SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR–440013

An Institute with Empowered Autonomy status
Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI

of First Year as per National Education Policy (NEP)

(With effect from Academic Year 2023-24)

B. Tech.

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Department Vision:
To establish the department as a center of excellence in academics and research with advances in the rapidly changing field of Electronics and Communication.

Department Mission:
To create stimulating environment for learning and imparting quality technical education to fulfill the needs of the industry and society.

Program Educational Objectives:
After graduation, graduates of Electronics & Communication Engineering will demonstrate ability to:

1. Exhibit effective communication, teamwork, multidisciplinary-approach, and ability to relate engineering issues in broader social context.
2. Engage in career enhancement through lifelong learning, research, higher studies and entrepreneurship to adapt to the changing professional and social needs.
3. Solve real life engineering problems by applying the knowledge of Electronics and Communication Engineering.

Program Outcomes:
Engineering Graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of Mathematics, Science, Engineering fundamentals, and 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 consideration for the public health and safety, and the cultural, societal and environmental considerations.
4. **Conduct investigation of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select and apply appropriate techniques resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary 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 documentations, 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 lifelong learning in the broadest context of technological change.

Program Specific Outcomes:

The Graduates of Electronics & Communication will be able to:

1. Apply electronic principles to analyze and interconnect functional blocks of analog & digital electronics and communication systems.
2. Select and apply appropriate technologies for simulation, design, and implementation and performance evaluation of hardware and software prototypes for electronics and communication systems.
3. Implement effective and appropriate interdisciplinary solutions including electronics and communication, for research, industrial and societal problems.

Scheme of Teaching & Examination of Bachelor of Technology
(Electronics and Communication Engineering)

Semester I

Sr. No.	Course Type	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	BSC	PHT1003	Semiconductor Physics	2	1	0	3	50	50	100	3
2	BSC	PHP1003	Semiconductor Physics Lab	0	0	2	1	50	0	50	0
3	BSC	MAT1001	Applied Mathematics I	2	1	0	3	50	50	100	3
4	BSC	MAP1001	Computational Mathematics Lab	0	0	2	1	50	0	50	0
5	BSC	EET1004	Basic Electrical Engineering	2	0	0	2	50	50	100	2
6	PCC	ECT1001	Digital Circuits and Fundamentals of Microprocessor	3	0	0	3	50	50	100	3
7	PCC	ECP1001	Digital Circuits and Fundamentals of Microprocessor Lab	0	0	2	1	50	0	50	0
8	ESC	ECT1002	Programming for Problem Solving	2	0	0	2	50	50	100	2
9	ESC	ECP1002	Programming for Problem Solving Lab	0	0	2	1	50	0	50	0
10	AEC	HUT1002	English for Professional Communication	2	0	0	2	50	50	100	2
11	AEC	HUP1002	English for Professional Communication Lab	0	0	2	1	50	0	50	0
12	CCA	HUP0001/ PEP0001/ CHP0001	Liberal/Performing Art Lab basket	0	0	2	1	50	0	50	0
13	VEC	HUT1004	Foundational course in Universal Human Value	1	0	0	1	50	0	50	0
			TOTAL	**14**	**2**	**12**	**22**				

Liberal/Performing Art Lab basket		
Sr. No.	**Course Code**	**Course Name**
1	HUP0001-1	Fundamentals of Indian Classical Dance: Bharatnatayam
2	HUP0001-2	Fundamentals of Indian Classical Dance: Kathak
3	HUP0001-3	Introduction to Digital Photography
4	HUP0001-4	Introduction to Japanese Language and Culture
5	HUP0001-5	Art of Theatre
6	HUP0001-6	Introduction to French Language
7	HUP0001-7	Introduction to Spanish Language
8	HUP0001-8	Art of Painting
9	HUP0001-9	Art of Drawing
10	HUP0001-10	Nature camp
11	PEP0001-21	Disaster Management through Adventure Sports
12	PEP0001-22	Self-defense Essentials and Basic Knowledge of Defense forces
13	CHP0001-31	Art of Indian traditional cuisine
14	CHP0001 -32	Remedies by Ayurveda

Scheme of Teaching & Examination of Bachelor of Technology

(Electronics and Communication Engineering)

Semester II

Sr. No.	Course Type	Course Code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	BSC	CHT2002	Chemistry of Functional Materials	2	0	0	2	50	50	100	2
2	BSC	CHP2002	Chemistry of Functional Materials Lab	0	0	2	1	50	0	50	0
3	BSC	MAT2001	Applied Mathematics II	2	1	0	3	50	50	100	3
4	ESC	ECT2001	Network Theory	3	0	0	3	50	50	100	3
5	PCC	ECT2002	Electronic Devices	3	0	0	3	50	50	100	3
6	PCC	ECP2002	Electronic Devices Lab	0	0	2	1	50	0	50	0
7	VSEC	ECT2003	Object Oriented Programming	3	0	0	3	50	50	100	3
8	VSEC	ECP2003	Object Oriented Programming Lab	0	0	2	1	50	0	50	0
9	ESC	ECP2004	Computer Workshop Lab	0	0	2	1	50	0	50	0
10	IKS	HUT2001	Foundational Literature of Indian Civilization	2	0	0	2	50	50	100	2
11	CCA	PET2001	Sports-Yoga-Recreation	1	0	0	1	50	0	50	0
12	CCA	PEP2001	Sports-Yoga-Recreation Lab	0	0	2	1	50	0	50	0
			TOTAL	**16**	**1**	**10**	**22**				

Exit option 1
(Additional 8 Credits)
Offline/Online (ESSC-India / NSQF skill) Certification Course on – Assembly & Maintenance of Personal Computer / Electronics Servicing and Maintenance or similar course, approved by the BoS. **OR** Technical Project **OR** One Month Internship at Industry

Scheme of Teaching & Examination of Bachelor of Technology
(Electronics and Communication Engineering)

Semester III

Sr. No	Course Type	Course Code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	PCC	ECT3001	Electronic Circuits	3	0	0	3	50	50	100	3
2	PCC	ECP3001	Electronic Circuits Lab	0	0	2	1	50	0	50	0
3	PCC	ECT3002	Analog Circuits Design	3	0	0	3	50	50	100	3
4	PCC	ECP3002	Analog Circuits Design Lab	0	0	2	1	50	0	50	0
5	PCC	ECT3003	Digital system Design with HDL	3	0	0	3	50	50	100	3
6	PCC	ECP3003	Digital system Design with HDL Lab	0	0	2	1	50	0	50	0
7	PCC	ECT3004	Signals and Systems	2	1	0	3	50	50	100	3
8	OE	ECT2980	Open Elective - 1	2	0	0	2	50	50	100	3
9	MDM	MAT3004	Applied Mathematics – III	2	1	0	3	50	50	100	3
10	VEC	CHT3001	Environmental Science	2	0	0	2	50	50	100	2
			TOTAL	**18**	**3**	**6**	**22**				

Open Elective - I	
Course Code	**Course Name**
ECT2980 – 1	Electronic Sensors for Industrial applications
ECT2980 – 2	Fundamentals of Computer Networking

Scheme of Teaching & Examination of Bachelor of Technology
(Electronics and Communication Engineering)
Semester IV

Sr. No.	Course Type	Course Code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	PCC	ECT4001	Electromagnetic Fields	2	1	0	3	50	50	100	3
2	PCC	ECT4002	Analog and Digital Communication	3	0	0	3	50	50	100	3
3	PCC	ECP4002	Analog and Digital Communication Lab	0	0	2	1	50	0	50	0
4	PCC	ECT4003	Microcontrollers & Peripherals	3	0	0	3	50	50	100	3
5	PCC	ECP4003	Microcontrollers & Peripherals Lab	0	0	2	1	50	0	50	0
6	MDM	ECT4004	Data Structures and Algorithms	2	0	0	2	50	50	100	2
7	MDM	ECP4004	Data Structures and Algorithms Lab	0	0	2	1	50	0	50	0
8	OE	ECT2990	Open Elective - 2	2	1	0	3	50	50	100	2
9	VSEC	ECP4005	Electronic Measurements & Instrumentation Lab	0	0	2	1	50	0	50	0
10	CEA	ECP4006	Co curricula Activities/ Community/Field Project	0	0	4	2	50	0	50	0
11	AEC	HUT4001	Business Communication	2	0	0	2	50	50	100	2
			TOTAL	**14**	**1**	**8**	**22**				

Open Elective - II	
Course Code	**Course Name**
ECT2990 – 1	Electronics in Agriculture
ECT2990 – 2	Evolution in Communication Technologies

Exit option 2(Additional 8 Credits)

Offline/Online (ESSC-India / NSQF skill) Course on –
Microprocessors/Microcontrollers based Product Design / PCB Design and Circuit Simulation or similar course, approved by the BoS
OR
Technical Project
OR
One Month Internship at Industry

Scheme of Teaching & Examination of Bachelor of Technology
(Electronics and Communication Engineering)
Semester V

Sr. No.	Course Type	Course Code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Conti-nous Evaluation	End Sem Exam	Total	
1	PCC	ECT5001	Probability Theory and Stochastic Processes	3	0	0	3	50	50	100	3
2	PCC	ECT5002	Digital Signal Processing	3	0	0	3	50	50	100	3
3	PCC	ECP5002	Digital Signal Processing Lab	0	0	2	1	50	0	50	0
4	PCC	ECT5003	VLSI Design	3	0	0	3	50	50	100	3
5	PCC	ECP5003	VLSI Design Lab	0	0	2	1	50	0	50	0
6	MDM	ECT5004	Computer Architecture and Organization	2	0	0	2	50	50	100	2
7	MDM	ECP5004	Computer Architecture and Organization Lab	0	0	2	1	50	0	50	0
8	VSEC	ECP5005	Electronic Design Workshop	0	0	2	1	50	50	100	2
9	PEC	ECT5006	Program Elective 1	3	0	0	3	50	50	100	3
10	OE	ECT3980	Open Elective 3	2	1	0	3	50	50	100	2
			TOTAL	**16**	**0**	**8**	**21**				

Program Elective -1	
Course Code	**Course Name**
ECT5006 – 1	Information Theory and Coding
ECT5006 – 2	Smart Sensors
ECT5006 – 3	MEMS and NEMS

Open Elective - III	
Course Code	**Course Name**
ECT3980 – 1	Multimedia Communications
ECT3980 – 2	Information and Communication Technologies in Rural Sector

Scheme of Teaching & Examination of Bachelor of Technology
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Semester VI

Sr. No.	Course Type	Course Code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Conti-nous Evaluation	End Sem Exam	Total	
1	PCC	ECT6001	Embedded Systems	3	0	0	3	50	50	100	3
2	PCC	ECP6001	Embedded Systems Lab	0	0	2	1	50	0	50	0
3	PCC	ECT6002	Waveguides and Antennas	3	0	0	3	50	50	100	3
4	PCC	ECP6002	Waveguides and Antennas Lab	0	0	2	1	50	0	50	0
5	PCC	ECT6003	Wireless Communication	3	0	0	3	50	50	100	3
6	MDM	ECT6004	Data Base Management Systems	2	0	0	2	50	50	100	2
7	MDM	ECP6004	Data Base Management Systems Lab	0	0	2	1	50	0	50	0
8	PEC	ECT6005	Program Elective 2	3	0	0	3	50	50	100	3
9	PRJ	ECP6006	Major Project Phase I	0	0	4	2	50	50	100	2
10	HSSM	HUT6001	Financial Management for Engineers	2	0	0	2	50	50	100	2
			TOTAL	**16**	**0**	**10**	**21**				

Program Elective - 2	
Course Code	**Course Name**
ECT6005 – 1	Speech and Audio Processing
ECT6005 – 2	Introduction to Internet of Things
ECT6005 – 3	System Verilog

Exit option 3
(Additional 8 Credits)
Offline/Online (ESSC-India / NSQF skill) Course on – PC Hardware and Computer networking / Embedded system design IoTor similar course, approved by the BoS **OR** Technical Project **OR** One Month Internship at Industry

Scheme of Teaching & Examination of Bachelor of Technology
(Electronics and Communication Engineering)
Semester VII

Sr. No.	Course Type	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration(Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	PCC	ECT7001	Computer Networks	3	0	0	3	50	50	100	3
2	PCC	ECP7001	Computer Networks Lab	0	0	2	1	50	0	50	0
3	PEC	ECT7002	Program Elective 3	3	0	0	3	50	50	100	3
3	PEC	ECT7003	Program Elective 4	3	0	0	3	50	50	100	3
4	PEC	ECT7004	Program Elective 5	3	0	0	3	50	50	100	3
5	ESC	ECT7005	Control Systems	3	0	0	3	50	50	100	3
6	MDM	ECT7006	System Software & Operating System	2	0	0	2	50	50	100	2
7	PRJ	ECP7007	Major Project Phase 2	0	0	4	2	50	50	100	2
			TOTAL	**17**	**0**	**6**	**20**				

Program Elective - 3	
Course Code	**Course Name**
ECT7002– 1	Microwave Theory & Techniques
ECT7002– 2	Unmanned Aerial Systems
ECT7002– 3	Semiconductor Device Modelling

Program Elective - 4	
Course Code	**Course Name**
ECT7003– 1	Smart Antennas
ECT7003– 2	Artificial Intelligence
ECT7003– 3	Fundamentals of Physical Design

Program Elective - 5	
Course Code	**Course Name**
ECT7004– 1	Optical & Satellite Communication
ECT7004– 2	Digital Image Processing
ECT7004– 3	VLSI Signal Processing

Scheme of Teaching & Examination of Bachelor of Technology
(Electronics and Communication Engineering)
Semester VIII

Sr. No	Course Type	Course Code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	PEC	ECT8001	Program Elective 6	3	0	0	3	50	50	100	3
2	PEC	ECT8002	Program Elective 7	3	0	0	3	50	50	100	3
3	PRJ	ECP8003	Project	0	0	12	6	50	50	100	3
			TOTAL	**6**	**0**	**12**	**12**				
			OR								
1	INT	ECP8004	Full Semester Industry Internship	**0**	**0**	**24**	**12**				

Program Elective - 6	
Course Code	**Course Name**
ECT8001 – 1	Wireless Sensor Networks
ECT8001 – 2	Deep Learning
ECT8001 – 3	Advanced Semiconductor Devices

Program Elective - 7	
Course Code	**Course Name**
ECT8002 – 1	5G and Future Generation Communication Systems
ECT8002 – 2	Networks and Systems Security
ECT8002 – 3	RF Circuit Design

Scheme of B. Tech. in Electronics and Communication Engineering– HONORS

Sem	Course Code	Name	L	T	P	Cr	Continuous Assessment	ESE	Total	ESE Duration
III	ECTH3100	Communication System Analysis	3	0	0	3	50	50	100	3
IV	ECTH4100	Multimedia Networks	3	0	0	3	50	50	100	3
V	ECTH5100	Cryptography and Information Security	4	0	0	4	50	50	100	3
VI	ECTH6100	Evolution of Air Interface towards 5G	4	0	0	4	50	50	100	3
VII	ECPH7100	Project	0	0	8	4	50	50	100	3
		TOTAL	**14**	**0**	**8**	**18**				

Scheme of B. Tech. in Electronics and Communication Engineering – HONORS with RESEARCH

Sem	Course Code	Name	L	T	P	Cr	Continuous Assessment	ESE	Total	ESE Duration
VII	ECTR7100	Research Methodology	3	0	0	3	50	50	100	3
VII	ECPR7100	Research Project Phase – I	0	0	6	3	50	50	100	-
VIII	ECPR8100	Research Project Phase – II	0	0	24	12	50	50	100	-
		TOTAL	**3**	**0**	**30**	**18**				

Scheme of B. Tech. in Electronics and Communication Engineering–MINOR

Sem	Code	Name of the course	L	T	P	Cr	Continuous Assessment	ESE	Total	ESE Duration
III	ECTM 3100	Fundamentals of Communication Engineering	3	0	0	3	50	50	100	3
IV	ECTM 4100	Sensors for Smart City	3	0	0	3	50	50	100	3
V	ECTM 5100	IoT for Industrial Application	4	0	0	4	50	50	100	3
VI	ECTM 6100	Future Generation Networks	4	0	0	4	50	50	100	3
VII	ECPM 7100	Project	0	0	8	4	50	50	100	3
		TOTAL	**14**	**0**	**8**	**18**				

I SEMESTER

SYLLABUS FOR SEMESTER I

Electronics & Communication Engineering,

Course Code: PHT1003 **Course: Semiconductor Physics**

L: 2 Hrs. T: 1 Hrs. P: 0 Hrs. per week **Total Credits: 3**

Course Objectives

1. To introduce ideas of quantum mechanics necessary to begin understanding semiconductor devices;

2. To familiarize prospective engineers with fundamental concepts of semiconductors and their interaction with light and resulting devices

Course Outcomes

On successful completion of the course, student will be able to

1: Outline the difference between intrinsic/extrinsic semiconductors and their carrier transport phenomena in semiconductor.

2: Illustrate the working and design aspects for the various photonic devices like LEDs, solar-cells and LASER diodes.

3: Classify materials on the basis of band theory and its importance for semiconductors.

4: Apply fundamental knowledge of quantum mechanics to examine electrons behavior in solids at the quantum level.

5: Analyze the process of generation and recombination of excess charge carriers in semiconductors along with working principle of P-N junction and Metal-Semiconductor junction diode

Course Content:

Unit 1: Introduction to Quantum Mechanics

Wave-particle duality, Heisenberg uncertainty relations, the quantum state wave function and its probability interpretation, Schrodinger's equation, Particle in an infinite potential well, Quantum tunneling,

Unit 2: Electronic Materials

Formation of energy bands in solids, Classification of electronic materials, Kronig-Penny model, E-k diagram, Direct and indirect bandgaps, Valence and conduction bands, Density of states, Fermi-Dirac statistics, Fermi level, Effective mass.

Unit 3: Intrinsic and Extrinsic Semiconductors

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier transport: diffusion and drift

Unit 4: Non-Equilibrium Semiconductors

Carrier generation and recombination, Continuity equation, Ambipolar transport equation, Quasi-Fermi Energy levels, Excess Carrier Lifetime, Qualitative introduction to recombination mechanisms.

Unit 5: Junction Physics

p-n junction diode, Zero-applied bias, forward bias, reverse bias, Application of diode as a rectifier, Zener diode, Special diodes: Tunnel diode, Schottky diode, Ohmic contacts, NPN and PNP transistor &its characteristics, Configurations.

Unit 6: Optoelectronic Devices

Optical absorption in semiconductors**,** Light emitting diodes, Laser diode, Stimulated emission and photon amplification, Einstein Coefficients, Solar Energy Spectrum, Solar Cells.

Text Book(s):

1. Semiconductor Physics and Devices (Fourth Edition), Donald A. Neamen, McGraw-Hill 2012.
2. Semiconductor Device Physics and Design, Umesh K Mishra and Jasprit Singh, Springer 2008.
3. Electronic Devices and Circuits, Jacob Millman, Christos C. Halkias, McGraw Hill 1967.

References:

1. Optoelectronics and Photonics: Principles and Practices by S. O. Kasap, Prentice Hall2001
2. Physics of Semiconductor Devices, Simon M. Sze, Wiley-Interscience (1981)

SYLLABUS FOR SEMESTER I

Electronics & Communication Engineering,

Course Code: PHP1003 **Course: Semiconductor Physics Lab**

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. per week **Total Credits: 1**

Course Outcomes

At the end of the Course the students will learn to:

1: Develop skills required for experimentation and verification of physics laws.

2: Analyse the results obtained through proper graph plotting and Error analysis.

3: Conduct experiments to validate physical behavior of materials/components.

4: Analyze the behavior and characteristics of P-N Junction, Zener-Diode and other semiconductor devices.

5: Prepare laboratory reports on interpretation of experimental results

List of Experiments:

1. Parameter extraction from V-I characteristics of a diode
2. Parameter extraction from V-I characteristics of a transistor
3. Analysis of diode rectifier
4. Resistivity measurement of semiconductor by Four Probe method
5. Performance and analysis of Hall Effect in semiconductor to determine the Hall coefficient and carrier concentration of the majority carriers in the given specimen
6. Estimation of energy gap in semiconductor
7. Characteristics and analysis of solar cells
8. Verification of Ohm's law and error analysis of the data using Linear Least Square Fit (LLSF) method
9. Analysis of energy values and wave function using Mathematica software
10. Verification of Planck's constant

Reference:

1. Laboratory manual of the Physics Department
2. Principles and Practices by S. O. Kasap, Prentice Hall2001

B. Tech Semester I

(For Electronics & Communication Engineering, Electronics & Computer Science Engineering , Electrical Engineering, Civil Engineering , Mechanical Engineering , Biomedical Engineering)

Course Code: MAT1001 **Course Name: Applied Mathematics I**

L: 2Hrs., T: 1 Hrs., P: 0 Hrs., Per week **Total Credits: 03**

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in Ordinary differential equation, statistics, probability and differential calculus.
It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes:

On successful completion of the course, the students will able to:

1. Recognize first order ordinary differential equations that can be solved by each of the four methods – Linear DE, exact DE, reducible to linear DE and reducible to exact differential equations and use the appropriate method to solve them.
2. Solve higher order ordinary differential equations with constant and variable coefficients.
3. Find best fit curve by method of least square method and calculate correlation, regressions.
4. Recognize and understand discrete, continuous probability distributions and apply Binomial distribution, Poisson distribution and Normal distribution to appropriate problems.
5. Internalize multivariable calculus and apply it find Jacobians, maxima and minima of function.
6. Solve numerical integrations by Newton coat formulas and Gauss-Legendre Quadrature.

Course Content:

Module 1: First order ordinary differential equations(7 hours)

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut'stype, Applications of First order Differential Equations.

Module 2: Ordinary differential equations of higher orders (8 hours)

Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation. Applications of Higher order Differential Equations.

Module 3: Statistics: (7 hours)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation, Multiple regression and correlation and its application in Engineering.

Module 4: Differential Calculus (10 hours**)**
Taylor's and Maclaurin's series expansions, radius of curvature (Cartesian form), evolutes and involutes, Limit and continuity of functions of several variables and their partial derivatives, Euler's Theorem, chain rule, total derivative, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers.

Module 5: Probability: (8 hours)(**For All Branches except Mechanical Branch**)
Probability spaces, conditional probability, independence, Bay's Theorem, Discrete random variables, Binomial distribution, Poisson distribution, Normal distribution. Relation between binomial, Poisson and Normal distributions.

OR

Module 5: Numerical Integration (8 hours**)** (**Only for Mechanical Branch**)
Simpson's 1/3rd rule, 3/8th rule, Trapezoidal rule, Gauss-Legendre Quadrature.

Textbooks/References:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Theory and Problems of probability and statistics : 2nd ed :J. R. Spiegal ,Schaum series
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India).
9. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

B. Tech Semester I

(For Electronics & Communication Engineering, Electronics & Computer Science Engineering , Electrical Engineering, Civil Engineering , Mechanical Engineering)

Course Code: MAP1001 **Course: Computational Mathematics Lab**

L: 0 Hr., T: 0 Hr., P: 2 Hrs., Per week **Total Credits:1**

Course Objectives:

The computational Mathematics Lab course will consist of experiments demonstrating the principles of Mathematics relevant to the study of Science and Engineering. Students will show that they have learnt Laboratory skills that will enable them to properly acquire and analyze the data in the lab and draw valid conclusions. On successful completion of the course students shall be able to:

Course Outcomes:

By using open source software SageMath Students will be able to

CO1: Download SageMath and use it as an advance calculator.

CO2: Sketch and analyze function graphs.

CO3: Apply the concepts of differential calculus to find extreme value of continuous functions and analyze solutions of differential equations

CO4: Evaluate improper integrals and its applications to find length, area, volume, centre of gravity and mass.

CO5: Analyze and calculate eigen values, eigen vectors, rank nullity, and solve system of linear equations of a matrix / linear map.

CO6: Analyze the data to find best fit curve.

Mapping of Course outcomes (COs) with Experiments

Exp. No.	Name of Experiments	Mapped COs
1	To use SageMath as advanced calculator	CO1
2	2D Plotting with SageMath	CO2
3	3D Plotting with SageMath	CO2
4	Differential Calculus with SageMath	CO3
5	Solution of differential equations in SageMath	CO3
6	Basics of Linear Algebra	CO5
7	Curve Fitting by using SageMath	CO6
8	Integral Calculus with SageMath	CO4

Syllabus for Semester I, B.Tech. (Electronics and Communication Engineering)

Course Code: EET1004 **Course: Basic Electrical Engineering**
L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 02**

Course Objectives

The objective of the course is to make the studentsfamiliar with basic concepts of electrical engineering, transformer and rotating electrical machines.

Course Outcomes

At the end of this course, students will be able to

1. Apply the concept of basic laws for solving the DC circuits.
2. Analyse the behaviour of single phase and three phase AC circuits.
3. Discuss the working principle of transformer and calculate its parameters.
4. Comprehend the working of Induction motors and BLDC motor.

Course Content:

Module I: (6 Hours)

DC Circuits: circuit elements resistor, inductor and capacitor, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel circuits excited by independent voltage sources; energy sources, dependent sources, star- delta transformation.

Module II: (8 Hours)

A.C. Circuits: Generation of sinusoidal voltage, basic terminologies associated with AC quantity, phasor representation of alternating quantities, Real power, reactive power, apparent power and power factor, Analysis of basic series and parallel AC circuit.

Three Phase A.C. Circuits: Basic concepts; Relationship between line and phase values of balanced star and delta connections; Power in balanced three phase circuits.

Module III: (8 Hours)

Transformers: Basic principle and construction of single-phase transformer; Operation under no load and load condition, equivalent circuit, voltage regulation and efficiency.

Module IV: (6 Hours)

Induction Motors: Construction, working principle and applications of single-phase motors. Working principle of three phase induction motor; Introduction to BLDC motors: working principle, construction with its applications.

TEXT/REFERENCS BOOKS:

1. Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.
2. Electrical Technology: B. L. Thareja, S. Chand Publications.
3. Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P.P.H. Pvt. Ltd.

4. Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill
5. AICTE's Prescribed Textbook: Basic Electrical Engineering, Khanna Book Publishing.

Syllabus for Semester I, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT1001 **Course: Digital Circuits and Fundamental of Microprocessors**

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Objectives

1. To acquire knowledge of various logic families of Digital Circuits and understand basic concepts of Digital Systems.
2. To understand Hardware Implementation of design circuits and determine the output and performance of given combinational circuits.
3. To make student aware of microprocessors and will impart the concept of assembly programming.
4. To make student aware of hardware interfaces needed to develop a microcomputer system.

Course Outcomes

On completion of this course students will be able to:

1. Identify the logic families and understand the requirements of digital logic design.
2. Implement logic circuits using Boolean algebra.
3. Apply knowledge of digital circuits to different types of arithmetic and combinational circuits.
4. Evaluate ALU design for microprocessor and infer its programming needs in terms of architecture.
5. Construct a microprocessor circuit and demonstrate interfacing requirements of microprocessor.

Course Content:

Unit I Logic families (TTL, ECL) and their characteristics – Fan-In, Fan-Out, Propagation Delay, Power dissipation, Noise Margin, Timing issues, Comparison of different logic families.

Unit II Analog v/s Digital systems, Number Systems, Boolean algebra, Boolean identities, Digital Codes – Binary, Gray, Hex, ASCII, BCD, Self Complimentary, Conversion, D Morgan's laws, SOP, POS, representation of signed numbers, Logic Gates, Implementation of Boolean expression using logic gates, Karnaugh Map, simplification and Implementation using K-Maps.

Unit III Combinational circuits – Decoders, Encoders, Multiplexers, Demultiplexers, Adders, Subtractors, and ALU.

Unit IV Introduction to Intel's 8086 Architecture and its description along with functional pin diagram, organization of Memory in microcomputer system. Flag structure, Addressing

Modes & Instruction set of 8086.

Unit V Assembly language Programming and timing diagram of instructions. Concept of Interrupts and its structure in 8086 & Interrupt service routines. Min/Max mode of 8086

Text books:

1. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
2. K M Bhurchandi, A K Ray, Advanced microprocessors and Peripherals, McGraw Hill Education India, 2012, 3rd ed.

Reference Books:

1. R.P.Jain,"ModerndigitalElectronics",TataMcGrawHill,4thedition,2009.
2. Morris Mano and Michael Ciletti,"Digital Design: With an Introduction to Verilog HDL", 5e, 2011

Syllabus for Semester I, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP1001 **Course: Digital Circuits and Fundamental of Microprocessors Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course Objectives

1. To acquire knowledge of various logic families of Digital Circuits and understand basic concepts of Digital Systems.
2. To understand Hardware Implementation of design circuits and determine the output and performance of given combinational circuits.
3. This course will make student aware of microprocessors and will impart the concept of assembly programming.
4. This course will make student aware of hardware interfaces needed to develop a microcomputer system.

Course outcomes

On completion of this course students will be able to:

1. Understand digital circuits requirements for logic design.
2. Implement logic circuits using Boolean algebra.
3. Apply knowledge of digital circuits to different types of arithmetic and combinational circuits.
4. Validate assembly language programming for microprocessor.
5. Construct a microprocessor circuit and demonstrate interfacing requirements of microprocessor.

Experiments based on:

1. Boolean Equations and Gate IC's.
2. Combinational circuits.
3. Assembly language programs based on logical and arithmetic instructions with microprocessor.
4. Assembly language programs based on hardware interface modules with microprocessor.

Syllabus for Semester I, B. Tech (Electronics and Communication Engineering)

Course Code: ECT1002 **Course: Programming for Problem Solving**
L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 02**

Course Objectives

The objective of the course is to prepare the students:

1. To choose a suitable C-construct and recognize the bugs to develop C code.
2. To develop C programs by illustrating the applications of different data types such as arrays, pointers, functions to solve various problems.

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Understand fundamentals of algorithms, Flowchart, Pseudo code and C language
2. Identify correctness in syntax and logic for the program which is developed from algorithm.
3. Use arrays, pointers, structures and I/O operations for the formulation of algorithms and programs.
4. Apply programming to solve matrix addition, multiplication problems and searching & sorting problems.
5. Implement conditional branching, iteration and recursion, to decompose a problem into functions and synthesize a complete program using divide and conquer approach.

Course Content:

Unit I: Introduction to Programming: – Algorithm building, Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. Introduction to C language: Comments, Header files, Keywords, Constant, Variable, data types, constants and variables, operators, Types of Statements, Pre-processor Directives. Control statements, Looping statements and Nesting of control structures.

Unit II: Arrays and Functions: - Concepts of array, one- and two-dimensional arrays, declaration and initialization of arrays for algorithm building. User defined and Library Functions, Parameter passing in functions, call by value, passing arrays to functions, call by reference, Difference between functions and recursion.

Unit III: Pointers and Structures: - Basics of pointers, pointer to pointer, pointer and array, pointer to array, array to pointer, function returning pointer. Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers.

Unit IV: File handling: - Streams in C, Types of Files, File Input/output Operations: Modes of file opening, Reading and writing the file, Closing the files.

Text Books:

1. Programming in ANSIC: E. Balguruswami Mc-Graw Hill
2. Mastering C: K. R. Venugopal and S. R. Prasad, Tata Mc-Graw Hill

Reference Books:

1. Programming with C: Byron Gottfried, Schaums Outline Series.
2. Let Us C: Yashwant Kanetkar, B P B Publication

Syllabus for Semester I, B. Tech (Electronics and Communication Engineering)

Course Code: ECP1002 Course: Programming for Problem Solving Lab.
L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week Total Credits: 01

Course Objectives

The objective of the course is to prepare the students:

1. To choose a suitable C-construct and recognize the bugs to develop C code.
2. To develop C programs by illustrating the applications of different data types such as arrays, pointers, functions to solve various problems.

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Understand fundamentals of C language
2. Analyze correctness in syntax and logic for the program which is developed from algorithm.
3. Apply debugging techniques according to the algorithm requirements
4. Evaluate the computational resources for a program application
5. Implement conditional branching, iteration and recursion, to decompose a problem into functions and synthesize a complete program.

Experiments based on:

- Control statements, Looping statements and Nesting of control structures
- Arrays and Functions
- Pointers and Structures
- File handling

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code: HUT1002 Course: English for Professional Communication
L: 2 Hrs, T: 0 Hr, P: 0Hr, Per Week Total Credits: 2

Course Objectives

The main objective of this course is to enhance the employability skills of students as well as prepare them for effective work place communication.

Course Outcomes

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate effective use of word power in written as well as oral communication.

CO2. Understand the techniques of listening and apply the techniques of reading comprehension used in professional communication.

CO3. Apply the principles of functional grammar in everyday as well as professional communication.

CO4. Effectively implement the comprehensive principles of written communication by applying various writing styles.

CO5. Create precise and accurate written communication products.

Course Content:

Unit-1: Vocabulary Building

1.1 Importance of using appropriate vocabulary

1.2 Techniques of vocabulary development

1.3 Commonly used power verbs, power adjectives and power adverbs.

1.4 Synonyms, antonyms, phrases & idioms, one-word substitutions and standard abbreviations

Unit -2: Listening and Reading Comprehension

2.1 Listening Comprehension: active listening, reasons for poor listening, traits of a good listener, and barriers to effective listening

2.2 Reading Comprehension: types and strategies.

Unit -3: Functional Grammar and Usage

3.1 Identifying Common Errors in use of: articles, prepositions, modifiers, modal auxiliaries, redundancies, and clichés

3.2 Tenses

3.3 Subject-verb agreement, noun-pronoun agreement

3.4 Voice

Unit-4: Writing Skills

4.1 Sentence Structures

4.2 Sentence Types

4.3 Paragraph Writing: Principles, Techniques, and Styles

Unit-5: Writing Practices

5.1 Art of Condensation: Précis, Summary, and Note Making

5.2 Correspondence writing techniques and etiquettes – academic writing

5.3 Essay Writing

Reference Books

1. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press.2011.

2. Practical English Usage. Michael Swan. OUP. 1995.

3. Remedial English Grammar. F.T. Wood. Macmillan.2007

4. On Writing Well. William Zinsser. Harper Resource Book. 2001

5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code: HUP1002 Course: English for Professional Communication Lab
L: 0 Hrs, T: 0 Hr, P: 2Hr, Per Week Total Credits: 1

Course Objective

To enhance competency of communication in English among learners

Course Outcomes

On completion of English Lab course, students will be able to achieve the following:

CO1: Apply effective listening and speaking skills in professional and everyday conversations.

CO2: Demonstrate the techniques of effective Presentation Skills

CO3: Evaluate and apply the effective strategies for Group Discussions

CO4: Analyze and apply the effective strategies for Personal Interviews

CO5: Implement essential language skills- listening, speaking, reading, and writing Syllabus

List of practicals:

Computer Assisted + Activity Based Language Learning

Practical 1: Everyday Situations: Conversations and Dialogues – Speaking Skills

Practical 2: Pronunciation, Intonation, Stress, and Rhythm

Practical 3: Everyday Situations: Conversations and Dialogues – Listening Skills

Activity Based Language Learning

Practical 4: Presentation Skills: Orientation & Mock Session

Practical 5: Presentation Skills: Practice

Practical 6: Group Discussions: Orientation & Mock Session

Practical 7: Group Discussions: Practice

Practical 8: Personal Interviews: Orientation & Mock Session

Practical 9: Personal Interviews: Practice

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-1	**Fundamentals of Indian Classical Dance: Bharatnatayam**	I/II	2	1	50

Course objective

The course aims to introduce the students to Bharatnatyam, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Bharatnataym as an Indian dance formCO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Pratham* (1st level formal exam of Bharatnatayam).

Syllabus

Practical -1: Orientation in Bharatnatayam

Practical-2: Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,

Practical -3: Practice sessions

Practical-4: Tatta Kuditta Adavu (Metta), Tatta Kuditta Adavu (Metta) 2 Steps, Tirmanam Adavu 3 Steps, Kattu Adav - 3 Steps, Kattu Adav - 3 Steps

Practical-5: Practice sessions

Practical-6: Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps, Practical-7: practice sessions

Practical – 8: final practice sessions and performances.

Recommended reading

1. *Introduction to Bharata's Natyasastra*, Adya Rangacharya, 2011
2. *The Natyasastra and the Body in Performance: Essays on the Ancient Text*, edited by Sreenath Nair, 2015
3. *Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form*, Eshwar Jayalakshmi, 2011

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-2	**Fundamentals of Indian Classical Dance: Kathak**	I/II	2	1	50

Course objective

The course aims to introduce the students to Kathak, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Kathak as an Indian dance form CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Prarambhik* (1st level formal exam of Kathak).

Syllabus

Practical -1: Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),

Practical -2: practice sessions of practical 1

Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings

Practical -4: practice sessions of practical 3

Practical -5: Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,

Practical -6: practice sessions of practical 5

Practical -7: 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions

Practical -8: Final performances.

Recommended reading

1. Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), Marami Medhi & Debasish Talukdar, 2022, Anshika Publication (13 September 2022)

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-3	**Introduction to Digital Photography**	I/II	2	1	50

Course objective

The course aims to develop basic skills of students in digital photography to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Develop an understanding of the technical aspects and aesthetics of Photography. CO2: Apply the rules of digital photography for creating photographs.

CO3: Develop skills to enhance photographs through post processing. CO4: Create a portfolio of their photographs in selected genre.

Syllabus

Practical 1: **Orientation in digital photography:** Genres, camera handling and settings Practical 2: **Rules of Composition**

Practical 3: **Rules of Composition**: practice sessions

Practical 4: **Understanding Exposure and Art of Pre-Visualization**

Practical 5: **Rules of Composition and Art of Pre-Visualization:** practice sessions Practical 6: **Post Processing Photographs and Portfolio creation**

Practical 7: **Post Processing Photographs:** practice sessions

Practical 8: **Portfolio finalization and presentation in selected genre.**

Reference material

1. Scott Kelby (2020) *The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros*, Rocky Nook, USA
2. Larry Hall (2014) *Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography*, Speedy Publishing LLC, Newark
3. J Miotke (2010) *Better Photo Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro*, AMPHOTO Books, Crown Publishing Group, USA

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-4	**Introduction to Japanese Language and Culture**	I/II	2	1	50

Course objective

The course aims to develop basic communication skills in Japanese Language and help develop a basic understanding of Japanese culture in cross-cultural communication.

Course outcome

CO1: Gain a brief understanding about Japan as a country and Japanese culture.
CO2: Develop ability to use vocabulary required for basic level communication in Japanese language. CO3: Able to write and read the first script in Japanese language.
CO4: Able to frame simple sentences in Japanese in order to handle everyday conversations CO5: Able to write in basic Japanese about the topics closely related to the learner.

Syllabus

Practical-1: Orientation about Japan, its language, and its culture
Practical-2: Communication Skills 1: Vocabulary for basic Japanese language
Practical -3: Practice sessions
Practical-4: Writing Skills 1: Reading and writing first script in Japanese
Practical-5: Practice sessions
Practical- 6: Communication Skills 2: framing sentences
Practical- 7: Practice sessions
Practical- 8: Writing Skills 2: Write basic Japanese and practice

Recommended reading

1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)
2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language Solutions (ISBN: 9788194562900)

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-5	**Art of Theatre**	I/II	2	1	50

Course objectives:

The course aims to develop in the students, an actor's craft through physical and mental training.

Course Outcomes:

On completion of the course, students will be able to achieve the following:

CO1: Understand and synthesize the working of the prominent genres of theatre across the world. CO2: Apply the skill of voice and speech in theatre and public speaking
CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline. CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus:

Syllabus

Practical 1: **Orientation in theatre**
Practical 2: **Voice and Speech training**
Practical 3: **Voice and Speech training**: practice sessions
Practical 4: **Art of acting**
Practical 5: **Art of acting:** practice sessions Practical 6: **Art of script writing**
Practical 7: **Art of script writing:** practice sessions Practical 8: **Final performances**

Reference books:

1. Boleslavsky, R. (2022). *Acting: The First Six Lessons* (1st ed., pp. 1-92). Delhi Open Books.
2. Shakthi, C. (2017). *No Drama Just Theatre* (1st ed., pp. 1-171). Partridge.
3. Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). *A Practical Handbookfor the Actor* (1st ed.). Vinatge Books New York.

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-6	**Introduction to French Language**	I/II	2	1	50

Course objective:

To help build a foundation and interest in French language so that the students can pursue theproficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France

CO2. Learn to use simple language structures in everyday communication.

CO3. Develop ability to write in basic French about themselves and others.

CO4. Develop ability to understand beginner level texts in French

Syllabus

List of Practicals

Practical-1: Orientation about France, the language, and culture

Practical-2: Communication Skills 1: Vocabulary building for everyday conversations

Practical -3: Practice sessions

Practical-4: Reading and writing Skills : Reading and writing simple text in French

Practical-5: Practice sessions

Practical-6: Communication Skills 2: listening comprehension

Practical-7: Practice sessions

Practical-8: Writing Skills: Write basic French and practice

Recommended reading

1. 15-minute French by Caroline Lemoine
2. Cours de Langue et de Civilisation Françaises by G. Mauger Vol. 1.1
3. Cosmopolite I by Natalie Hirschsprung, Tony Tricot

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	**Maximum Marks (Continuous Evaluation)**
HUP0001-7	**Introduction to Spanish Language**	I/II	2	1	50

Course objective:

To help build a foundation and interest in Spanish language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France

CO2. Learn to use simple language structures in everyday communication. CO3. Develop ability to write in basic Spanish about themselves and others. CO4. Develop ability to read and understand beginner level texts in Spanish

Syllabus

List of Practicals

Practical-1: Orientation about Spain, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in Spanish
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic Spanish and practice

Recommended reading

1. 15-Minute Spanish by Ana Bremon
2. Aula Internacional 1 by Jaime Corpas ,Eva Garcia, Agustin Garmendia.
3. Chicos Chicas Libro del Alumno by María Ángeles Palomino

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-8	**Art of Painting**	I/II	2	1	50

Course objective

Painting is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in painting tolay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Become familiar with the basic methods, techniques & tools of painting.
CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.
CO3: Develop the ability to observe and render simple natural forms.
CO4: Enjoy the challenging and nuanced process of painting.

Syllabus

Practical 1: **Orientation in Painting tools & basics of lines, shapes, light, shadows and textures**
Practical 2: **The art of observation** how to see shapes in drawing Practical 3: **Introduction Water color** how to handle water paints Practical 4: **Introduction to acrylic colors** how to handle acrylic paints

Practical 5: **Explore layering paint and capturing the quality of light with paint.**
Practical 6: **Create landscape painting**
Practical 7: **Create Abstract painting**
Practical 8: **Paint on Canvas** (try to recreate any famous painting)

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland
3. Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-9	**Art of Drawing**	I/II	2	1	50

Course objective

Drawing is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in drawing to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Become familiar with the basic methods, techniques & tools of drawing. CO2: Train the eye and hand to develop sense of balance, proportion and rhythm. CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of drawing.

Syllabus

Practical 1: **Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures**
Practical 2: **The art of observation** how to see shapes in drawingPractical 3: **One/two-point basic linear perspective**
Practical 4: **Nature drawing and landscapes**
Practical 5: **Gestalt principles of visual composition**
Practical 6: **Figure drawing**: structure and proportions of human body Practical 7: **Gesture drawing:** expression and compositions of human figures Practical 8: **Memory drawing:** an exercise to combine the techniques learnt

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
HUP0001-10	**Nature camp**	II	2	1	50

Course Objective: To create an opportunity for the students to develop affinity with nature and thus subsequently impact their ability to contribute towards sustainability of nature.

Course outcome:

After the completion of the course the students will be able to do the following:

CO1: Develop an affinity with nature by observing and understanding it marvels with guidance from experts

CO2: Develop an understanding of the challenges and solutions associated with nature and its conservation.

Course content

In collaboration with the Forest Department and/or a local NGO working in the field of environment conservation, this course would be conducted in 24 hours. Students will be taken to a tiger reserve in Central Indian region or Forest fringe villages or work with an NGO from Central Indian region working on natural resource management. The camps (for 2 days) will cover any one of the following topics as decided by the course coordinator:

1. Awareness about each element of biodiversity (camps on moths, butterflies, birds, other wildlife etc)
2. Environment management (water, forest, wildlife) – practices of Forest Department in managing a tiger reserve, and other aspects of water and forest conservation.
3. Sustainable natural resource management - initiatives by rural communities and local NGOs
4. Man-animal conflict and solutions (socio-economic and technical) – role of local communities and Forest Department
5. Traditional practices in environment conservation – role of local communities and local NGOs

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

DEPARTMENT OF PHYSICAL EDUCATION

Syllabus of Semester I UG Engineering Program

COURSE: DISSASTER MANAGEMENT THROUGH ADVENTURE SPORTS

Code: PEP0001-21 **Course Type:** Liberal Arts

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week **Total Credits:** 01

Objectives of the Course:

To enable the student:

1. To inculcate rational thinking and scientific temper among the students.
2. To develop critical awareness about the social realities among the students.
3. To build up confidence, courage and character through adventure sports.

Course Outcomes:

On completion of the course, students will be able to:

1. Understand the meaning and importance of Adventure sports.
2. Learn the various types of adventure sports, the equipment and resources required to practice disaster Management activities.
3. Learn the safety measures about different risk and their management.
4. To apply Disaster management theory to institutional & Societal problems andsituations.

Course Content:

1. Basic adventure
2. First AID
3. various types of knots
4. Shelter making
5. Disaster management
6. Team building and goal setting
7. Realization of fear, risk and their roles and analyzing safety Management Plan

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

DEPARTMENT OF PHYSICAL EDUCATION

Syllabus of Semester I UG Engineering Program

COURSE: **SELF-DEFENSE ESSENTIALS AND BASIC KNOWLEDGE OF DEFENSE FORCES**

Course Code: PEP0001-22 **Course Type:** Liberal Arts

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week **Total Credits:** 01

Course Outcomes:

On completion of the Course the student will be able to:

- Understand the meaning, need and fitness requirements to implement self-defense
- Learn the basic techniques of selected combative sports.
- Learn to prepare basic Physical Training for Defense forces.
- Implement survival techniques during emergencies.

Course Content:

- General conditioning and self-defense specific conditioning
- Applications of techniques of combative sports for self-defense.
- Self-defense techniques for specific situations: chains natching, knife or stick attack, holding from back or front etc.
- Basic Military Knowledge and exposure making students Confident, bold, disciplined and trains them to join Armed Forces.

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	CHP0001-31				
Category	Basket of Liberal Learning Course				
Course Title	**Art of Indian traditional cuisine**				
Scheme& Credits	L	T	P	Credits	Semester I/II
	0	0	2	1	

Course outcomes:

At the end of the course the students will be able to achieve the following:

CO1: Understand the factors that affect regional eating habits and the unique ingredients found in variousstates of India

CO2: Get insight to prepare popular dishes from various regions of India. ·

Module 1: Indian Regional foods and snacks - factors effecting eating habits.
Module 2: Indian gravies – ingredients, their importance
Module 3: Indian Sweets - ingredients, their importance
Module 4: Presentation of Indian Meals, Menu Planning, Food Costing
Module 5: Food Preservatives and Safety

List of experiments:

1) Introduction to cookery : does and don'ts
2) Introduction to Indian cuisine, philosophy and classification.
3) Regional influence on Indian Food- factors affecting eating habits
4) Preparation of Garam masala and or Chat masala with ingredients and their importance
5) Preparation of different gravies such as white, yellow or brown gravies with ingredients and theirimportance
6) Preparation of Indian sweets like Besan ke laddu with ingredients and their importance
7) Presentation of meal, Menu planning and Food costing
8) Common chemical food preservatives and their safety standards.

Reference books

[1] Arora, K.,; Theory of cookery; First Edition, Frank Brothers Company (Pub) Pvt. Ltd., 2008 ISBN:9788184095036, 8184095031

[2] Philip, Thangam . E.,; Modern Cookery: Vol. 1; Sixth Edition, Orient BlackSwan., 2008 ISBN:9788125040446, 8125040447ali

[3] Parvinder S;Quantity Food Production Operations and Indian Cuisine (Oxford Higher Education); FirstEdition; Oxford University Press, 2011 ISBN 10: 0198068492 ISBN 13: 9780198068495

[4] Singh, Yogesh; A Culinary Tour of India; First Edition I.K. International Publishing House Pvt. Ltd.
ISBN 978-93-84588-48-9

[5] Singh Shakesh;Simplifying Indian Cuisine;First Edition, Aman Publications, ISBN81-8204-054-X

[6] Dubey Krishna Gopal; The Indian Cuisine;PHI Learning Pvt. Ltd.ISBN978-81 203-4170-8

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code	CHP0001-32				
Category	Basket of Liberal Learning Course				
Course Title	**Introduction to Remedies by Ayurveda**				
Scheme& Credits	L	T	P	Credits	Semester I/II
	0	0	2	1	

Course outcomes:

At the end of the course the students will be able to achieve the following

CO1: Know basic principle of Ayurvedic formulations.

CO2: Different types of Natural Remedies.

CO3: Basic idea about their Characterization

Module 1- Introduction to Ayurveda

Module 2- Different types of Ayurvedic formulations: Churn, Bhasma, Vati, Tailum

Module 3- Introduction to Methods of preparation

Module 4- Characterization, applications

Practicals based on above syllabus

1) Preparations of some medicinal oils like Bramhi tel, Bramhi Awala, Vatnashak Tel, Bhurngraj Tel etc.
2) Preparation of Churn, like Trifala Churn, Hingastak Churn, Trikut Churn etc.
3) Preparation of some Bhasmas and vati

Books

1) Chemistry and Pharmacology of Ayurvedic Medicinal Plants by Mukund Sabnis, Chaukhambha Amarbharati Prakashan.
2) Everyday Ayurveda by Shailesh Rathod
3) A text Book of Rasashastra by Vikas Dhole and Prakash Paranjpe
4) A text Book of Bhaiajya Kalpana Vij¯nana

Syllabus for Semester I, B-Tech (Electronics and Communication Engineering)

Course Code: HUT1004 **Course: Foundational course in Universal Human Value**

L: 1 Hrs, T: 0 Hr, P: 0 Hr, Per Week **Total Credits: 1**

Course Objectives

1. To help the student see the need for developing a holistic perspective of life.
2. To sensitize the student about the scope of life – individual, family (inter-personal relationship), society and nature/existence.
3. To strengthen self-reflection.
4. To develop more confidence and commitment to understand, learn and act accordingly.

Course outcomes

On completion of course, students will be able to achieve the following:

CO1: Develop a holistic perspective of life.

CO2: Better understanding of inter-personal relationships and relationship with society and nature.

CO3: An ability to strengthen self-reflection.

Course Content:

Unit 1:- Aspirations and concerns

Need for Value Education: Guidelines and content of value education.

Exploring our aspirations and concerns: Knowing yourself, Basic human aspirations

Need for a holistic perspective, Role of UHV; Self-Management: harmony in human being.

Unit 2:- Health

Harmony of the Self and Body, Mental and physical health; Health for family, friends and society.

Unit 3:- Relationships and Society

Harmony in relationships, Foundational values: Trust, Respect, Reverence for excellence, Gratitude and love; harmony in society; harmony with nature.

Reference Material

The primary resource material for teaching this course consists of

Text book:

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174- 46781-2

Reference books:

a) B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

b) PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

c) Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

d) Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA

e) Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.

f) SubhasPalekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) KrishiTantraShodh, Amravati.

g) A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.

h) E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.

i) A.N. Tripathy, 2003, Human Values, New Age International Publishers.

II SEMESTER

SYLLABUS FOR SEMESTER II

B. Tech. (Electronics and Communication Engineering)

Course Code: CHT2002 Course: Chemistry of Functional Materials

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 02

Course Outcomes

After the successful completion of the course, students shall be able to

CO1: Investigate the chemical properties of materials for various technological applications.

CO2: Discuss how spectroscopic methods are used for qualitative and quantitative analyses.

CO3: Apply the knowledge of material property and energy to analyze environmental issues.

CO4: Analyze the utilization of sensor technology for environmental issues.

Course Content:

Unit 1: Nano-material (7 Hours)

Nanomaterials: Introduction, Classification and size dependent properties (surface area, Optical and catalytic properties). Synthesis of nano-materials (Solution combustion and Sol-gel methods).

Carbon nanomaterials: Introduction, types, synthesis by modified CVD method, functionalization and applications of CNT and Graphene.

Applications of Nanomaterials

Unit 2: Material Characterization using different Spectroscopic Techniques (7 Hours)

Spectroscopy: Fundamentals of spectroscopy, Interaction of light with matter, Beer's-Lambert's Laws of absorption.

Electronic Spectroscopy: Types of transitions, Chromophores, auxochrome, different type of absorption shifts, Woodward-Fieser Rule.

Nuclear Magnetic Resonance Spectroscopy: Phenomenon of NMR, important aspects of NMR, Prediction of NMR spectrum.

Unit 3: Energy Storage and conversion devices (8 Hours)

Battery: Introduction, types, characteristics, components/materials, working and applications of Lithium-cobalt oxide and metal air batteries.

Super capacitors: Introduction, types (EDLC, pseudo and asymmetric capacitor) with examples and applications.

Energy conversion devices: Introduction, characteristics, materials, working and applications of H2-O2 fuel cells, amorphous Si and quantum dye sensitized solar cells.

Unit4: Sensors and Instrumental method of analysis (7 Hours)

Sensors: Introduction, types of sensors (Piezoelectric and electrochemical), principle, materials used and applications of optoelectronics sensors, piezoelectric sensors, electrochemical sensors and gas sensors.

Instrumental method of analysis: Principle, instrumentation: Colorimetry, potentiometry, conductometry.

Text and Reference Books

1. Energy storage and conversion devices: Supercapacitors, batteries and hydroelectric cells, Anurag Gaur, A. L. Sharma, Anil Arya. 2021, CRC press, 1st edition, ISBN: 978-1-003-14176-1.
2. A. K. Das and M. Das, An introduction to nanomaterials and nanoscience, CBS Publishers and Distributors
3.Smartnanomaterials for sensor application, Li S, Ge Y, Li H, 2012, Bentham Science Publishers, ISBN: 9781608055425.
4. Fundamentals of analytical chemistry: An introduction, Douglas A. Skoogetetal., 2004 Thomson Asia pte Ltd., 8th, ISBN: 978-0-495-55828-6.
5. Chemistry in microelectronics, Yannick Le Tiec, 2013, Wiley Publications, ISBN: 9781848214361.
6. Electronics properties of materials, Rolf E, Hummel, 2012, Springer Publications New York, 4th Edition, ISBN 9781441981639.
7. William Kemp, Organic Spectroscopy, Third Edition, Palgrave Publication, 1991.
8. C. N. Rao,A Muller and A. K. Cheetam, The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Wiley-VCH, 2004

E-books

1. Functional and smart materials, Chander Prakash, Sunpreet Singh, J. Paulo Davim, 2020, CRC Press, ISBN: 978-036-727-510-5.
2. Electrical and electronic devices, circuits and materials: Technological challenges and solutions. Tripathi, S. L., Alvi, P. A., &Subramaniam, U, 2021, John Wiley & Sons, ISBN: 978-0367564261.

Syllabus for Semester II,
B. Tech. (Electronics and Communication Engineering)

Course Code: CHP2002 Course: Chemistry of Functional Materials Lab
L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week Total Credits: 01

Laboratory Outcomes

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will learn to:

1. Estimate the amount of different elements present in the given samples.
2. Measure molecular /system properties such as surface tension, viscosity of aqueous or other industrially important liquids/mixtures etc.
3. Use of computational tools for analysis of different spectral properties.

List of Experiments for Chemistry Lab

1. Determination of Surface tension of a given liquid / mixture.
2. Determination of Viscosity of a given liquid / mixture.
3. Estimation of Cu and Zn in a brass sample.
4. Potentiometric estimation of iron.
5. Colorimetric estimation of copper.
6. Conductometric estimation
7. Estimation of acid value of oil.
8. Estimation of saponification value of oil.
9. Synthesize a polymer/drug molecule/nano-material.(Demonstration Experiment)
10. Predict and Interpret the NMR spectra (Demonstration Experiment)
11. Spectroscopic/colorimetric determination of wavelength of maximum absorption and determination of unknown concentration by Beers-Lamber Law

Suggested Books/Reference Books

1. Experiments and Calculation in Engineering Chemistry by S. S. Dara, S. Chand Publications.
2. Advanced Practical Physical Chemistry by J. B. Yadav, Krishna's Prakashan Media (P) Limited.
3. Collection of Interesting General Chemistry Experiments, A by A.J.Elias, Universities Press Publications.
4. College Practical Chemistry by V. K. Ahluwalia, S. Dhingra and A. Gulati, Universities Press Publications.
5. Advanced Practical Medicinal Chemistry by Ashutosh Kar, New Age International Publisher.

B. Tech Semester II

(For Electronics & Communication Engineering, Electronics & Computer Science Engineering , Electrical Engineering, Civil Engineering , Mechanical Engineering , Biomedical Engineering)

Course Code: MAT2001 **Course Name: Applied Mathematics II**

L: 2Hrs, T: 1 Hrs, P: 0 Hrs, Per week **Total Credits: 03**

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in Calculus and multivariate analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes:

On successful completion of the course, the students will able to:

1. Interpret the solutions of system of linear equations and use the concepts of Eigen values, Eigen vectors to find diagonalization of matrices, reduction of quadratic form to canonical form.
2. Evaluate definite and improper integrals using Beta, Gamma functions. Also trace cartesian curves.
3. Solve multiple integration by change of order, change of variable methods and apply it to find area, volume, mass and center of gravity.
4. Understand geometric meaning of gradient, curl, divergence
5. Perform line, surface and volume integrals of vector-valued functions.
6. Analyze and compare different sets of data and classify the data by means of diagrams and graph.

Course Content:

Module 1: Matrices: (8 hours)

Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms, Introduction to n-dimensional space.

Module 2: Integral Calculus: (8hours)

Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Tracing of curves (Cartesian form)

Module 3: **Multiple Integrals** (10 hours)
Multiple Integration: Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: area, mass and volume by double integration, Center of mass and Gravity (basic concepts).

Module 4: Vector Calculus (Differentiation)(7hours)
Scalar point function, Vector point function, vector differentiation, gradient, divergence and curl, directional derivatives with their physical interpretations, solenoidal and irrotational motions, Scalarpotential function.

Module 5: Vector Calculus (Integration)(7 hours**)(All Branches except Biomedical Engineering)**
Vector integration: Line integrals, work done, conservative fields, surface integrals and volume integrals, Stoke's theorem, Gauss divergence theorem, Green's theorem and their simple applications.

OR

Module 5: Descriptive Statistics (7- Lectures)(Only for Bio-Medical Engineering)
Types of statistical data: categorical, ranked, discrete, and continuous. Distinction between univariate, bi-variate, and multivariate statistics, Visualization techniques such as joint contingency tables, scatter plots, 2D histograms and line graphs , Measures of central tendency and Dispersion .

Topics for self learning

Rolle's theorem, Mean value theorems, Indeterminate forms, Applications of definite integrals to evaluate perimeter, area, surface areas and volumes of revolutions.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
6. Biomedical Statistics –Shantikumar Yadav, Sompal Singh, Ruchika Gupta
7. Theory and Problems of Probability and Statistics - M.R. Spiegal (McGraw Hill) Schaum Series

Syllabus for Semester II, B.Tech. (Electronics and Communication Engineering)

Course Code: ECT2001 **Course: Network Theory**
L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Objectives

The objective of the course is to make students capable of –

1. Analyzing different electrical networks.
2. Solving electrical circuits using suitable network theorems and methods.
3. Applying suitable transformation techniques to analyze electrical circuits in time and frequency domain.
4. Understanding different parameters of two port networks.

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand the fundamentals of nodal and mesh analysis.
2. Analyze the transient and steady state behavior of electrical networks.
3. Apply network theorems to calculate electrical circuit parameters.
4. Estimate the network characteristics from pole-zero locations of network functions.
5. Model two port electrical networks.

Course Content:

Unit I: Node and mesh analysis, matrix approach of networks containing voltage sources, current sources, reactance, Dependent sources, source transformation, duality properties in the electrical networks.

Unit II: Network theorems: Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Compensation theorem, Millman's theorem, as applied to D.C. and AC. Circuits with their applications.

Unit III: Evaluation of initial conditions in RL, RC and RLC networks. Laplace transforms and properties: Partial fraction, inverse Laplace transform, analysis of RC, RL, and RLC networks with and without initial conditions using Laplace Transforms. Steady state response of electrical networks to sinusoidal and non-sinusoidal inputs using Laplace transforms.

Unit IV: Concept of complex frequency, driving points and transfer functions of ladder and non-ladder network structures, Poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations. Behaviors of resonant circuits designed using RLC components.

Unit V: Two port network calculations for impedance, admittance, ABCD and hybrid

parameters. Interconnections of 2-port networks. Introduction to passive low-pass, high-pass, band-pass filters using RLC.

Text Books:

1) Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994.
2) Ravish R. Singh, "Network Analysis & Synthesis" Tata McGraw Hill Education (India) Private Limited (2013).
3) Van, Valkenburg.; " Network analysis" ; Prentice hall of India, 2000.

Reference Books:

1) A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education.

Syllabus for Semester II, B-Tech (Electronics and Communication Engineering)

Course Code: ECT2002 **Course: Electronic Devices**

L: 3 Hrs, T: 0Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Objectives

The objective of the course is to prepare the students:

1. To learn electrical properties, characteristics and behavior of basic solid state devices.
2. To develop applications in circuit design using device models.

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand characteristics of electronic devices.
2. Comprehend the fundamentals of MOS technology.
3. Demonstrate the operation of digital circuits using CMOS logic.
4. Select biasing circuits for BJT and FET amplifier.
5. Analyze electronic circuits.

Course Content:

Unit I

BJT biasing:AC/DC load line concept, Operating Point Analysis, need of biasing, biasing techniques, bias stabilization, compensation techniques, Application of BJT as Amplifier.

Unit II

Low frequency analysis of an amplifier: Determination of h-parameters from I-V characteristics, Analysis of amplifier at low frequency to estimate voltage gain, current gain, input resistance, output resistance etc.

Unit III

Field effect Transistor: JFET classification, construction, principle of operation, I-V characteristics, FET amplifier configuration, Biasing techniques, Applications of FET.

Unit IV

Introduction to MOS and CMOS Technology: - Classification of ICs, MOS transistor, MOSFETI-Vcharacteristics, Body Effect, Applications of MOSFET, Implementation of Boolean Expressions using CMOS.

Unit V

Power Electronics Devices: Characteristics and working principle of Power devices such as SCR, UJT, TRIAC, DIAC, IGBT and PUT.

Text Books:

1. Integrated Electronics: Jacob Millman , Christos Halkias, Chetan Parikh, Second Edition,TMH.
2. An Introduction to semiconductor Devices: Donald Nemen, Tata-McGraw Hill
3. CMOS VLSI Design – A Circuits and Systems Perspective: Neil Weste and David Harris, Addison-Wesley, 4th Edition, Pearson.
4. Power Electronics: M. D. Singh and K. B. Khanchandani, Second Edition, TMH.

Reference Books:

1. Electronic devices and Circuit Theory: R. Boylestad, 9th edition, Pearson Education
2. Electronic Devices and Circuits: David A. Bell, 4th Edition, PHI.
3. Electronic Circuits – Analysis and Design: Donald Nemen, Tata-McGraw Hill
4. Power electronics: P. S. Bimbhra, Fifth edition,khanna Publication.
5. Basic VLSI Design: Douglas Pucknell and Kamran Eshraghian, Third Edition, PHI
6. **S**olid State Electronic Devices: Ben G Streetman, Sanjay Kumar Banerjee, Sixth Edition, PHI.

Syllabus for Semester II, B-Tech (Electronics and Communication Engineering)

Course Code: ECP2002 **Course: Electronic Devices Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course Objectives

The objective of the course is to prepare the students:
To verify the characteristics of different electronic devices and verify it using EDA tools.

Course outcomes

At the end of this course students will demonstrate the ability to

1. Plot V-I characteristics of electronic components and analyze performance parameters.
2. Study biasing techniques and examine effect of temperature on the performance of an amplifier
3. Investigate Characteristics of power electronic devices.
4. Verify Boolean logic of CMOS gates.
5. Use EDA tool for analysis of electronic circuits

Experiments based on:

- Characteristics of transistors
- Biasing of BJT
- Characteristics of Power Devices
- Circuit Simulations using EDA tool
- Implementation of Boolean Expression using CMOS

Syllabus for Semester II, B-Tech (Electronics and Communication Engineering)

Course Code: ECT2003 **Course: Object Oriented Programming**
L: 3 Hrs, T: 0 Hr, P: 0Hr, Per Week **Total Credits: 3**

Course Objectives

1. To make students understand Fundamental features of an object oriented language Java: it's object classes and interfaces, exceptions and libraries of object collections
2. Introduce students with fundamental concepts like exception handling, generics, multithreading and streams.

Course Outcomes

On successful completion of the course, students will be able to demonstrate

1. Understand the principles of object-oriented programming; create classes, instantiate objects and invoke methods.
2. Apply the concepts of generics and implement collection classes and develop reusable programs using the concepts of OOP.
3. Apply the concepts of Multithreading and Exception handling to develop efficient and error free Codes for solving classic synchronization problems.
4. Create design Pattern in Software design process.

Course Content:

UNIT I: Features of Object Oriented Programming languages, Abstraction, Encapsulation, Inheritance, polymorphism and late binding, Concept of a class, Access control of members of a class, instantiating a class, constructor and method overloading and overriding.

UNIT II: Concept of inheritance, methods of derivation, use of super keyword and final keyword in inheritance, run time polymorphism, abstract classes and methods, Interface, implementation of interface, creating packages, importing packages, static and non-static members, Lambda Expressions Introduction, Block, Passing Lambda expression as Argument.

UNIT III: Exceptions, types of exception, use of try catch block, handling multiple exceptions, using finally, throw and throws clause, user defined exceptions, file handling in Java, Serialization, Generics, generic class with two type parameter, bounded generics. Collection classes: Arraylist, Linked List, Hashset, Treeset.

UNIT IV: Multithreading: Java Thread models, creating thread using runnable interface and extending Thread, thread priorities, Thread Synchronization, Inter Thread communications.

UNIT V: Introduction to Design Patterns, Need of Design Pattern, Classification of Design Patterns, and Role of Design Pattern in Software design, Creational Patterns, Structural Design Patterns and Behavioral Patterns.

Text Books:

1. Herbert Schildt; JAVA, the Complete Reference; Ninth Edition, TataMcGraw- Hill Publishing Company Limited.
2. Design Patterns by Erich Gamma, Pearson Education.

Reference Books:

1. Cay S. Horstmann and Gary Cornell; Core JAVA Volume-II Advanced Features; Eighth Edition; Prentice Hall, Sun Microsystems Press2008.
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw HillEducationPrivateLtd2013.

Syllabus for Semester II, B-Tech (Electronics and Communication Engineering)

Course Code: ECP2003 **Course: Object Oriented Programming Lab.**

L: 0 Hrs, T: 0 Hr, P: 2 HrPer Week **Total Credits: 1**

Course Objectives

1. To develop ability of students to implement basic concepts and techniques of object oriented programming paradigm like encapsulation, inheritance, polymorphism, exception handling.
2. Develop solution to problems using collection classes, generics, streams, multithreading.

Course Outcomes

On completion of the course the student will be able to

1. Design solution to problems using concepts of object oriented programming like classes, objects, inheritance with proper exception handling.
2. Use collection classes, generic classes to design programs and perform database connectivity.
3. Implement programs based on streams and multithreading.

Experiments based on

- Data types, variable, operators, arrays and control structures
- Class, methods and objects
- Exception Handling
- Multithreading
- I/O operations
- Applet structure and event handling

Syllabus for Semester II, B. Tech. Electronics and Communication Engineering

Course Code: ECP2004 **Course: Computer Workshop-1 Lab**

L: 0 Hrs, T: 0 Hr, P: 2Hr, Per Week **Total Credits: 1**

Course Objective

The objective of this course is to familiarize the students with Computer components, its functioning and configuration with peripherals hardware and develop the skill towards troubleshooting.

Course Outcomes

After successful completion of this course, the student will be able to,

1. Understand components functioning of a computer and procedure to assemble-disassemble it.
2. Install operating system and configure the computer as per the external devices.
3. Install necessary tools and packages to use them maintaining cyber hygiene.
4. Troubleshoot the fault in hardware and software and suggest the preventive measures.
5. Demonstrate an application on computer.

Course Content:

Unit-1: Computer Hardware

Identification of hardware components of computer, configuration of each peripheral, disassemble and assemble the PC back to working condition, installation of operating system like Linux or Windows on the personal computer, Hardware troubleshooting and Software troubleshooting.

Unit-2: Internet & World Wide Web

Local Area Network configuration and TCP/IP setting to access the Internet, Web Browsers, plugins, proxy settings. Using search engines, installation of antivirus and block active x downloads to avoid viruses and/or worms. Basics of HTML.

Laboratory Exercise:

1. Personal Computer (PC) identification of components, functionality, its assembly - disassembly and configuration.
2. Installation of Operating system and configuring it for dual boot.
3. Hardware troubleshooting of peripherals and devices like printer, scanner, mouse, keyboard, monitor and other devices.
4. Software installation and troubleshooting of licensed and open source softwares and packages like Matlab, Orcad, Simulink, Multisim, Python, Scilab, etc.
5. Local Area Network(LAN) configuration and TCP/IP setting using user interface and Command Line Interface (CLI) like ping, if config, ipneigh, nslookup, etc.
6. Antivirus setup and configuration for online protection, scheduled scan, definition updates, etc.

7. Web Browser configuration and customization for search engine, addons and plugins, proxy settings.
8. Example of HTML web page including text fields (plain and urls), images, animation, etc.

Text Books:

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
2. Comdex Information Technology course tool kit by Vikas Gupta, WILEY Dreamtech

Syllabus for Semester II, B. Tech. (Electronics and Communication Engineering)

Course Code: HUT2001 **Course: Foundational Literature of Indian Civilization**

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 02**

Course outcome

At the end of the course the students will be able to achieve the following:

CO1: Understand the Indian knowledge system and its scientific approach

CO2: Get introduced to the Vedic corpus and recognize the multi-faceted nature of the knowledge contained in the Vedic corpus

CO3: Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools

CO4: Develop a basic understanding of the ancient wisdom recorded in various Indian literary work

Course Content:

Unit 1: Overview of Indian Knowledge System: Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.

Unit 2: The Vedic corpus: Introduction of Vedas, four Vedas, divisions of four Vedas, six Vedangas, Distinct features of Vedic life.

Unit 3: Indian Philosophical systems: Development and unique features, Vedic schools of philosophy, Samkhya and Yoga School of philosophy, Nayay and Vaisesika school of philosophy, Purva-mimamsa and Vedanta schools of Philosophy, Non-vedic philosophies: Jainism, Buddhism, and other approaches

Unit 4: Indian wisdom through ages: Panchtantras, Purans: contents and issues of interests, Itihasa: uniqueness of the two epics (Ramayan and Mahabharata), Key issues and messages from Ramayana, Mahabharata – a source of worldly wisdom; Indian ancient Sanskrit literature: Kalidas, Vishakadutta, Bhavbhuti, Shudraka*

*any one text as decided by the course teacher

Reference material

1. B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N., "Introduction to Indian Knowledge System: Concepts and Applications" PHI, 2022

2. S.C. Chatterjee and D.M. Datta, An introduction to Indian Philosophy, University of Calcutta, 1984

Syllabus for Semester II, B. Tech. (Electronics and Communication Engineering)
Course Code: PET2001/PEP2001 Course: Sports-Yoga-Recreation
L: 1 Hrs, T: 0 Hr, P: 2 Hrs. Per week Total Credits: 02

Aim of the Course

The course aims at creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness to promote Health and wellness through Healthy Lifestyle.

Course Objective

1. To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.
2. To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.
3. To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.
4. To create Environment for better interaction and recreation among students as neutralizer for stress through various minor and recreational games.

Course Outcomes

On completion of the course, students will be able to:

1. Understand fundamental skills, basic principle and practices of sports and Yoga.
2. Practically learn the principles of implementing general and specific conditioning of physical exercises and yoga.
3. Develop Health-related fitness and Body-mind co-ordination through various fitness activities, sports, recreational games and yoga.
4. Practice healthy & active living with reducing Sedentary Life style.

Course Content

Unit 1: - Theory: Introduction

• Meaning, Definition and Importance of Health & Wellness
• Dimensions of Health and Wellness
• Factors influencing Health and Wellness
• Physical Fitness, Nutrition, Habits, Age, Gender, Lifestyle, Body Types
• Health & Wellness through Physical Activities, Sports, Games, Yoga and

Recreation activities
• Causes of Stress & Stress relief through Exercise and Yoga
• Safety in Sports

Unit 2: - Practical- Exercises for Health and Wellness

• Warm-Up and Cool Down - General & Specific Exercises

• Physical Fitness Activities
• Stretching Exercises
• General & Specific Exercises for Strength, Speed, Agility, Flexibility, coordinative abilities
• Cardiovascular Exercises
• Assessment of BMI
• Relaxation techniques
• Physical Efficiency Tests

Unit 3: - Yoga
• ShukshmaVyayam
• Suryanamaskar
• Basic Set of Yogasanas – Sitting, standing, supine and prone position
• Basic Set of Pranayama & Meditation

References:
1. Russell, R.P. (1994). Health and Fitness Through Physical Education. USA: Human Kinetics.
2. Uppal, A.K. (1992). Physical Fitness. New Delhi: Friends Publication.
3. AAPHERD "Health related Physical Fitness Test Manual."1980 Published by Association drive Reston Virginia
4. Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: RashtrothannaPrakashana.
5. Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS 'Science)

III SEMESTER

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT3001 **Course: Electronic Circuits**

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Understand the concept of feedback amplifiers.
2. Comprehend Transistorized Multi vibrators and wave shaping circuits.
3. Analyze frequency response of multistage amplifiers.
4. Estimate the performance parameters of Power amplifiers.
5. Design voltage regulators.

Unit I:
Power amplifiers: Class A, B, AB, C amplifiers, Operation and Analysis, Merits and Demerits, Push-pull amplifier configurations.

Unit II:
Multistage Amplifiers: Calculation of Gain, Methods of Coupling – RC Coupling, Transformer Coupling, Direct Coupling, Techniques of improving input impedance – Darlington transistors and Bootstrapping, Frequency response of RC Coupled transistor amplifier.

Unit III:
Feedback amplifiers: Feedback Topologies, effect of feedback on bandwidth, gain, stability,Transistorized Oscillators: Barkhausen Criterion, RC Phase Shift Oscillator, Wein Bridge Oscillator, LC Oscillator, Crystal oscillator, frequency stability analysis.

Unit IV:
Transistorized Multivibrators and Waveshaping Circuits: - Astable, Monostable and BistableMultivibrators, clipper and Clamper Circuits.

Unit V:
Regulated Power Supply: - Design of Transistor shunt regulator, emitter follower type voltage regulator, series voltage regulator with Darlington pair. Design factors to consider – output peak to peak ripple, over voltage and over load protection.

Text Books:

1. Integrated Electronics: *Millman, Halkias,Parikh TMH, 2nd Edition*
2. Microelectronic Circuits: *Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar, Oxford University Press*

Reference Books:

1. Electronic Devices and Circuit Theory: *R. Boylestad, Pearson Education, 9th Edition*
2. Foundation of Electronics Circuits and Devices: *Meade, Thompson, 4th Edition*
3. Electronic Devices and Circuits: *David A. Bell, PHI. 4th Edition*
4. Pulse and Digital Waveshaping Circuits: *Millman and Taub, TMH*
5. Microelectronics Circuit Analysis and Design: *Donald Nemen, Tata-McGraw Hill*
6. Electronic Devices and Circuits: *Salivahanan, 2nd Edition, Tata McGraw Hill.*

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP3001 **Course: Electronic Circuits Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Select the feedback topologies for amplifier configuration.
2. Analyze electronic circuits using simulation software.
3. Determine the frequency response of multistage amplifier.
4. Design waveshaping circuits.
5. Design Voltage Regulators.

Experiments based on following topics:

- Circuit simulation
- Series Voltage Regulator
- Single Stage and Two stage RC coupled amplifier using BJT
- Oscillator
- Feedback Amplifier
- Multivibrators, Clippers and Clampers

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT3002 **Course: Analog Circuits Design**

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Understand the concepts of OP-AMP and its performance parameters.
2. Understand linear and non linear applications of OP-AMP.
3. Apply feedback topologies in OPAMP based Circuits.
4. Analyze op-amp application circuits.
5. Design active filters & Timer IC 555 based circuits.

Unit I:

Differential amplifier, DC and AC analysis, Biasing configurations of Differential amplifier, Constant current Bias circuits, Level shifting techniques, cascaded differential amplifier stages, Characteristics of an operational amplifiers, Open loop and closed loop Op-amp Configuration, Op-amp Parameters & their analysis.

Unit II:

Simple Op-amp Circuits: inverting, non-inverting amplifiers, summers, integrators and differentiators, log, antilog circuits, Differential amplifier configurations, instrumentation amplifiers, Current to voltage and voltage to current converter

Unit III:

Precision rectifiers, sinusoidal oscillators:RC phase shift, Wein bridge, Quadrature oscillator, with frequency and amplitude stabilization, elementary idea of active filter, First /second order Low pass and High pass Butterworth filters, Band pass and Band reject filters.

Unit IV:

Op-amp's non-Linear application: Clipper, clamper, comparator, zero crossing detector , Schmitt trigger circuits, Triangular wave generator, Monostable, Astablemultivibrator circuits using op-amps, sample and hold circuits, D/A converter: Binary weighted resistor type and R-2R ladder, A/D converter: The parallel comparator (Flash) type, Successive approximation converter.

Unit V:

Integrated Circuits: Timer IC LM-555, Internal block schematic, astable, monostable configurations and its application, PLL IC 565: Operating principle lock range and capture range, PLL application: frequency multiplier and FSK demodulator, Integrated Circuit Voltage Regulators.

Text Books:

1. Linear Integrated Circuits: D. *Roy Choudhary, Shail Jain, New Age International*.
2. Operational Amplifiers Design & Applications: *Tobey Graeme, Huelsman, McGraw hill*
3. OP-AMPS and Linear Integrated Circuits: *RamakantGaikwad, PHI*

Reference Books:

1. Design with Operational Amplifiers and Analog Integrated Circuits: *Sergio Franco, TMH, 3rd Edition*
2. Operational Amplifiers: *G. B. Clayton, International Edition*
3. Operational Amplifiers and Linear Integrated Circuits: *Coughlin Driscoll, PHI, 4th Edition.*
4. Analog Filter Design: *M. E. Van Valkenburg ,PHI*.
5. Op-Amps and linear ICs*: Fiore J. M, Thomson Delmar learning.*

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP3002 **Course: Analog Circuits Design Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Analyze analog circuits using simulation software.
2. Perform mathematical operations using OPAMP.
3. Implement Linear and nonlinear applicationsof OPAMP.
4. Estimate parameters affecting the performance of the amplifier.
5. Design Multivibrators using IC 555.

Experiments based on following topics:

- Circuit simulation.
- Linear Applications of OPAMP
- Non Linear Applications of OPAMP
- IC – 555
- Voltage Regulators using IC723

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT3003 Course: Digital System Design with HDL

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 03

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Understand fundamentals of Hardware Description Language.
2. Realize Boolean expressions of digital logic circuits.
3. Design digital circuits using Finite State Machines.
4. Design combinational and sequential circuits using Hardware Description Language.
5. Design digital functions using Programmable Logic Devices and FPGAs.

Unit I –

Introduction to Logic Gates and implementation in Combinational and Sequential Logic Design, Introduction to Verilog, Fundamentals of Verilog including language basics and relation to circuit implementation, Concept of SOP,POS and Karnaugh maps.

Unit II –

Modules and Ports in Verilog, modeling techniques in Verilog, Task and Functions, Synthesis and Simulation, Timing and delays, Verilog constructs and codes for combinational and sequential circuits.

Unit III –

Combinational Circuits (using Verilog): Comparators, Multiplexers and De-multiplexer, Encoder, Decoder, Halfand Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit IV –

Sequential Circuits (using Verilog): Latches/buffers and Flip-Flops as memory storage elements, Counters, Shift registers and its variants, Memory and its internal organization, FSM design.

Unit V -

Concepts and Generic architecture of PAL, PLA, PLD and FPGA's, Synthesis and Implementation of Boolean functions using programmable logic devices.

TextBooks:

1. R.P.Jain,"ModerndigitalElectronics",TataMcGrawHill,4thedition,2009.
2. Stephen Brown and ZvonkoVranesic, "FundamentalsofDigital Logic with Verilog Design" TataMcGrawHill, 3rd ed, 2009.

ReferenceBooks:

1. Douglas Perry, “VHDL”, Tata McGraw Hill, 4thedition, 2002
2. W.H. Gothmann, “Digital Electronics- An introduction to theory and practice” , PHI, 2nd edition ,2006
3. M. Morris Mano and Michael Ciletti,“Digital Design: With an Introduction to Verilog HDL”, 5e, 2011
4. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989
5. Samir Palnitkar“Verilog HDL-A guide to Digital Design and Synthesis”SunSoft Press 1996
6. Charles Roth, “Digital System Design using VHDL” , Tata McGraw Hill 2nd edition
   2012

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP3003 **Course: Digital System Design with HDL Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Examine functionality of digital integrated circuits.
2. Apply simulation tools to test the functionality of logical circuits.
3. Write and debug Hardware Description Language programs.
4. Perform simulation & synthesis of combinational and sequential circuits using Verilog.
5. Implementdigital circuits on FPGA.

Experiments based on following topics:

1. Combinational and sequential circuits.
2. Different techniques of modeling.
3. Verilog statements and test benches.
4. Design of arithmetic blocks in Verilog and implement the same.

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT3004 **Course: Signals and Systems**

L: 2 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Understand the classification of signals & systems.
2. Characterize the LTI system in terms of impulse response.
3. Analyze continuous time systems using Laplace Transform
4. Analyze discrete time systems using Z-Transform
5. Investigate stability of the system.

Unit I

Signals and systems as seen in everyday life, in various branches of engineering and science, Types of Signals, Types of Systems, System properties: linearity –additivity and homogeneity, Time-invariance, causality, stability, Operations on Signals – Time Shifting, Time Scaling and Time Inversion, Elementary Signals.

Unit II

Linear Time – Invariant (LTI) systems, Representation of discrete time signals using shifted and weighted impulses, impulse response analysis – The Convolution, input- output behavior with aperiodic & periodic convergent inputs, Characterization of causality and stability of linear time-invariant systems based on impulse response analysis.

Unit III

Analysis of Continuous Time Systems: Laplace domain analysis, region of convergence, poles and zeros of system, Properties of Laplace Transform, Properties of Region of Convergence, Inverse Laplace Transform, Transfer Function, Impulse and Step Response, Stability and Causality of the Continuous Time LTI system based on region of convergence in S-plane.

Unit IV

Analysis of Discrete Time Systems: z-domain analysis, The z-Transform for discrete time signals and systems, region of convergence, Properties of z-transform, Properties of Region of Convergence, Inverse z-transform, Transfer Function, Impulse and Step Response, Stability and Causality of the Discrete Time LTI systems based on region of convergence in z-plane.

Unit V

Representation of Continuous Time systems using Differential Equations, solution to Linear constant coefficient differential equations using Laplace Transform, Representation of Discrete Time systems using Difference Equations**,** solution to Linear constant coefficient Difference equations using z-transform.

Text Books:.

1) V**.** Krishnaveni, A. Rajeswari, “Signals and Systems”, Wiley India Pvt. Ltd., New Delhi, 2013.
2) B. P. Lathi, “Linear Systems and Signals”, OXFORD University Press.
3) Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, c1998.
4) A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983**.**

Reference Books:

1) M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", TMH, 2003.
2) J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.
3) M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB",TMH, 2003.
4) J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.
5) Ashok Ambardar,"Analog and Digital Signal Processing", 2nd Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), 1999.
6) R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
7) Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT2980 – 1 Course: Electronic Sensors for Industrial applications (Open Elective – 1)

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 02

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Understand Errors in instrumentation systems.
2. Learn Classification of Transducers based on their functionality.
3. Explore different types of sensors
4. Comprehend Smart Sensor architecture.
5. Select the suitable sensors and transducers for desired application.

Unit I

General Configuration and Functional Description of measuring instruments: Block schematic of general instrumentation system (Analog and Digital), Static and Dynamic Characteristics of Instrumentation system, errors in instrumentation system, Standards and calibration, Active and Passive Transducers and their classification.

Unit II

Motion Transducers: Resistive strain gauge, LVDT, Capacitive transducers, Piezo-electric transducers, vibrometers and accelerometers.

Temperature Transducers: Thermistor, RTD, Thermocouple and their characteristics.

Piezoelectric Transducers: Piezoelectric phenomenon, Piezoelectric materials, Force, Strain, Torque, Pressure and Acceleration transducers.

Unit III

MagnetostrictiveTransducers: Magnetostriction phenomenon, Force, Torsion transducers, Hall Effect Transducers.

Electromechanical Transducers: Tachometers, Variable reluctance, Electrodynamic pressure, Electromagnetic flow meters.

Unit IV

Photoelectric Transducers and Sensors: Photoelectric phenomenon, Photoconductive, Photovoltaic, Photoemmisive.

Sensors: Proximity Devices, Bio-Sensors, Smart-Sensors, Piezo-electric Sensors.

Text Books:.

1. Transducers and Instrumentation: *Murty D.V. PHI, 10th print 2003*
2. Mechanical and Industrial Measurements: *Jain R.K., Khanna Publ. 10th Edition-4th reprint 2000*
3. Electrical and Electronic Measurements and Instrumentation: *Sawhney A. K., DhanpatRai and Sons.*

Reference Books:

1. Sensors and Transducers: *Patranabis D., PHI, 2nd edition*
2. Instrumentation Devices and Systems:*Rangan C. S., Sharma G. R., Mani V. S. V., Tata McGraw Hill Publication Limited.*
3. Instrumentation Measurement and Analysis:*Nakra B. C., Chaudhary K. K., Tata McGraw Hill Publication Limited.*

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT2980 – 2 Course: Fundamentals of Computer Networking
(Open Elective – 1)

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 02

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Understand computer networking and reference models.
2. Comprehend the protocols implemented at various layers of reference model.
3. Identify components of computer networks, switching, addressing and routing techniques.
4. Analyze error control techniques.
5. Examine security in computer networks

Unit I

Introduction to computer networks and the Internet, Network types: LAN, MAN, WAN, Reference models- OSI and TCP/IP.

Unit II

Hubs, Switches, Bridges, Routers, Transmission media, Switching, Error detection and control, IPv4 addressing, Routing protocols

Unit III

World Wide Web (WWW), Hyper Text Transfer Protocol (HTTP), File Transfer (FTP), Domain Name System (DNS), Electronic Mail (E-mail),

Unit IV

Security: Cryptography, Digital Signature

Text Books:

1) 1. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4 th Edition

2) 2. J.F. Kurose and K. W. Ross, “ Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition

Reference Books:

1) 1. Andrew Tanenbaum, “Computer networks”, Prentice Hall 2. William Stallings, “Data and computer communications” , Prentice Hall

2) 2. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: MAT3004 **Course: Applied Mathematics – III**

L: 2 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Understand the concept of Laplace Transform along with its properties and apply Laplace Transform to solve ordinary and partial differential equations.
2. Apply Z-transform to solve difference equation, and understand the fundamental concepts of discrete-time signals and systems.
3. Find the Fourier transform of algebraic and trigonometric function along with the analysis of these transferred functions.
4. Understand the theory of analytic function, complex integration, including line integrals, contour integration, and the Cauchy Integral Theorem.
5. Solve various types of linear and nonlinear partial differential equations, including the wave equation, transmission line equations.

Course Pre-requisite: Basic knowledge of differential equations and calculus.

Unit I

Laplace transforms and its existence, properties of Laplace transform, inverse Laplace transform and application of Laplace Transform to solve differential equations.

Unit II

Definition and properties of Z- Transform,inverse of $Z-$ transform, region of convergence, and relation with Laplace transform, application of Z-transform to solve difference equations.

Unit III

Fourier Transform – Fourier Integral Theorem, Fourier Sine and Cosine Integrals, Fourier transform and its properties,Finite Fourier Sine and Cosine Transforms.

Unit IV

Lagrange's partial differential equation of first order, Homogeneous PDE of nth order with constant coefficient, method of separation of variables, Applications of partial differential equations to solve the problems of transmission line.

Unit V

Function of complex variables, Differentiation of function of complex variables, Cauchy-Riemann equations, analytic functions, harmonic functions, findingharmonicconjugate,Cauchy Integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof).

Text Books:

1) B. S. Grewal, Higher Engineering Mathematics, Khanna publishers 43rd edition (2015).

2) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Reference Books:

1) N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

2) J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

Syllabus for Semester III, B. Tech. (Electronics and Communication Engineering)

Course Code: CHT3001 **Course: Environmental Science**

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 02**

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Develop an understanding of pollution and its types.
2. Learn about different kinds of sources of pollution.
3. Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development
4. Understand different methods of assessing environmental quality and associated risks.

Unit 1: Environmental Pollution I

Air pollution: Sources of air pollution; Primary and secondary pollutants; carbonmonoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and sulphurdioxide; Other important air pollutants. Indoor air pollution; Adverse health impactsof air pollutants; National Ambient Air QualityWater pollution: Sources of water pollution; marine pollution and groundwaterpollution; Water quality parameters and standards; adverse health impacts of waterpollution on human and aquatic life, treatment scheme for waste water from different industry.

Unit 2: Environmental Pollution II

Soil pollution and solid waste: Soil pollutants, hazardous wastes and their sources;Impact on human health.Introduction, types of e-wastes, environmental impact, e-waste recycling, e-wastemanagementrules.Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sourcesof noise pollution; Noise standards; adverse impacts of noise on human health, recentadvances in noise pollution control and benefits.Thermal and Radioactive pollution: Sources and impact on human health andecosystems.

Unit 3: Environmental Sustainability

Introduction to sustainable development: Sustainable Development Goals (SDGs)-targets and indicators, challenges and strategies for SDGsGreen Technology: goals and significance, sustainabilityGreen chemistry, challenges to green technology, advantage and disadvantages ofgreen processes, Eco mark certification- its importance and implementation

Unit 4: Environmental laws and regulation

Introduction to environmental laws and regulation: Constitutional provisions- Article48A, Article 51A (g) and other derived environmental rights; Introduction toenvironmental legislations on the forest, wildlife and pollution control.Environmental management system: ISO 14001Environmental audit and impact assessment; Environmental risk assessment Pollutioncontrol and management.

Reference Books:

1. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
2. B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut
3. P AarneVesilind, J. Jeffrey Peirce and Ruth F. Weiner, EnvironmentalPollution and Control, Butterworth-Heinemann
4. P.T. Anastas& J.C. Warner, Green Chemistry: Theory & practice, Oxford University Press.
5. Environmental Pollution and its control Techniques by Dr. S.S. Dara.

IV SEMESTER

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT4001 **Course: Electromagnetic Fields**

L: 2 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes

At the end of this course students will demonstrate the ability to:

1. Understand static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials
2. Visualize different coordinate systems to understand the spatial variations of the physical quantities dealt in electromagnetic field theory.
3. Apply the principles of electromagnetic statics to the solutions of problems relating to electromagnetic field, potential, and work.
4. Apply Maxwell‘s equations for solutions of problems pertaining to uniform plane wave propagation
5. Analyze propagation of Electromagnetic Waves

Unit – I

Vector Algebra & Co-ordinate Geometry: Cartesian, Cylindrical and Spherical co-ordinate systems, differential lengths, differential surfaces, differential volumes, Gradient, divergence & curl of a vector & their physical interpretation.

Unit – II

Time Invariant Electric Fields, Energy and Potentials: Coulomb's law, Electric Field Intensity, Electric Flux Density, Gauss law, Applications of Gauss’s law, Divergence Theorem, Work Done, Potential Difference, Potential Gradient, Poisson’s & Laplace equations.

Unit – III

Time Invariant Magnetic Fields: Biot-Savart’s law, Ampere’s circuital law and applications, Magnetic field due to current carrying conductor of infinite length, Magnetic flux and Flux density, Gauss law**,** Lenz’s law, Stokes’ Theorem.

Unit – IV

Time-Varying Fields and Maxwell's Equations: Displacement current and Displacement current Density, The equation of Continuity for Time varying Fields, Faraday's law, Maxwell's equations for steady fields, Maxwell's equations for time varying fields, Transformation of time varying quantity into phasor and vice versa, Maxwell's equations in phasor form.

Unit – V

Uniform Plane Waves: Electromagnetic wave equation, Propagation constant, attenuation constant, phase constant, Poynting vectors theorem, Solution of wave equation in free space, conducting and dielectric media, Skin effect, Depth of Penetration.

Text Books:

1. "Engineering Electromagnetics": *William Hyat, John Buck ; Tata McGraw Hill.*
2. Electromagnetic Waves & Radiating Systems: *Advard C. Jordan, Keith G. Balman, Second Edition, Prentice-Hall of India Pvt. Ltd.*

Reference Books:

1. Problems and Solutions in Electromagnetics: *W. H. Hyat, J. A. Buck, Tata McGraw Hill Education Private Limited, New Delhi.*
2. Theory and Problems of Electromagnetics: *Joseph A. Edminister, Schaum's outline series in Engineering, McGraw Hill Book Company.*
3. Electromagnetic Fields: *K. B. MadhuSahu, 2nd Edition, Scitech Publications Pvt ltd.*

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT4002 Course: Analog and Digital Communication

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 03

Course outcomes :

At the end of this course students will demonstrate the ability to

1. Understand fundamentals of analog and digital communication system
2. Analyze the performance of the receiver under optimum conditions.
3. Analyze the effect of noise on analog communication systems.
4. Estimate parameters of digital communication systems.
5. Detect output signals of digital modulation techniques.

Unit I:

Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems – DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Unit II

Sources of Noise, Classification of Noise, Effect of Noise in amplitude modulation systems, Pre-emphasis and De- emphasis,

Unit III

Pulse modulation, Sampling process, Pulse Amplitude and Pulse code modulation (PCM),Noise considerations in PCM, Differential pulse code modulation, Delta modulation, Adaptive delta modulation

Unit IV

Digital Modulation schemes- BinaryAmplitude Shift Keying, Binary Frequency Shift Keying, M-ary Frequency Shift Keying, Minimum Shift Keying, Binary Phase Shift Keying, Differential Phase Shift Keying, Quadrature Phase Shift Keying, Quadrature Amplitude Modulation.

Unit V

Convolution Coding, Maximum likelihood sequence detection (Viterbi Detection), Sequential detection, Recent trends in modern communication systems

Text Books:

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. B. P. Lathi, “Modern Digital and Analog Communication Systems”, Third Edition, Oxford University press.

Reference books:

1. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
2. Taub H. and Schilling D.L., "Principles of Communication Systems”, Tata McGraw Hill, 2001.
3. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering", John Wiley, 1965.
4. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.
5. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.
6. George Kenndey, 4th Edition , “ Electronics Communication systems ”

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP4002 Course: Analog and Digital Communication Lab

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week Total Credits: 01

Course outcomes

At the end of this course students will demonstrate the ability to

1. Understand functional blocks of transmitter and receiver in communication systems.
2. Estimate functioning of analog and digital communication system using simulation platforms
3. Determine desired parameters of analog and digital modulation techniques experimentally.
4. Analyze performance of analog and digital modulation scheme
5. Evaluate the performance of analog and digital communication techniques

Experiments based on the following topics

- Amplitude Modulation
- Frequency Modulation
- SNR calculation
- Pulse Code Modulation
- Delta Modualtion
- Adaptipe Delta Modualation
- TDM
- Communication Receiver
- Communication Software Study
- Digital Modulation Scheme

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT4003 Course: Microcontrollers and Peripherals

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 03

Course outcomes

At the end of this course students will demonstrate the ability to

1. Understand Architecture, functional diagram of microcontrollers compared to microprocessor
2. Infer the programming needs of microcontrollers in terms of assembly language and embedded C.
3. Apply the knowledge of architecture and programming to interface various peripherals with microcontrollers
4. Analyze and simulate algorithms of microcontrollers in regards to the circuit requirement.
5. Design solution for the complex systems using microcontroller.

Unit I

Introduction to microcontroller Intel 8051 architecture, functional pin diagram and its description, Organization of internal RAM, ROM and register banks, organization SFR and flags, Ports functionality.

Unit II

Addressing modes, Instruction set of 8051, Organization of hardware interrupt structure, Vector interrupt table, External memory interfacing, and basic assembly/Embedded C language programming concepts with examples for various software routines.

Unit III

Counters and timers, serial data communication, input/output devices interfacing and application development with microcontroller using keyboards, LEDs, LCD displays, pulse measurements, D/A and A/D conversions, stepper motor.

Unit IV

ARM Processor architecture: Register Set, Modes of operation and overview of Instructions and software routine development, Interrupts and Device Drivers: Exceptions and Interrupt handling Schemes –Context & Periods for Context Switching, Deadline & interrupt latency.

Unit V

Basic Concepts of RTOS, Hard and Soft Real Time Systems, Tasks –periodic and aperiodic tasks, Timing parameters –release time, execution time, deadline, period, Basic real time Task Scheduling Algorithms, Resource Contention, Deadlocks, Priority Inversion, Basics of Re-entrancy and Thread Safety in Embedded Software Development.

Text Books:

1. Muhammad Ali Mazidi& Janice GilliMazidi, R. D. Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.
2. Embedded Microcomputer Systems, Real Time Interfacing –Jonathan W. Valvano –Brookes / Cole, 1999, Thomas Learning.
3. ARM System Developer's Guide Designing and Optimizing System Software - Andrew N. Sloss, Dominic Symes, Chris Wright, Morgan Kaufmann Publishers.

Reference Books:

1. Real Time Systems – Design for distributed Embedded Applications: HermaK.Kluwer Academic.
2. Operating Systems – A Design Oriented approach: Charles Crowley, McGraw Hill.
3. The 8051 Microcontroller – Architecture, Programming and Applications – Kenneth J. Ayala, West Publishing Company.
4. ARM Architecture Reference Manual, David Seal, Adison Wesley Publication.

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP4003 Course: Microcontrollers and Peripherals Lab

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week Total Credits: 01

Course outcomes

At the end of this course students will demonstrate the ability to

1. Understand programming for microcontrollers 8051 and ARM7TDMI LPD2148
2. Demonstrate hardware interfacing with microcontroller and its programming requirements.
3. Formulate algorithms of microcontroller in regards to the circuit requirement.
4. Simulate and analyze the developed algorithm on a simulator
5. Design solution for the complex systems using microcontroller.

Experiments based on following topics:

- Programs based on timers
- programs based on serial communication
- programs based on memory accessing
- Programs based on interrupts.
- Programs based on interfacing of peripheral devices like ADC, DAC, LCD, Keyboard, LEDs, Stepper motor.

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT4004 Course: Data Structures and Algorithms

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 02

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Understand the concepts of arrays and their operations to design applications.
2. Understand the concepts of queues and its types to solve the real world problems.
3. Understand tree data structure to formulate the problem, devise an algorithm and transform into code.
4. Solve real world problems using various linked list algorithms and techniques.
5. Apply stacks mechanism and algorithms to design various applications.

Unit I

Introduction to Data Structures: Definition, Arraysimplementation in memory, Types of arrays. Applications of Arrays: Polynomial Representation Using Arrays, Addition and multiplication of Two Polynomial.
Sorting & Searching: General Background, Different Sorting & Searching Techniques and their complexities.

Unit II

Linked List: Concept of Linked Lists, Types, Operations on Linked lists, concept of Doubly Linked List, HeaderLinked List. Other Operation & Applications: Reversing a Linked List, Concatenation of Two Lists.

Unit III

Stacks: Definition and example, primitive operations on Stacks, Arithmetic expressions (Infix, Postfix andPrefix), Evaluating postfix expression, converting an expression from infix to postfix. Applications of stacks: Tower of Hanoi Problem, Recursion.

Unit IV

Queues: Definition and examples of queues, primitive operations, Types of Queues.

Trees: Definition and Basic Terminology of trees, Binary Tree, Binary Search Tree, Tree Traversal.

Text Books:

1) Data Structures and Program Design: Robert Kruse, PHI.
2) Classical Data Structure: Samanta, PHI.
3) Fundamentals of Data Structures: Elis Horowitz, SartajSahani, Galgotia Publications.
4) Data Structures And Algorithms: Alfred V.Aho , John E.Hopcroftand Jeffrey D Ullman, Pearson.

Reference Books:

1) Schaum's Outlines Data structure: Seymour Lipschutz, Tata McGraw Hill 2nd Edition.
2) Data Structures and Algorithms, G A V Pai, Tata McGraw Hill.

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP4004 **Course: Data Structures and Algorithms Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes-

At the end of this course students will demonstrate the ability to:

1. Implement various data structures and operations on them.
2. Implement various mathematical expression evaluation and memory & CPU management using stacks and queues.
3. Implement different types of trees and different algorithms.

Following practicals can be executed/ implemented using C or Java language:

1. Study and implementation of one dimensional array and their operations.
i) Traversing ii) Insertion iii) Deletion
2. Study and implementation of two dimensional array and their operations.
i) Traversing ii) Multiplication iii) Transpose
3. Study and implementation of various Searching techniques using arrays:
i) Linear Search Method ii) Binary Search method
4. Study and implementation of various Sorting techniques using arrays:
i) Bubble Sort ii) Selection Sort iii) Insertion Sort iv) Merge Sort
v) Quick Sort
5. Study and implementation of polynomials and their operations.
i) Addition ii) Multiplication
6. Study and implementation of various operations on Single Link List:
i) Add a node at the front ii) Insert a node at a given position
iii) Add a node at the end iv) Delete a front Node v) Delete a node from given position
7. Applications of single linked list:
i) Reversing a linked list ii) Concatenation of two lists
8. Study and implementation of PUSH and POP operations on Stack using array.
9. Study and implementation of Circular Queue using array:
i) Insert an elements in queue ii) Delete an element from queue
10. Study and implementation of Binary tree traversals: INORDER, PREORDER and POSTORDER.

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT2990 – 1 **Course: Electronics in Agriculture**
(Open Elective – 2)

L: 2 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes

At the end of this course students will demonstrate the ability to

1. Understand the importance of electrical energy for the benefits of agricultural development.
2. Identify the role and responsibility of an engineer in the agricultural sector.
3. Understand the diversity of precision farming.
4. Infer the modern remote sensing technology for agricultural development.
5. Differentiate advanced agricultural technologies for Indian agronomy.

Unit I:

Role of engineering in agricultural sector, Professional responsibilities and professional ethics, engineering divisions in agricultural sector, Environmental issues, various government policies for research and development under agricultural engineering for productivity enhancement.

Unit II:

Use of electrical energy in agriculture, electromechanical energy conversion, Electrical motors, Selection of motors for different farming applications, renewable energy sources, Instrument for measurement: pH, Electrical conductivity, gas analysis, humidity, leaf area, chlorophyll content and soil moisture & temperature.

Unit III:

Remote Sensing and Application**:** data acquisitionsystems, Test sites, Common measurements, Geologic investigations, Agriculture and Forestry investigations, Atmospheric investigation, visual image interpretation, digital image processing, Earth resource satellite .

Unit IV:

Precision Farming:An introduction to precision farming. GIS/GPS positioning system for precision farming, Yield monitoring and mapping, soil sampling and analysis, Computers and Geographic information systems, Precision farming-Issues and conditions, Role of electronics in farm machinery for precision farming.

Unit V:

Advanced Agricultural Technologies:Difference between traditional and modern agricultural practices; Internet of Things (IoT), Online Marketing of agrobased products, Information and Communication Technology (ICT), Mobile Technology, Agricultural Drones & Robotics, Artificial Intelligence (AI) based farming.

Text Books and Reference Books:

1. Bhatia, S.L. "Handbook of Electrical Engineering". Khanna Publications.
2. Bsown, R.H., "Farm Electrification". McGraw Hills, 1956.
3. ConsidineT..M. "Process/Industrial Instruments and Controls· Handbook", McGraw Hill 1993.
4. Kuhar, John. E. 1977. The precision farming guide for agriculturalist. Lori J. Dhabalt, USA
5. Barret, E.C. and Curits, L.F. "Introduction to Environmental Remote Sensing". John Wiley and Sons Inc. New York, 1976.
6. Megh R. Goyal, “Emerging Technologies in Agricultural Engineering” Apple Academic Press.

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECT2990 – 2 **Course: Evolution in Communication Technologies (Open Elective – 2)**

L: 2 Hrs, T: 1 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Recall the need and aspects of Telecommunication Engineering in modern world.
2. Understand use of different modulation techniques used in Analog and Digital Communication.
3. Acquire basic knowledge of advanced Telecommunication systems and their applications.
4. Compare and contrast advantages and limitations of various Telecommunication systems.
5. Explore the applications of Mobile Communication.

Unit I

Basics of Telecommunication Engineering:

Definition of Telecommunication, Examples of telecommunications and evolution, various types of telecommunication systems such as telephone network, Radio broadcasting system, Computer networks, Internet etc., General Block schematic of communication system, Communication channels, Analog versus digital communication systems, Need of modulation, Types of analog modulation such as AM and FM, Types of digital modulation such as Pulse code modulation, delta modulation, Continuous wave modulation such as ASK, FSK, PSK.

Unit II

Introduction to Optical Fiber Communication

Use of optical fiber in communication, Principle and working of OFC system, Block diagram, Types of optical fibers, various elements required in designing OFC system, Applications such as long distance transmission links, Computer communication networks etc.

Unit III

Introduction to Satellite Communication

Use of satellite in telecommunications, Launching of Satellite from earth station, Types of satellite orbits, Classification of satellite according to applications, Satellite communication link block diagram.

Unit IV

Concepts in Wireless communications

Wireless Standards: Overview of 2G and 3G, 4G cellular standards, Multiple access schemes-FDMA, TDMA, CDMA and OFDM, Modulation schemes – BPSK, QPSK.
GSM, Wi-Fi & Wi-Max, Bluetooth,

Unit V

Basics of Mobile Communication

Cellular concepts- Cell structure, frequency reuse, cell splitting, channel assignment, handoff, interference, capacity, power control; Signal propagation-Propagation mechanism-reflection, refraction, diffraction and scattering, large scale signal propagation, Antennas for mobile terminal- monopole antennas, base station antennas and arrays.

Text Books:

1) Communication Electronics: *Simon Haykin, 4th Edition, John Wiley Publication.*
2) George Kenndey*, 4th Edition , " Electronics Communication systems "*
3) *Digital Communication: John G. Proakis, Tata McGraw Hill*
4) *Satellite Communication : T . Prat, C.W. Bostian, Wielly Publication*

Reference Books:

1) Wireless communication – Principles and Practice: *Theodore S. Rappaport, Pearson Education.*
2) Optical Fiber Communication – Principles and Practice: *John M. Senior, Pearson Education.*

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP4005 **Course: Electronic Measurement Lab**

L: 0 Hrs, T: 0 Hr, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes

At the end of this course students will demonstrate the ability to

1. Understand the fundamentals of electronic measurements.
2. Perform resistance measurement using DC Bridges.
3. Perform capacitance and inductance measurement using AC Bridges.
4. Validate the characteristics of transducers.
5. Use simulation platforms for parameter measurement of electronic circuits

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Experiments based on:

- DC bridge for Resistance Measurement
- AC bridge Circuit for capacitance measurement
- AC bridge Circuit for Inductance measurement
- Signal Conditioning circuit for Temperature Measurement
- Error compensation study using Numerical analysis using MATLAB (regression)
- LABVIEW/ Virtual Lab

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: ECP4006 Course: Co curricula Activities/ Community/Field Project

L: 0 Hrs, T: 0 Hr, P: 4 Hrs. Per week Total Credits: 02

Students will be evaluated on the basis of their participation in voluntary services, performance in games and sports, performance in literary activities, performance in cultural activities and their participation at Regional/State/National and International level in technical and co-curricular events.

Desirable: Development of Technical/ Community/ Field Project pertaining to the domain of Electronics and Communication Engineering.

Syllabus for Semester IV, B. Tech. (Electronics and Communication Engineering)

Course Code: HUT4001 Course: Business Communication

L: 2 Hrs, T: 0 Hr, P: 0 Hrs. Per week Total Credits: 02

Course Objective

The course aims to develop the skills of students to proficiently craft compelling business documents and employ strategic verbal communication techniques. By honing these skills, students will gain the ability to convey ideas persuasively and interact confidently in diverse business contexts.

Course Outcomes

On successful completion of the course the students will be able to achieve the following:

1. Understand the fundamentals of business communication.
2. Apply tools and techniques to create effective workplace correspondence.
3. Analyse and apply visual design principles to create business documents.
4. Understand and evaluate information to draft reports.
5. Apply and evaluate strategies for effective communication for employment.

UNIT 1: Fundamentals of Business Communication

Definition of communication, Emergence of communication as a key concept in the Corporate and Global world, Types- Internet, Blogs, E-mails, social media, Channels- Formal and Informal: Vertical, Horizontal, Diagonal, Grapevine, Persuasive Communication-Negotiation Skills, PAC concept

UNIT 2: Business Correspondence

Planning, Writing, and Completing Business Messages

Personnel Correspondence: Job Application Letter, Letter of Acceptance of Job Offer, Letter of Resignation, Letter of Appointment, Promotion and Termination, Letter of Recommendation

Trade Correspondence: Inquiry, Order, Credit and Status Enquiry, Complaints, Claims, Adjustments, Consumer Grievance Letters

UNIT 3: Visual and Content Creation

Visual design principles, Ethics of visual communication, selecting visuals for presenting data, Content Creation: Website, Help file, User Guides, Promotional leaflets and fliers

UNIT 4: Reports

Basic formats and types of reports - Feasibility, Progress, Project, Case Study Evaluation, Agenda, Notices, Minutes of Meeting, Organizational announcements, Statement of Purpose

UNIT 5: Communication for Employment

Pre-interview technique- NOISE Analysis, Job Description and Resume, Creating LinkedIn Profile, Effective use of job portals, Business etiquette.

Text Books

1. Sharon Gerson, Steven Gerson, "Technical Communication: Process and Product", 2018, Pearson
2. Courtland L Bovee, John V Thill and RoshanLal Raina "Business Communication Today", 14th edition Pearson
3. P.D. Chaturvedi and MukeshChaturvedi, Fundamentals of Business Communication, Pearson Publications, 2012.

Reference Books

1. Shalini Verma, Business Communication, Vikas Publishing House Pvt. Ltd., 2015.
2. Sanjay Kumar, PushpaLata, Communication Skills, 2nd Edition, Oxford Publication, 2018
3. William Strunk Jr. and E.B. White, The Elements of Style, Allyn & Bacon, A Pearson Education Company, 2000

HONORS COURSES

Syllabus for Semester III, B. Tech.
(Electronics and Communication Engineering – HONORS)

Course Code: ECTH3100 **Course: Communication System Analysis (HONORS Course)**

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Outcomes:

After completion of this course, the students will be able to:

1. Understand the advanced concepts in communication systems.
2. Understand advanced modulation techniques.
3. Know advanced concepts like synchronization, channel estimation
4. Analyze the behavior of ATM traffic in presence of congestion

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Unit I

Spread Spectrum Communications: Spreading sequences- Properties of Spreading Sequences, Pseudo- noise sequence, Gold sequences, Kasami sequences, Walsh Sequences, Orthogonal Variable Spreading Factor Sequences, Barker Sequence, Complementary Codes Direct sequence spread spectrum – DS-CDMA Model, Conventional receiver, Rake Receiver, Synchronization in CDMA, Power Control, Soft handoff

Unit II

Orthogonal Frequency Division Multiplexing: Basic Principles of Orthogonality, Single vs Multicarrier Systems, OFDM Signal Mathematical Representation, Selection parameter for Modulation, Pulse shaping in OFDM Signal and Spectral Efficiency, Window in OFDM Signal and Spectrum, Synchronization in OFDM, Pilot Insert in OFDM Transmission and Channel Estimation

Unit III

MIMO Systems: Introduction, Space Diversity and System Based on Space Diversity, Smart Antenna system and MIMO, MIMO Based System Architecture, MIMO Exploits Multipath, Space – Time Processing, Antenna Consideration for MIMO, MIMO Channel Modelling, MIMO Channel Measurement, MIMO Channel Capacity, Cyclic Delay Diversity (CDD), Space Time Coding, Advantages and Applications of MIMO in Present Context, MIMO Applications in 3G Wireless System and Beyond, MIMO-OFDM

Unit IV

SONET/SDH: Architecture, SONET Layers, SONET Frames, STS Multiplexing, SONET Networks, Virtual Tributaries.

ATM: Overview, Virtual channels, Virtual paths, VP and VC switching, ATM cells, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols.

Unit V

ATM Traffic and congestion Control: Requirements for ATM Traffic and Congestion Control, Cell Delay Variation, ATM Service Categories, Traffic and Congestion Control Framework, Traffic Control, Congestion Control

Text Books:

1. Gary J. Mullett, "Introduction to Wireless Telecommunications Systems and Networks", CENGAGE
2. Upena Dalal, "Wireless Communication", Oxford University Press, 2009
3. William Stallings, "ISDN and Broadband ISDN with Frame Relay and ATM" Prentice Hall, 4th edition

Reference books:

1) Ke-Lin Du & M N S Swamy, "Wireless Communication System", Cambridge University Press, 2010
2) Behrouz A Forouzan, "Data Communications and Networking", 4th Edition, McGraw Hill.

Syllabus for Semester IV, B. Tech.
(Electronics and Communication Engineering – HONORS)

Course Code: ECTH4100 **Course: Multimedia Networks (HONORS Course)**

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes

After completion of this course, the students will be able to understand:

1. Functioning of circuit switched and packet switched networks
2. Reasons for emergence of converged communication networks
3. Various media coding algorithms and their applications
4. Emerging trends in multimedia networks.

Unit I
Review of circuit switched digital telephony, signaling and transmission, ISDN, SS7. Evolution of packet switched networks, Internet and LANs. The TCP/IP protocol stack.

Unit II
Introduction to XoIP, network convergence, Needs of individual users, enterprises and network operators. How XoIP is expected to meet all these concerns.

Unit III
Source coding (speech, audio and video coding) PCM, ADPCM, LP coding, CELP, RPE-LTP, adaptive sub-band coding, MPEG standards for audio and video coding.

Unit IV
Signaling protocols: Review of H.323, MEGACO protocols, Session Initiation Protocol (SIP), detailed study of SIP, implementation of SIP through Java.
Media Transport: Need of special media transport protocols, RTP, RTCP, RTSP, QoS issues, routing, security etc.

Unit V
Modern network technologies: Mobile communication 3G, 4G, IMS, wireless LANs, wired networks. New services like IP-TV, multimedia conference calls, presence management, device and access independent services. VXML based applications

Text Books:

1) O. Hersent, D. Gurle and JP Petit- "IP Telephony", Pearson Education Asia.
2) J. D. Gibson (Editor) "Multimedia Communications" – Harcourt India.

Reference Books:

1) Bill Douskalis "IP Telephony", Prentice Hall.
2) R. Wittman, M.Zitterbart-Morgan Kaufman, "Multicast Communication".

MINOR COURSES

Syllabus for Semester III,

B. Tech. (Electronics and Communication Engineering – MINOR)

Course Code: ECTM3100 Course: Fundamentals of Communication Engineering (MINOR Course)

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Outcomes:

After completion of this course, the students will be able to:

1. Analyze various analog modulation schemes such as AM, FM etc.
2. Understand basics of Noise includes effect of noise on communication
3. Analyze various digital modulation schemes
4. Analyze recent communication technologies such as CDMA, GSM etc.

Unit I
Basic Communication System, Classification of electronic communication system, Need of modulation, Principles of Amplitude Modulation Systems- DSB, SSB, Angle Modulation, Representation of FM and PM signals.

Unit II
Introduction to Noise, Types of Noise, Noise Calculation, Noise factor, Noise Temperature, Pre-Emphasis and De-Emphasis

Unit III
Pulse modulation, Pulse code modulation (PCM), Differential pulse code modulation, Delta modulation and Adaptive Delta Modulation

Unit IV
Digital Modulation schemes- Amplitude shift Keying, Phase Shift Keying, and Frequency Shift Keying.

Unit V
Spread – Spectrum Communication: - Study of PN sequences, direct sequence methods, Frequency hop methods, slow and fast frequency hop.
Code Division Multiple Access (CDMA), GSM, LTE, Recent Trends/Developments

Text Books:

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. B. P. Lathi, “Modern Digital and Analog Communication Systems”, Third Edition, Oxford University press.

Reference Books:

1. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
2. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
3. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.
4. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.
5. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.
6. George Kenndey, 4th Edition , " Electronics Communication systems "

Syllabus for Semester IV,

B. Tech. (Electronics and Communication Engineering – MINOR)

Course Code: ECTM4100 **Course: Sensors for Smart City (MINOR Course)**

L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course Outcomes:

After completion of this course, the students will be able to:

1. Employ the knowledge of mathematics, science, and engineering to understand fundamentals of sensor systems.
2. Understand the applications of sensors in smart cities.
3. Learn IEEE Standards for advance Sensors
4. Comprehend actuating devices for sensor systems.

UNIT I

Smart City: Concept, Definition, Criteria for smart cities, Smartness (Eg. Environment, Mobility, Economy, Utilities, Transportation, road Infrastructure, Health Care etc.)

Unit II

Sensor Characteristics: Transfer function, accuracy, calibration, hysteresis, nonlinearity, saturation, repeatability, dead band, resolution, output impedance, excitation, dynamic characteristics, environmental factors, reliability and application characteristics.

Unit III

Review of transducers for various parameters (like temperature, pressure, flow, level, humidity, acceleration, vibration etc.), Sensor Materials and overview of sensor technologies: Silicon as Sensing Material, Plastics, Metals, Ceramics, Glasses, Optical Glasses, Nano-materials, Overview of Surface Processing technologies.

Unit IV

IEEE Standards for advance Sensors: Fundamentals, IEEE 1451 standard for smart sensors, Sensor Signals and Systems, Sensor specifications, Sensor Characteristics, Physical principles of sensing.

Unit V

Applications: Smart street lighting, Smart Parking, Environmental pollution monitoring, Vehicular tracking, Smart Traffic Control, Waste Management, Smart Grid, Smart Cars, Smart Homes, Smart Domestic Appliances, Smart Toys etc.

TEXT BOOKS:

1. D.V.S.Murty, "Transducers and Instrumentation", Second edition, PHI publication, Second edition, 2010.
2. Randy Frank, "Understanding Smart Sensors", Artech House Inc., 2nd Edition.
3. Jacob Fraden, "Handbook of Modern Sensors: Physics, Designs, and Applications", Springer; 4th editon.
4. Carlo Ratti and Matthew Claudel, ―The City of Tomorrow: Sensors, Networks, Hackers, andthe Future of Urban Life (The Future Series), Yale University Press.

REFERENCE BOOKS:

1. Mohammad Hammoudeh & Mounir Arioua, "Sensors and Actuators in Smart Cities" (Open Access book) MDPI, Basel, Switzerland.
2. Gerard Meijer, "Smart sensor systems", Wiley, 2008
3. W Gopel, J. Hesse, J. N. Zemel, "Sensors A Comprehensive Survey" Vol. 9, Wiley-VCH, 1995