance, Fading , Multi hop propagation	12
	Total Instructional Hours	**60**

Course Outcome

After completion of the course the learner will be able to

CO1: Understand the radiation phenomena and the antenna parameters

CO2: Understand the radiation characteristics of different types of aperture and slot antennas

CO3: Understand the radiation mechanism of various types of array antennas.

CO4: Understand the purpose on special antennas and some of the basic antenna measurements

CO5: Understand the characteristics of different types of radio wave propagation at different frequencies

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T1- John D Kraus, Ronald J Marhefka, Ahmad S Khan “Antennas and Wave Propagation”, Fifth Edition, Mc Graw Hill Education (India) Private Limited, Special Edition 2012. Unit-I-IV

T2 - K.D.Prasad, “Antenna and Wave propagation”, Satya Prakashan Publishers, Third Reprint Edition, 2016 Unit-I-V

REFERENCE BOOKS:

R1- Constantine.A.Balanis “Antenna Theory Analysis and Design”, Third Edition, Wiley India Pvt.Ltd., Reprint 2016- Unit-I,III&IV

R2 - Edward.C.Jordan and Keith G.Balmain, “Electromagnetic Waves and Radiating Systems”, Second Edition, PHI Learning Private Limited, 2011. Unit-V

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC6181	Principles of Management	3	0	0	3

Course Objective

The student should be able to
1. Acquire fundamental knowledge on management and organization
2. Extend the knowledge about the planning strategies.
3. Understand the nature of organizing and organization
4. Gain knowledge about the role of communication and types of leadership
5. Understand the system and process of controlling.

Unit	Description	Instructional Hours
	OVERVIEW OF MANAGEMENT AND ORGANIZATION	
I	Definition of Management – Science or Art – Manager Vs Entrepreneur – types of managers -managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises – Organization culture and Environment – Current trends and issues in Management.	9
	PLANNING	
II	Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.	9
	ORGANIZING	
III	Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority –centralization and decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management	9
	DIRECTING	
IV	Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership –communication – process of communication – barrier in communication – effective communication –communication and IT.	9

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	CONTROLLING	
V	System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.	9
	Total Instructional Hours	**45**

Course Outcome

After completion of the course the learner will be able to
CO1:Aanalyze strategies to handle the given issues in management
CO2: Discuss the nature of decision making process
CO3: Analyze the types of organization structure and departmentation.
CO4: Evaluate the theories of leadership.
CO5: Evaluate the techniques of budgetary and non – budgetary control.

TEXT BOOKS:

T1 - T1- Harold Koontz & Heinz Weihrich ,A.RamachandraAryasri , "Principles of management" ,2 Edition, Tata Mc Graw Hill, 2016 -UNIT (1to 5)

T2- Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 5th Edition UNIT (1to 5)

REFERENCE BOOKS:

R1- Stephen A. Robbins & David A. Decenzo& Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011

R2 - Robert Kreitner&MamataMohapatra, "Management", Biztantra, 2008.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC6251	Embedded Systems and IoT	2	0	3	3.5

Course Objective

The student should be able to

1. Learn the internal architecture and interfaces of an embedded system.
2. Understand the concepts of real-time operating systems.
3. Build a small low-cost embedded and IoT system using Raspberry Pi/open platform

Unit	Description	Instructional Hours
I	**INTRODUCTION TO EMBEDDED SYSTEMS** Introduction to Embedded Systems – Classification – Major Applications – General purpose and Domain specific processors – Sensors and Actuators – Communication Interfaces.	**7**
II	**REAL TIME OPERATING SYSTEMS** OS Basics – Types – Tasks – Process and Threads – Multiprocessor and Multitasking – VxWorks – MicroC/OS-II.	6
III	**GETTING STARTED WITH RASPBERRY PI** About the Board – Linux on Raspberry Pi - Interfaces - Programming Raspberry Pi with python – Examples.	5
IV	**OVERVIEW OF IoT UNDERSTANDING** Introduction – Physical and Logical design of IoT – IoT Enabling Technologies – IoT levels and deployment templates.	6
V	**APPLICATION DEVELOPMENT** Home Automation – Cities – **Environment**: Weather monitoring system – Forest Fire detection – Agriculture – Productivity Applications.	6

Practicals- IoT

1. Study of ARM Processor
2. LED blinking usingARM
3. ADC and temperature sensor interfacing withARM
4. Installation of OS in RaspberryPi
5. GPIO Control over WebBrowser

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6. Communicating data usingon-boardmodule
7. Home automation usingPi
8. Node-RED, MQTTProtocol
9. Using Node-RED Visual Editor onRpi
10. IoT Applications based onPi

Total Instructional Hours **45**

Course Outcome

After completion of the course the learner will be able to
CO1: Design and develop embedded systems.
CO2: Analyze program design and scheduling of the process.
CO3: Design portable IoT using Raspberry Pi /open platform.
CO4: Develop IoT applications using Raspberry Pi/open platform.
CO5: Explore deployment platforms for IoT applications.

TEXT BOOKS:

T1-Introduction to Embedded System, Shibu.K.V, McGraw and Hill Education, 13th Edition, 2014. (Unit 1&2).
T2- Internet of Things: An hands on approach, ArshdeepBahga, Vijay Madisetti, University Press, 2014. (Unit 3, 4, 5).

REFERENCE BOOKS:

R1 - Raspberry Pi cookbook: Software and hardware problems and solutions, Monk, Simon. O'Reilly Media, Inc., 2016.
R2- The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick – Wiley Publications -2012.
R3- Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for theInternet of Things", CISCO Press, 2017.
R4- Wayne Wolf, "Computers as Components: Principles of Embedded ComputerSystem Design", Elsevier, 2006.
R5-Andrew N Sloss, D. Symes, C. Wright, "Arm System Developers Guide", MorganKauffman/ Elsevier, 2006.
R6- IOT (Internet of Things) Programming: A Simple and Fast Way of Learning,IoT Kindle Edition.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC6001	Digital Communication Lab	0	0	3	1.5

S.NO **LIST OF EXPERIMENTS**

1. Signal Sampling and TDM.
2. Pulse Amplitude Modulation.
3. Pulse Code Modulation and Demodulation.
4. Line Coding Schemes.
5. Pulse Width and Pulse Time Modulation

SIMULATION EXPERIMENTS

6. Generation and Detection of Delta modulation Scheme.
7. ASK Modulator and Demodulator.
8. Simulation of FSK schemes.
9. Signal constellations of BPSK and QPSK .
10. Simulation of Communication Channel(AWGN).

TOTAL PRACTICAL HOURS 45

Course Outcome

CO1:Able to sampling and reconstruction for given signal.
CO2:Able to multiplex signals without aliasing effect.
CO3:Analyze the performance of various Pulse Modulations and Demodulation.
CO4:Able to design and implement the various bandpass modulation/demodulation schemes
CO5:Able to design a communication channel.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC6701	Internship	**0**	**0**	**0**	**1**

Course Objective	1. To provide students with opportunities to make connections between the theory and practice of academic study and the practical application of that study in a professional work environment. 2. Gain insight into a possible career path of interest while learning about the industry in which the organization resides, organizational structure, and roles and responsibilities within that structure 3. Develop professional connections and identify a strategy for maintaining those connections.

S.NO.	Description
1.	Conduct an informational interview with an individual at your organization other than your site supervisor to explore a profession of interest and summarize your findings.
2.	Analyze your internship experience, reflecting on lessons learned and how your liberal arts education prepared you for the internship.
3.	Add details about your experience including new skills developed and results obtained during the internship.

Course Outcome

CO1: Ability to articulate what was learned and how it will be apply to your professional career goals

CO2: Identification of professions that may be of interest as a result of this experience

CO3: Identification of additional skills that will need to be developed to ensure career readiness. This might include learning a new technology, developing a broader network, additional coursework, etc.

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Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	19HE6071	Soft Skill-II	**1**	**0**	**0**	**1**

Course Objectives:

1. To make the students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
2. To learn everything from equations to probability with a completely different approach.
3. To make the students learn on an increased ability to explain the problem comprehensively.

Unit	Description	Instructional Hours
I	**Group Discussion & Presentation Skills:** GD skills – Understanding the objective and skills tested in a GD – General types of GDs – Roles in a GD – Do's & Don'ts – Mock GD & Feedback. - Presentation Skills – Stages involved in an effective presentation – selection of topic, content, aids – Engaging the audience – Time management – Mock Presentations & Feedback	4
II	**Interview Skills and Personality Skills:** Interview handling Skills – Self preparation checklist – Grooming tips: do's & don'ts – mock interview & feedback - Interpersonal skills-creative thinking-problem solving-analytical skills	3
III	**Business Etiquette & Ethics:** Etiquette – Telephone & E-mail etiquette – Dining etiquette – do's & Don'ts in a formal setting – how to impress. Ethics – Importance of Ethics and Values – Choices and Dilemmas faced – Discussions from news headlines.	3
IV	**Quantitative Aptitude:** Permutation, Combination - Probability - Logarithm - Quadratic Equations - Algebra - Progression - Geometry - Mensuration.	3
V	**Logical Reasoning:** Logical Connectives - Syllogisms - Venn Diagrams – Cubes - Coded inequalities - Conditions and Grouping	2

Course Outcome:

CO1:	Students will have learnt to keep going according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict.
CO2:	Students will Actively participate meetings, Group Discussions / interviews and prepare & deliver presentations
CO3:	Students will define professional behavior and suggest standards for appearance, actions and attitude in a Business environment
CO4:	Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
CO5:	Students will excel in complex reasoning.

REFERENCE BOOKS

R1: Bridging the Soft Skills Gap: How to Teach the Missing Basics to Todays Young Talent- Bruce Tulgan
R2: Quantitative Aptitude for Competitive Examinations (5th Edition) - Abhjit Guha
R3: How to crack test of Reasoning - Jaikishan and Premkishan
R4: The hand on guide to Analytical Reasoning and Logical Reasoning - Peeyush Bhardwaj

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Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	19HE6072	**Intellectual Property Rights (IPR)**	**1**	**0**	**0**	**1**

Course Objectives:

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects.
3. To disseminate knowledge on copyrights and its related rights and registration aspects.
4. To disseminate knowledge on trademarks and registration aspects.
5. To disseminate knowledge on Design, Geographical Indication (GI) and their registration aspects.

Unit	Description	Instructional Hours
I	**INTRODUCTION TO INTELLECTUAL PROPERTY** Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.	3
II	**PATENTS** Patents -Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application -Non -Patentable Subject Matter -Registration Procedure, Rights and Duties of Patentee, Assignment and license.	3
III	**COPYRIGHTS** Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.	3
IV	**TRADEMARKS** Concept of Trademarks -Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) -Non-Registrable Trademarks -Registration of Trademarks.	3
V	**DESIGN AND GEOGRAPHICAL INDICATION** Design: meaning and concept of novel and original -Procedure for registration. Geographical indication: meaning, and difference between GI and trademarks -Procedure for registration.	3

Course Outcome:

CO1:	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
CO2:	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
CO3:	Identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing.
CO4:	Identify different types of trademarks and procedure for registration
CO5:	Recognize the concept of design, geographical indication and procedure for registration

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC7201	Digital Image Processing	3	0	0	3

Course Objective

1. To study the formation of an image and its acquisition.
2. To know about image enhancement in both time and frequency domains.
3. To be familiar with and restoration and segmentation techniques.
4. To know the widely used image compression algorithms.
5. To understand the image recognition concepts and image representation in the form of features.

Unit	Description	Instructional Hours
	DIGITAL IMAGE FUNDAMENTALS	
I	Introduction – Fundamental Steps in Digital Image Processing –Components of an Image Processing System, Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – RGB and HSI color models.	9
	IMAGE ENHANCEMENT	
II	**Spatial Domain**: Gray level transformations – Histogram processing: Histogram equalization – Basics of Spatial Filtering –Smoothing and Sharpening Spatial Filtering - Homomorphic filtering, Color image enhancement **Frequency Domain**: Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.	9
	IMAGE RESTORATION AND SEGMENTATION	
III	**Restoration** :Image Restoration degradation model– Mean Filters – Inverse Filtering – Wiener filtering- Geometric transformations-spatial transformations. **Segmentation** : point, line,edge detection-Edge Linking via Hough transformation – Region based segmentation: Region Growing, Region splitting and merging - Practical applications –process an image using various segmentation techniques.	9
	MORPHOLOGICAL PROCESSING AND IMAGE COMPRESSION	
IV	**Morphological processing**- Dilation and Erosion-Segmentation by morphological watersheds.**Compression**: Fundamentals – Error Free Compression – Variable Length Coding: Huffman coding, Arithmetic Coding – Compression Standards: JPEG and MPEG.	9
	PATTERN CLASSIFICATION	
V	Feature extraction-Boundary representation – Chain Code ,Signature, skeleton –boundary descriptor-shape number- Patterns classification methods- supervised and unsupervised neural networks in Pattern recognition.	9

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Total Instructional Hours **45**

After completion of the course the learner will be able to

Course Outcome

CO1: Explain and relate the concepts of digital image fundamentals.
CO2: Choose appropriate technique for image enhancement both in spatial and frequency domains.
CO3: Restore good quality images from the degraded one and Segment different aspects of the image
CO4: Categorize various compression techniques and interpret image compression standards.
CO5: Represent the image with various features and recognize an image from its features.

TEXT BOOKS:

T1- Rafael C Gonzalez, Richard E Woods, "Digital Image Processing", Pearson Education Inc, Fourth Edition, 2018. (Units I – V)

T2- Anil K- Jain, "Fundamentals of Digital Image Processing", Pearson/Prentice Hall of India,2002.

REFERENCE BOOKS:

R1- Annadurai and Shanmughalakshmi, "Fundamentals of Digital Image Processing',Pearson India,2006.

R2 - S.Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image Processing", TMH New Delhi ,2009

R3 - Kenneth R. Castleman, "Digital Image Processing", Pearson, 2006

R4- Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB ", Pearson Education, Inc., 2004.

R5- William K. Pratt, "Digital Image Processing", John Wiley, New York, 2002.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC7202	Optical and Microwave Engineering	3	0	0	3

Course Objective

The student should be able to
1. To facilitate the knowledge about optical fiber sources and transmission techniques
2. To understand the concepts of signal degradation in optical fibers.
3. To inculcate understanding of the fiber optical sources, receivers and coupling.
4. To understand the functional behavior of microwave semiconductor devices and microwave tubes
5. To enhance the knowledge in various Measurements of Microwave network

Unit	Description	Instructional Hours
I	**INTRODUCTION TO OPTICAL FIBERS** Elements of an Optical fiber communication system- Optical laws and definitions- optical modes and configurations -mode analysis for optical propagation through fibers modes in planar wave guide-modes in cylindrical optical fiber - Fiber materials--single mode fiber – multimode fiber-graded index fiber.	9
II	**TRANSMISSION CHARACTERISTIC OF OPTICAL FIBER** Attenuation-absorption --scattering losses-bending losses-core and cladding losses-signal dispersion –Inter symbol interference and bandwidth-Intra model dispersion-Material dispersion- Waveguide dispersion-Polarization mode dispersion-Intermodal dispersion-Dispersion optimization of single mode fiber-characteristics of single mode fiber-R-I Profile-cutoff wave length-dispersion calculation-mode field diameter.	9
III	**OPTICAL SOURCES, DETECTORS,RECEIVER AND COUPLING** Sources: - surface emitting LED-Edge emitting LED-quantum efficiency and power-modulation of LED –LASER diodes -modes and threshold conditions-Rate equations-external quantum efficiency- Detectors: PIN photo detector-Avalanche photo diodes- noise-SNR-detector response time-Avalanche multiplication noise-temperature effects - preamplifiers-digital receiver performance-probability of error and receiver sensitivity-quantum limit. - Lensing Schemes for Coupling Management- -LED Coupling to Single Mode Fibers	9
IV	**MICROWAVE PASSIVE COMPONENTS AND SEMICONDUCTOR DEVICES** Microwave Passive components: Directional Coupler, Power Divider, Magic Tee, attenuator, resonator, Principles of Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes, Microwave tubes: Klystron, TWT, Magnetron.	9
V	**MICROWAVE MEASUREMENTS** Measuring Instruments – VSWR meter, Power meter, Spectrum Analyser, Network Analyser – Principles; Measurement of Impedance, Frequency, Power, VSWR, Q factor, Dielectric Constant, S Parameter- Hazards of microwaves	9

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Total Instructional Hours **45**

Course Outcome

After completion of the course the learner will be able to

CO1: Realize basic elements in optical fibers, different modes and configurations

CO2: Analyze the transmission characteristics associated with dispersion and polarization techniques.

CO3: Design optical sources, detectors and coupling techniques with their use in optical communication system

CO4: Analyze various microwave semiconductor devices.

CO5: Analyze various waveguide components and performance of microwave tubes and Measurements

TEXT BOOKS:

T1. GerdKeiser,"OpticalFiber Communication‖, McGraw Hill Education (India) Private Limited. Fifth Edition, Reprint 2013. (UNIT I, II, III)

T2 - Annapurna Das and Sisir K Das, “Microwave Engineering”, Mc Graw Hill Inc., 2004. (UNIT IV, V)

REFERENCE BOOKS:

R1. John M.Senior, ―Optical fiber communication, Pearson Education, second edition.2007. (UNIT I, II, III)

R2 - D.M.Pozar, “Microwave Engineering.”, John Wiley & sons, Inc., 2006. . (UNIT IV, V)

R3- Samuel Y Liao, “Microwave Devices & Circuits”, Prentice Hall of India, 2006. (UNIT IV, V)

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Programme	Course Code	Name of the course	L	T	P	C
BE	19EC7251	**Wireless Communication**	2	0	2	3

Course Objective

1. To impart knowledge on Wireless communication.
2. To understand the performance of digital Modulation over wireless channel.
3. To interpret the various challenges in multi carrier modulation and design issues.
4. To provide an outline on cellular concepts and

Unit

I	**Introduction to Wireless Communications** Overview of wireless systems –Wireless Spectrum –Path Loss and Shadowing –Radio wave propagation –Transmit and Receive signal Models –Free-Space path loss- ray tracing-Empirical Path Loss model path loss models- Shadow fading.	6
II	**Performance of Digital Modulation over Wireless Channel and Diversity** AWGN Channels--Fading– Outage Probability– Average Probability of Error — Combined Outage and Average Error Probability – Doppler Spread – Inter symbol Interference. Realization of Independent Fading Paths – Receiver Diversity – Selection and Threshold Combining–Transmitter Diversity – Channel known at Transmitter – Channel unknown at Transmitter – The Alamouti Scheme	6
III	**Multicarrier Modulation** Challenges in Multicarrier Systems-Data transmission using multiple carrier-Multicarrier modulation with Overlapping subchannels-Mitigation of subcarrier Fading- Discrete Implementation of Multicarrier Modulation-OFDM	6
IV	**Cellular Architecture-System Design Fundamentals** Cellular concepts, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.	6
V	**Multiple Access Techniques for Wireless Communication** Introduction to Multiple Access- Frequency Division Multiple Access (FDMA)-Time Division Multiple Access(TDMA)-Spread Spectrum Multiple Access-Code division Multiple Access (CDMA)-Space Division Multiple Access (SDMA)	6

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Total Hours 30

List of Experiments

Study of wireless Communications using Communication Trainer Kits

1. To study the FHSS Modulation and Demodulation Techniques
2. To study the DS spread spectrum Modulation and Demodulation Technique
3. To study the Code Division Multiple Access (CDMA) with Multiuser
4. To study Baseband Communication
5. To study and implement Adaptive Linear Equalizer

Wireless Path loss Computations - Study of Propagation Path loss Models (Using Mat lab Programming)

6. Free Space Propagation – Path Loss Model
7. Link Budget Equation for Satellite Communication

Total Instructional Hours **15**

Total Hours **30+15=45**

Course Outcome

CO1: Demonstrate the signal propagation over wireless radio channel.

CO2: Illustrate the performance of digital modulation technique over AWGN channels

CO3: Infer the idea of multicarrier modulation in wireless system.

CO4: Describe the cellular concepts for solving spectral congestion and user capacity.

CO5: Summarize various Multiple Access Techniques for wireless channel.

TEXT BOOKS

T1. Andrea Goldmith, “Wireless Communication”, Cambridge University Press, 2005.(Unit I ,II and III)

T2. T.S. Rappaport, “Wireless Communication, Principles and Practice”, Pearson Education, Second Edition, 2002 (UNIT IV and UNIT V)

REFERENCE BOOKS:

R1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.

R2. William C Y Lee, “Wireless and Cellular Communications”, Tata McGraw Hill Publishing Company Limited, Third Edition, 2006..

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC7002	Optical Communication and Microwave Lab	0	0	3	1.5

S.NO **LIST OF EXPERIMENTS**

OPTICAL EXPERIMENTS

1. DC Characteristics of LED and PIN Photo diode
2. Coupling and bending losses of Fibers
3. Fiber optic Analog and Digital Link
4. Numerical Aperture determination for Fibers
5. Attenuation Measurement in Fibers

MICROWAVE EXPERIMENTS

6. Characteristics of Gunn diode
7. Characteristics of Reflex Klystron
8. Directional Coupler Characteristics.
9. S-parameter Measurement of the following microwave components (Isolator, Circulator, E plane Tee, H Plane Tee, Magic Tee)
10. Radiation Pattern of Horn Antenna.

TOTAL HOURS 45

Course Outcome

CO1: Analyze the performance of various microwave links.
CO2: Analyze the performance of various optical links.
CO3: Test microwave components
CO4: Analyze the radiation of pattern of antenna.
CO5: Test optical components

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC7901	Project Work –Phase I	0	0	4	2

Course Objective

The student should be able to

1. Work in teams to propose, formulate, and solve a challenging open-ended design problem of significant scope, depth, and breadth.
2. Understand and incorporate engineering standards and multiple realistic constraints, within realistic design time, budget, and performance objectives.
3. Develop a prototype of the proposed design and demonstrate the prototype in accordance with the specifications.
4. Effectively communicate information relating to all aspects of the design process in written, oral,and graphical form.

S.No	Guidelines
1.	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2.	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	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.	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.	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction an modelling to complex engineering activities with an understanding of the limitations.
6.	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.	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10.	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.	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.	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.

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Course Outcome

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Identify technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
4. Prepare report and present the oral demonstrations.

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VIII SEMESTER

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Programme	Course Code	Name of the Course	L	T	P	C
BE/B.Tech	19EC8303	Satellite Communication	3	0	0	3

Course Objective

The student should be conversant with

1. Basics of satellite communications and different satellite communication orbits
2. The effect of radio wave propagation in satellites
3. Understand the satellite segment and earth segment
4. In-depth treatment of satellite communication systems operation and planning, Link budgets & planning

Unit	Description	Instructional Hours
	INTRODUCTION TO SATELLITE COMMUNICATION	9
I	Historical background, Basic concepts of Satellite Communications, Communication Networks and Services, Comparison of Network Transmission technologies, Orbital and Spacecraft problems, Growth of Satellite communications. **Orbits and Launching Methods:** Introduction, Kepler's First Law,Kepler's Second Law, Kepler's Third Law, Definitions of Terms for Earth-Orbiting Satellites, Orbital Elements, Apogee and Perigee Heights, Orbit Per turbations, Effects of a non spherical earth, Atmospheric drag.	
	RADIO WAVE PROPAGATION AND POLARIZATON	9
II	**Radio wave Propagation:**Introduction, Atmospheric Losses, Ionospheric Effects, Rain Attenuation, Other Propagation Impairments.**Polarization:** Introduction, Antenna Polarization, Polarization of Satellite Signals, Cross Polarization, Discrimination, IonosphericDepolarization, Rain Depolarization, Ice Depolarization.	
	THE SPACE SEGMENT AND THE EARTH SEGMENT	9
III	**The space segment:**Introduction, The Power Supply, Attitude Control, Spinning satellite stabilization, Momentum wheel stabilization, Station Keeping, Thermal Control, TT&C Subsystem, Transponders, The wideband receiver, The input demultiplexer, The power amplifier, The Antenna Subsystem **The Earth Segment:** Introduction, Receive-Only Home TV Systems, The outdoor unit, The indoor unit for analog (FM) TV, Master Antenna TV System, Community Antenna TV System, Transmit-Receive Earth Stations.	
	THE SPACE LINK	9
IV	Introduction, Equivalent Isotropic Radiated Power, Transmission Losses, Free-space transmission, Feeder losses, Antenna misalignment losses, Fixed atmospheric and ionospheric losses, The Link-Power Budget Equation, System Noise, Carrier-to-Noise Ratio, The Uplink, Saturation flux density, Input backoff, Downlink, Output back-off, Combined Uplink and Downlink C/N Ratio	
V	**SATELLITE ACCESS AND SPECIALIZED SERVICES**	9

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Introduction, Single Access, Preassigned FDMA, Demand-Assigned FDMA, Spade System, TDMA, Preassigned TDMA, Demand-assigned TDMA, Satellite-Switched TDMA, Code-Division Multiple Access **Satellite Mobile and Specialized Services:** Introduction, Satellite Mobile Services, VSATs, Radarsat, Global Positioning Satellite System (GPS), Orbcomm, Iridium.

Total Instructional Hours **45**

After the completion of the course, the learner will be able to

Course Outcome

CO1: Understand principle, working and operation of various sub systems of satellite as well as the earth station.

CO2: Understand Effects of radio propagation in satellites

CO3: Apply various communication techniques for satellite applications

CO4: Analyze and design satellite communication link

TEXT BOOKS:

T1- Satellite Communications, by Dennis Roddy(Fourth edition),McGraw Hill

T2 – Satellite Communication Systems Engineering, by Wilbur L. Pritchard, Henri G. Suyderhoud, Robert A. Nelson (Second Edition), Pearson

REFERENCE BOOKS:

R1 – Satellite Communication, by Timothy Pratt, Charles Bostian, Jeremy Allnutt(Second Edition), John Wiley & Sons.

R2-Satellite Technology, Principles and Applications, by Anil K. Maini, VarshaAgarwal(Second Edition), Wiley.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC8306	Artificial Intelligence	3	0	0	3

Course Objective

The student should be able to

1. Understand concept of AI & the various characteristics of Intelligent agents
2. Learn the different search strategies in AI
3. Learn to represent knowledge in solving AI problems
4. Understand the different ways of Learning
5. Know about the various applications of AI.

Unit	Description	Instructional Hours
I	**INTRODUCTION** AI–Definition – Foundation & History of Artificial Intelligence –Intelligent Agents– Agents & Environments, Concept of Rationality, Structure of Agents	9
II	**PROBLEM SOLVING METHODS** **Solving Problems by searching:** Uninformed – Informed (Heuristics) search strategies. **Beyond Classical search:** Local Search Algorithms and Optimization Problems - Searching with Partial Observations –**Adversarial Search**: Game Playing - Optimal Decisions in Games, Alpha - Beta Pruning - Stochastic Games. **Constraint Satisfaction Problems:** Constraint Propagation - Backtracking Search -	9
III	**KNOWLEDGE, REASONING & PLANNING** **First Order Logic**: Syntax and Semantics –Unification and Lifting – Forward Chaining- Backward Chaining – Resolution, **Classical Planning**- Algorithms, planning Graphs, Hierarchical & multi agent planning – **Knowledge Representation** - Ontological Engineering- Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information	9
IV	**LEARNING** Forms of Learning, Supervised Learning, Learning Decision trees, Artificial Neural networks, Support vector machines, Knowledge in Learning, Inductive Logic Programming, Statistical Learning, Active & passive Reinforcement Learning.	9
V	**AI APPLICATIONS** **Natural Language Processing**: – Language Models – Information Retrieval- Information Extraction – **Natural Language for communication**: Machine Translation – Speech Recognition – **Robotics:** Robot Hardware, Perception – Planning – Moving, Robotic software Architectures.	9
	Total Instructional Hours	**45**

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Course Outcome

After completion of the course the learner will be able to

CO1: Use appropriate search algorithms for any AI problem.

CO2: Represent a problem using first order and predicate logic Write Genetic Algorithm to solve the optimization problem

CO3: Provide the apt agent strategy to solve a given problem.

CO4: Use Learning methods for the different types of problem

CO5: Design applications for NLP that use Artificial Intelligence

T1- S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009. (Unit I to V)

T2 - I. Bratko, ―Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011. (Unit I to V)

REFERENCE BOOKS:

R1-M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008

R2-David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010.

R3-Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2013

Chairman - BoS
ECE - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
BE	19EC8901	Project Work –Phase II	0	0	24	12

Course Objective

The student should be able to

1. Work in teams to propose, formulate, and solve a challenging open-ended design problem of significant scope, depth, and breadth.
2. Understand and incorporate engineering standards and multiple realistic constraints, within realistic design time, budget, and performance objectives.
3. Develop a extended prototype of the proposed design and demonstrate the prototype in accordance with the specifications.
4. Effectively communicate information relating to all aspects of the design process in written, oral,and graphical form.

S.No	Guidelines

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. 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. 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. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. 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. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. 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. Demonstrate knowledge and understanding of the engineering and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. 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.

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Course Outcome	1. Formulate a real world problem, identify the requirement and develop the design solutions. 2. Identify technical ideas, strategies and methodologies. 3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project. Test and validate through conformance of the developed prototype and analysis the cost effectiveness. 4. Prepare report and present the oral demonstrations.

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HindusthanCollegeofEngineeringandTechnology

(AnAutonomousInstitution, AffiliatedtoAnnaUniversity,Chennai
ApprovedbyAICTE,NewDelhi&AccreditedbyNAACwith'A'Grade)
ValleyCampus,PollachiHighways,Coimbatore,Tamilnadu.

DETAILS OF CHANGES CoPos

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E ELECTRONICS AND COMMUNICATION ENGINEERING (UG)

REGULATION-2022 (Revised on June 2021)
AY 2022-2023
Amendments on June 2023

SEMESTER I

22MA1101MATRICESANDCALCULUS

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	**PSO1**	**PSO2**
CO1	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	3
CO5	3	3	3	3	3	-	-	-	-	-	-	2	1	2
AVG	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2

22CY1151CHEMISTRYFORCIRCUITENGINEERING

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	1	1	1	1	-	1	-	1	2	-	-
CO2	2	3	2	1	1	1	1	-	1	-	1	2	-	-
CO3	2	2	2	2	1	1	1	-	1	-	1	2	-	-
CO4	2	2	3	1	2	1	1	-	1	-	2	2	-	1
CO5	2	3	3	2	2	1	1	-	1	-	1	2	-	-
Avg	2	2.6	2.6	1.4	1.4	1	1	-	1	-	1.2	2	-	1

22HE1151ENGLISHFORENGINEERS

POPSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1	2	2				1	1	2
CO2	2	1			1	1	1	2				2		2
CO3	2	1			1	1	2	3				1	1	2
CO4	2	1				1	2	2				1		
CO5	2	1				1	1	2				1	1	2
Avg	2	1	-	-	1	1	1.6	2.2				1.2	1	2

22EC1151ELECTRONDEVICES

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	1	-	-	-	-	-	-	2	2	2
CO2	3	2	2	-	1	-	-	-	-	-	-	2	2	2
CO3	3	2	2	-	1	-	-	-	-	-	-	2	2	2
CO4	3	2	2	-	1	-	-	-	-	-	-	2	2	2
CO5	3	2	2	-	1	-	-	-	-	-	-	2	2	2
AVG	3	2	2		1							2	2	2

22IT1151/22CS1152PYTHONPROGRAMMINGANDPRACTICES/OBJECTORIENTED

PROGRAMMINGUSINGPYTHON(IBMSTUDENTSONLY)

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

22HE1071 Universal Human Values

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
C	2	3	3	-	2	-	-	-	2	-	-	2	2	2

O4														
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

22HE1072 ENTREPRENEURSHIP&INNOVATION

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	**PSO1**	**PSO2**
CO1	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	3
CO5	3	3	3	3	3	-	-	-	-	-	-	2	1	2
AVG	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2

22MC1091/22MC1092தமிழரசும்ததுழிலும்நடபமசும்/IndianConstitution

PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2

CO 4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO 5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

SEMESTER II

22MA2102 DIFFERENTIAL EQUATION AND LAPLACE TRANSFORMS

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	1	1	2	1	2	2	3	-	3	1	-
CO2	2	1	1	1	1	2	2	2	2	3	-	2	-	1
CO3	2	2	1	1	1	2	2	2	2	3	1	3	1	-
CO4	2	2	1	1	2	2	2	2	3	3	1	3	1	1
CO5	1	1	1	1	1	2	2	1	2	3	1	3	1	1
Avg	1.6	1.6	1	1	1.2	2	1.8	1.8	2.2	3	1	2.8	1	1

21MA2103LinearAlgebra,Numerical Methodsand Transform Calculus

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	1	-
CO2	3	3	3	2	3	-	-	-	-	-	-	2	1	-
CO3	3	3	3	3	3	-	-	-	-	-	-	2	1	-
CO4	3	3	3	3	3	-	-	-	-	-	-	2	1	-
CO5	3	3	3	3	3	-	-	-	-	-	-	2	1	-
Avg	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1	-

22PH2101 Basics of Material Science

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	1	-	-	-	-	-	1	2	1
CO2	3	3	1	1	2	-	-	-	-	-	-	1	2	2
CO3	3	2	1	2	2	-	-	-	-	-	-	1	2	3
CO4	3	3	1	2	2	1	-	-	-	-	-	1	2	2
CO5	3	2	2	3	2	1	2	-	-	-	-	1	2	3
Avg	3	2.4	1.2	1.8	1.8	1	2	-	-	-	-	1	2	2.2

22CY2101 Environmental Studies

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	2	-	-	-	-	2	3	3	2	-	-	2	-	-
CO2	2	-	-	-	-	2	3	3	2	-	-	2	-	-
CO3	2	1	1	-	-	2	3	3	2	-	-	2	-	-
CO4	2	1	2	-	-	2	3	3	2	-	-	2	-	-
CO5	2	1	2	-	-	2	3	3	2	-	-	2	-	-
Avg	2	1	1.7	-	-	1	2	3	2	-	-	2	-	-

22CS2154 Essential of C&C++ Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3	3	1	-	-	-	1	-	-	-	1	1	1	2
CO2	3	3	2	1	-	-	1	-	-	-	1	1	1	2
CO3	3	3	1	-	-	1	1	-	-	1	1	-	1	1
CO4	3	3	2	1	-	2	1	-	-	1	1	1	1	1
CO5	3	3	2	1	-	3	1	-	-	1	1	1	1	1
Avg	3	3	1.6	1		2	1			1	1	1	1	1.4

21ME2154 Engineering Graphics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO 2
CO1	2	3	2	-	1	-	1	-	-	1	1	1	1	2
CO2	3	3	2	1	1	-	1	-	-	1	1	1	1	2
CO3	3	3	3	-	1	1	1	-	-	1	1	-	1	1
CO4	3	3	3	1	1	2	1	-	-	1	1	1	1	1
CO5	3	3	3	1	1	3	1	-	-	1	1	1	1	1
Avg	2.8	3	2.6	1	1	2	1	-	-	1	1	1	1	1.4

21ME2001 Engineering Practices

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3	-	3	-	3	-	1	-	1	-	-	-	1	2
CO2	3		3		3		1		1				1	2
CO3	3		3		3		1		1				1	2
CO4	3		3		3		1		1				1	2
CO5	3		3		3		1		1				1	2
Avg	3		3		3		1		1				1	2

22IT1151/22CS1152PYTHONPROGRAMMINGANDPRACTICES/OBJECTORIENTED PROGRAMMINGUSINGPYTHON(IBMSTUDENTSONLY)

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

22EC1153ELECTRON DVICES AND CIRCUITS

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
C	2	3	3	-	2	-	-	-	2	-	-	2	2	2

O4														
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

22HE1072 ENTREPRENEURSHIP&INNOVATION

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	**PSO1**	**PSO2**
CO1	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	3
CO5	3	3	3	3	3	-	-	-	-	-	-	2	1	2
AVG	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2

21HE2001 Language Competency Enhancement course II

PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2

CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

SEMESTER III

21MA3102 CPMPLEX ANALYSISANDTRANSFORMS(commontoECE,EEE,EIE)

PO & PSO	**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**	**PSO2**
CO1	3	3	3	2	2	-	-	2	-	2	-	2	2	2
CO2	3	3	3	2	3	-	-	2	-	2	-	2	2	2
CO3	3	3	3	3	3	-	-	2	-	2	-	2	2	2
CO4	3	3	3	3	3	-	-	2	-	2	-	2	1	2
CO5	3	3	3	3	3	-	-	2	-	2	-	2	2	1
Avg	3	3	3	2.6	2.8	-	-	2	-	2	-	2	1.8	1.8

21EC3203 ELECTRONIC CIRCUITS

PO CO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO 10	PO1 1	PO1 2	**PSO 1**	**PSO 2**
CO1	**3**	3	3	3	**-**	3	**-**	3	**-**	2	**1**	**3**	**2**	**3**
CO2	**3**	3	3	3	**-**	3	**-**	3	**-**	2	**1**	**3**	**2**	**3**
CO3	**3**	3	3	3	**-**	3	**-**	3	**-**	2	**1**	**3**	**2**	**3**
CO4	**3**	3	3	3	**-**	3	**-**	3	**-**	2	**1**	**3**	**2**	**3**
CO5	**3**	3	3	3	**-**	3	**-**	3	**-**	2	**1**	**3**	**2**	**3**
AVG	**3**	**3**	**3**	**3**	-	**3**	**-**	**3**	-	2	**1**	**3**	**2**	**3**

21EC3202 SIGNALSANDSYSTEMS

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 2	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 3	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 4	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 5	3	2	2	-	-	-	-	2	-	2	-	1	2	-
AVG	3	2	2					2		2		1	2	-

21EC3201 DIGITALEL ELECTRONICS

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 2	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 3	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 4	3	2	2	-	-	-	-	2	-	2	-	1	2	-
CO 5	3	2	2	-	-	-	-	2	-	2	-	1	2	-
AVG	3	2	2					2		2		1	2	-

21HE3073 Leadership Management Skills

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	1	1	2	1	2	1	2	2	1
CO2	3	2	2	1	1	1	1	2	1	2	1	2	2	1
CO3	3	2	2	1	1	1	1	2	1	2	1	2	2	1
CO4	3	2	2	1	1	1	1	2	1	2	1	2	2	1
CO5	3	2	2	1	1	1	1	2	1	2	1	2	2	1
AVG	3	2	2	1	1	1	1	2	1	2	1	2	2	1

21IT3252 RELATIONALDATABASEMANAGEMENTSYSTEM(IBMSTUDENTSONLY)

POCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	3	3	3	-	3	-	3	-	1	**1**	**3**	**2**	**3**
CO2	**3**	3	3	3	-	3	-	3	-	1	**1**	**3**	**2**	**3**
CO3	**3**	3	3	3	-	3	-	3	-	1	**1**	**3**	**2**	**3**
CO4	**3**	3	3	3	-	3	-	3	-	1	**1**	**3**	**2**	**3**
CO5	**3**	3	3	3	-	3	-	3	-	1	**1**	**3**	**2**	**3**
AVG	**3**	**3**	**3**	**3**	-	**3**	-	**3**	-	1	**1**	**3**	**2**	**3**

21EC3001 ELECTRONIC CIRCUITS LABORATORY

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	**PSO1**	**PSO2**
CO1	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO2	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO3	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO4	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO5	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
AVG	3	3	3	3	1	3	-	3	1	1	1	3	2	3

21MC1191 Essence of Indian Tradition Knowledge

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	**PSO1**	**PSO2**
CO1	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO2	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO3	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO4	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO5	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
AVG	3	3	3	3	1	3	-	3	1	1	1	3	2	3

21EC3002 DIGITAL ELECTRONICS LABORATORY														
PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	**PSO1**	**PSO2**
CO1	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO2	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO3	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO4	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
CO5	**3**	3	3	3	1	3	-	3	1	1	**1**	**3**	**2**	**3**
AVG	3	3	3	3	1	3	-	3	1	1	1	3	2	3

21HE3072 Career Guidance Level – III Personality, Aptitude and Career Development														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PS2**
CO1	2	3	3	-	2	-	-	**1**	2	1	-	2	2	2
CO2	2	3	3	-	2	-	-	1	2	1	-	2	2	2
CO3	2	3	3	-	2	-	-	1	2	1	-	2	2	2
CO4	2	3	3	-	2	-	-	1	2	1	-	2	2	2
CO5	2	3	3	-	2	-	-	1	2	1	-	2	2	2
Avg	2	3	3	-	2	-	-	1	2	1	-	2	2	2

SEMESTER IV

21MA4104 Probability and Random Processes

PO & PSO	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
CO 1	2	3	2	1	1	-	-	-	-	-	1	2	2	2
CO 2	2	3	2	1	1	-	-	-	-	-	1	2	2	2
CO 3	2	2	2	2	1	-	-	-	-	-	1	2	2	2
CO 4	2	2	3	1	2	-	-	-	-	-	2	2	3	3
CO 5	2	3	3	2	2	-	-	-	-	-	3	2	3	3
Avg	2	2.6	2.4	1.4	1.4	-	-	-	-	-	1.6	2	2.4	2.4

21EC4201 Electro Magnetic Fields and waves

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 1	PO 8	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	3	2	2	3	-	-	2	-	-	-	-	3	3	1
CO 2	3	3	3	3	-	-	2	-	-	-	-	3	3	1
CO 3	3	2	2	3	-	-	1	-	-	-	-	3	3	1
CO 4	3	3	3	2	-	-	2	-	-	-	-	3	3	1
CO 5	3	2	2	2	-	-	1	-	-	-	-	3	3	1
AVG	3	2.4	2.4	2.5	-	-	1.6	-	-	-	-	3	3	1

21EC4202 Analog Communication

CO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	2	2	2	-	-	3	-	3	2	3
CO2	3	2	3	3	2	2	2	-	-	3	-	3	2	3
CO3	3	2	3	3	2	2	2	-	-	3	-	3	2	-
CO4	3	2	3	3	2	2	2	-	-	3	-	3	2	3
CO5	3	2	3	3	2	2	2	-	-	3	-	3	2	-
AV	3	3	3	3	2	2	2			2		3	3	1.8

21EC4203 Linear Integrated Circuits

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

21EC4251 Control Systems

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2	2	-	-	-	-	-	2	2
CO2	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO3	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO4	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO5	3	3	3	2	2	2	2	-	-	-	-	-	2	2
AVG	3	3	3	2	2	2	2						2	2

21EC4001 Linear Integrated Circuits Lab

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2	2	-	-	-	-	-	2	2
CO2	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO3	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO4	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO5	3	3	3	2	2	2	2	-	-	-	-	-	2	2
AVG	3	3	3	2	2	2	2						2	2

21EC4002 Analog communication Lab

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2	2	-	-	-	-	-	2	**2**
CO2	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO3	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO4	3	3	3	2	2	2	2	-	-	-	-	-	2	2
CO5	3	3	3	2	2	2	2	-	-	-	-	-	2	2
AVG	3	3	3	2	2	2	2						2	2

SEMESTER V

19EC5201Microprocessor and Microcontroller

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2
CO 1	3	3	2	2	2	2	2	3	3-	1	-	2	3	3
CO 2	3	3	2	2	2	2	2	3	3	1	-	2	2	3
CO 3	3	3	2	2	2	2	2	3	3	1	-	3	3	3
CO 4	3	3	3	2	2	2	2	3	3	1	-	3	3	3
CO 5	3	3	2	2	3	2	2	3	3	1	-	3	3	3
AV G	3	3	2	2	2	2	2	3	3	1	-	3	3	3

19EC5202Transmission lines and WaveGuides

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2
CO 1	3	3	3	1	2	1	2	1	-	2	-	-	3	3
CO 2	2	2	2	1	3	1	2	1	-	2	-	-	3	2
CO 3	3	3	2	1	2	2	2	1	-	2	-	-	3	2
CO 4	3	3	2	1	3	2	2	1	-	2	-	-	2	2
CO 5	3	3	1	1	1	2	2	1	-	2	-	-	2	1
AV G	2.8	2.8	2	1	2.2	1.6	2	1	-	2	-	-	2.6	2

19EC5203VLSI Design

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PS O1	PS O2
CO 1	3	3	2	3	2	2	3	1	2	3	1	2	3	2
CO 2	3	3	2	3	2	2	2	1	1	2	2	2	2	2
CO	3	2	3	3	2	2	2	1	-	2	-	2	3	2

3														
CO 4	3	2	3	2	2	2	2	1	2	2	1	2	2	2
CO 5	3	2	3	3	2	2	2	1	-	2	1	2	2	3
AV G	**3**	3	3	3	1.8	1.8	1.4	1	1	1.8	1	2.4	3	3

19EC5251Data Communication and Networks

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	3	-	3	3	3	2	3	3	2
CO 2	3	3	3	3	3	3	-	3	-	3	-	3	3	3
CO 3	3	3	3	3	3	-	3	-	-	-	-	3	3	3
CO 4	3	3	3	3	-	-	2	3	3	-	2	-	3	3
CO 5	3	3	3	3	3	3	2	-	3	3	2	3	3	2
AV G	**3**	3	3	3	1.8	1.8	1.4	1.8	1.8	1.8	2	2.4	3	3

19EC5252Digital Signal Processing

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	3	3	2	3	2	3	3	1	-	1	-	1	2	3
CO 2	3	3	3	3	2	3	2	1	-	1	-	1	3	3
CO 3	3	3	2	3	3	3	3	1	-	1	-	1	3	3
CO 4	3	3	3	3	3	3	2	1	-	1	-	1	3	3
CO 5	3	3	3	3	3	3	3	1	-	1	-	1	2	3

AVG	**3**	3	2.6	3	2.6	3	2.6	1	-	1	-	1	2.6	3

19EC5001VLSI Design Lab

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	3	3	1	-	1	-	1	2	3
CO2	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO3	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO4	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO5	3	3	3	3	3	3	3	1	-	1	-	1	3	3
AVG	**3**	3	3	3	3	3	3	1	-	1	-	1	3	3

19EC5002 Microprocessors and Microcontrollers Lab

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	2	3	3	1	-	1	-	1	2	3
CO2	3	3	3	3	2	3	2	1	-	1	-	1	3	3
CO3	3	3	2	3	3	3	3	1	-	1	-	1	3	3
CO4	3	3	3	3	3	3	2	1	-	1	-	1	3	3
CO5	3	3	3	3	3	3	3	1	-	1	-	1	2	3
AVG	**3**	3	2.6	3	2.6	3	2.6	1	-	1	-	1	1	3

19HE5071 Soft Skills - I

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	3	3	1	-	1	-	1	2	3

CO 2	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO 3	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO 4	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO 5	3	3	3	3	3	3	3	1	-	1	-	1	3	3
AVG	**3**	3	3	3	3	3	3	1	-	1	-	1	3	3

19HE5072 Design Thinking														
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	3	3	3	1	-	1	-	1	2	3
CO 2	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO 3	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO 4	3	3	3	3	3	3	3	1	-	1	-	1	3	3
CO 5	3	3	3	3	3	3	3	1	-	1	-	1	3	3
AVG	**3**	3	3	3	3	3	3	1	-	1	-	1	3	3

SEMESTER VI

19EC6202 Antenna and Wave Propagation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**	3	**3**	2	**2**	-	-	-	-	-	-	**3**	**2**
CO2	3	3	3	3	2	2	-	-	-	-	-	-	3	2
CO3	3	3	3	2	2	2	-	-	-	-	-	-	3	2
CO4	3	3	3	3	2	3	-	1	-	-	-	-	3	2
CO5	3	3	3	3	2	2	-	-	-	-	-	-	3	2
AVG	3	3	3	3	2	2							3	2

19EC6181 Principles of Management

PO&PSO ⟶	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2		2				3			3	3
CO2	3	2	2	2		2				3			3	3
CO3	3	2	2	2		2				3			3	3
CO4	3	2	2	2		2				3		2	3	3
CO5	3	2	2	2		2				3		2	3	3
AVG	3	2	2	2		2				3		2	3	3

19CS6231Node JS and micro services

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	2	2	2	-	-	-	2	1	2
CO2	2	2	3	3	3	2	2	2	-	-	-	2	1	2
CO3	2	2	3	3	3	2	2	2	-	-	-	2	1	2
CO4	2	3	3	3	3	2	3	2	-	-	-	2	1	2
CO5	2	2	3	3	3	2	2	2	-	-	-	2	1	2
AVG	2	2	3	3	3	2	2	2				2	1	2

19EC6253 Digital Communication

PO&PSO ⟶	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

CO1	3	2	2			2							3	3
CO2	3	2	2			2							3	3
CO3	3	2	2	2		2								3
CO4	3	2	2			2						2		3
CO5	3	2	2	3		2						2		3
AVG	3	2	2	2.5		2						1.5	1.5	3

19EC6001 Digital Communication Lab

PO&PSO ⟶	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2			2							3	3
CO2	3	2	2			2							3	3
CO3	3	2	2	2		2								3
CO4	3	2	2			2						2		3
CO5	3	2	2	3		2						2		3
AVG	3	2	2	2.5		2						1.5	1.5	3

21EC7201 Digital Image Processing

PO&PSO ⟶	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	1			2			2	2	3
CO2	3	3	3	3	3	1			2			2	2	3
CO3	3	3	3	3	3	1			2	3		2	2	3
CO4	3	3	3	2	3	1			2	3		2	2	3
CO5	3	3	3	3	3	1			2	3		2	2	3
AVG	3	3	3	3		1			2	1.4		2	1	3

19IT6003 Project based Learning

PO&PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
3	3	2	2	3	2	2	2	3	2	2	3	1	3	1
CO2	3	2	2	3	2	2	2	3	2	2	3	1	3	1

CO3	3	2	2	3	2	2	2	3	2	2	3	1	3	1
CO4	3	2	2	3	2	2	2	3	2	2	3	1	3	1
CO5	3	2	2	3	2	2	2	3	2	2	3	1	3	1
AVG	3	2	2	3	2	2	2	3	2	2	3	2	2	1

SEMESTER VII

19EC7201Digital Image Processing

PO&PSO ⟶	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	1		1	2			2	2	3
CO2	3	3	3	3	3	1		1	2			2	2	3
CO3	3	3	3	3	3	1		1	2	3		2	2	3
CO4	3	3	3	2	3	1		1	2	3		2	2	3
CO5	3	3	3	3	3	1		1	2	3		2	2	3
AVG	3	3	3	3		1		1	2	1.4		2	1	3

19EC7202Optical and Microwave Engineering

PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	3	2	2	2	1		1		1	3	1
CO2	3	2	2	3	2	2	2	1		1		1	3	1
CO3	3	2	2	3	2	2	2	1		1		1	3	1
CO4	3	2	2	3	2	2	2	1		1		1	3	1
CO5	3	2	2	3	2	2	2	1		1		1	3	1
AV	3	2	2	3	2	2	2	1		1		2	2	1

G														

19EC7251Wireless Communication

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	3	2	2	-	1	-	3	3	1	3	3
CO 2	3	3	3	3	2	2	-	1	-	3	3	1	3	3
CO 3	3	3	3	2	2	2	-	1	-	3	3	1	3	3
CO 4	3	3	3	3	2	3	-	1	-	3	3	1	3	3
CO 5	3	3	3	3	2	2	-	1	-	3	3	1	3	3
AVG	3	3	3	3	2	2		1		3	3	1	3	3

19EC7001Digital Image Processing Lab

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 2	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 3	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 4	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 5	3	2	2	3	2	2	2	3	3	3	3	1	3	1
AVG	3	2	2	3	2	2	2	3	3	3	3	2	2	1

19EC7002Optical and Microwave Engineering Lab

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 2	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 3	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 4	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 5	3	2	2	3	2	2	2	3	3	3	3	1	3	1
AVG	3	2	2	3	2	2	2	3	3	3	3	2	2	1

19EC7401 Introduction to IOT

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	3	3	3	-	1	-	3	3	1	3	3
CO 2	3	3	3	3	3	2	-	1	-	3	3	1	3	3
CO 3	3	3	3	2	3	2	-	1	-	3	3	1	3	3
CO 4	3	3	3	3	3	2	-	1	-	3	3	1	3	3
CO 5	3	3	3	3	3	2	-	1	-	3	3	1	3	3
AVG	3	2	3	3	3	3	-	1	-	3-	1	3	2	3

19EC7901Project Work – Phase I

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2

CO 1	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 2	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 3	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 4	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 5	3	2	2	3	2	2	2	3	3	3	3	1	3	1
AVG	3	2	2	3	2	2	2	3	3	3	3	2	2	1

SEMESTER VIII

19EC8303 Satellite Communication

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	**3**	3	**3**	-	1	-	3	3	1	3	3
CO 2	3	3	3	3	3	2	-	1	-	3	3	1	3	3
CO 3	3	3	3	2	3	2	-	1	-	3	3	1	3	3
CO 4	3	3	3	3	3	2	-	1	-	3	3	1	3	3
CO 5	3	3	3	3	3	2	-	1	-	3	3	1	3	3
AVG	3	2	3	3	3	3	-	1	-	3-	1	3	2	3

19EC8306 Artificial Intelligence

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	**3**	3	**3**	-	1	-	3	3	1	3	3
CO 2	3	3	3	3	3	2	-	1	-	3	3	1	3	3
CO 3	3	3	3	2	3	2	-	1	-	3	3	1	3	3
CO 4	3	3	3	3	3	2	-	1	-	3	3	1	3	3
CO	3	3	3	3	3	2	-	1	-	3	3	1	3	3

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AVG	3	2	3	3	3	3	-	1	-	3-	1	3	2	3

19EC8901Project Work – Phase II

PO & PSO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 2	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 3	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 4	3	2	2	3	2	2	2	3	3	3	3	1	3	1
CO 5	3	2	2	3	2	2	2	3	3	3	3	1	3	1
AVG	3	2	2	3	2	2	2	3	3	3	3	2	2	1

Chairman - RoS
ECE - HiCET

ACADEMIC COUNCIL
Chairman
VINAYAKA MISSIONS KIRUPANANDHA VARIYAR ENGINEERING COLLEGE

Dean (Academics)
HiCET