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Shri Ramdeobaba College of
Engineering and Management, Nagpur

SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR – 440013

An Autonomous College affiliated to
Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI 2023 – 2024

**B. Tech. (ELECTRONICS AND
COMMUNICATION ENGINEERING)**



Published By

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Principal

Shri Ramdeobaba College of Engineering & Management

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ISO 9001 : 2015 CERTIFIED ORGANISATION



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 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 to 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

Graduates of Electronics & Telecommunication Engineering by the time of Graduation will demonstrate:

1. **Engineering Knowledge** : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis** : Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/Development of Solutions** : Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems** : Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage** : Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.



6. **The Engineer and Society** : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability** : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics** : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work** : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication** : Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance** : Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
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, 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.



**Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - I)**

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	BSC	PHT1003	Semiconductor Physics	2	1	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
6.	PCC	ECT1001	Digital Circuits and Fundamentals of Microprocessor	3	0	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
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



Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - II)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	BSC	CHT2002	Chemistry of Functional Materials	2	0	0	2	50	50	100	2 Hrs.
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 Hrs.
4.	ESC	ECT2001	Network Theory	3	0	0	3	50	50	100	3 Hrs.
5.	PCC	ECT2002	Electronic Devices	3	0	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
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



**Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - III)**

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ECT3001	Electronic Circuits	3	0	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
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 Hrs.
8.	OE	ECT2980	Open Elective - 1	2	0	0	2	50	50	100	2 Hrs.
9.	MDM	MAT3004	Applied Mathematics – III	2	1	0	3	50	50	100	3 Hrs.
10.	VEC	CHT3001	Environmental Science	2	0	0	2	50	50	100	2 Hrs.
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



Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - IV)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ECT4001	Electromagnetic Fields	2	1	0	3	50	50	100	3 Hrs.
2.	PCC	ECT4002	Analog and Digital Communication	3	0	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
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	3 Hrs.
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 Hrs.
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)
<p style="text-align: center;">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</p>



**Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - V)**

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ECT5001	Probability Theory and Stochastic Processes	3	0	0	3	50	50	100	3 Hrs.
2.	PCC	ECT5002	Digital Signal Processing	3	0	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
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 Hrs.
9.	PEC	ECT5006	Program Elective 1	3	0	0	3	50	50	100	3 Hrs.
10.	OE	ECT3980	Open Elective 3	2	1	0	3	50	50	100	3 Hrs.
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



Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - VI)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ECT6001	Embedded Systems	3	0	0	3	50	50	100	3 Hrs.
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 Hrs.
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 Hrs.
6.	MDM	ECT6004	Data Base Management Systems	2	0	0	2	50	50	100	2 Hrs.
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 Hrs.
9.	PRJ	ECP6006	Major Project Phase I	0	0	4	2	50	50	100	2 Hrs.
10.	HSSM	HUT6001	Financial Management for Engineers	2	0	0	2	50	50	100	2 Hrs.
TOTAL				16	0	10	21				

Program Elective - 2	
Course Code	CourseName
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 IoT or similar course, approved by the BoS OR Technical Project OR One Month Internship at Industry



**Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - VII)**

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



**Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)
(Semester - VIII)**

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PEC	ECT8001	Program Elective 6	3	0	0	3	50	50	100	3 Hrs.
2.	PEC	ECT8002	Program Elective 7	3	0	0	3	50	50	100	3 Hrs.
3.	PRJ	ECP8003	Project	0	0	12	6	50	50	100	3 Hrs.
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



**Teaching Scheme for Bachelor of Technology
B. Tech. (Electronics & Communication Engineering)**

Honors with Multi-disciplinary Minor (Additional 18 Credits)

Sr. No.	Sem.	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	III	ECTH3100	Communication System Analysis	3	0	0	3	50	50	100	3 Hrs
2.	IV	ECTH4100	Multimedia Networks	3	0	0	3	50	50	100	3 Hrs
3.	V	ECTH5100	Cryptography and Information Security	4	0	0	4	50	50	100	3 Hrs
4.	VI	ECTH6100	Evolution of Air Interface towards 5G	4	0	0	4	50	50	100	3 Hrs
5.	VII	ECPH7100	Project	0	0	8	4	50	50	100	3 Hrs
TOTAL				14	0	8	18				

Honors with Research in Multi-disciplinary Minor (Additional 18 Credits)

Sr. No.	Sem.	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	III	ECTR 3100	Research Methodology	3	0	0	3	50	50	100	3 Hrs
2.	IV	ECTR 4100	Communication System Analysis	3	0	0	3	50	50	100	3 Hrs
3.	V	ECTR 5100	LTE Technologies	4	0	0	4	50	50	100	3 Hrs
4.	VI	ECTR 6100	5G Wireless Technologies	4	0	0	4	50	50	100	3 Hrs
5.	VII	ECPR 7100	Project	0	0	8	4	50	50	100	3 Hrs
TOTAL				14	0	8	18				

Minor with Minors Specialization (Additional 18 Credits)

Sr. No.	Sem.	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	III	ECTM3100	Fundamentals of Communication Engineering	3	0	0	3	50	50	100	3 Hrs
2.	IV	ECTM4100	Sensors for Smart City	3	0	0	3	50	50	100	3 Hrs
3.	V	ECTM5100	IoT for Industrial Application	4	0	0	4	50	50	100	3 Hrs
4.	VI	ECTM6100	Future Generation Networks	4	0	0	4	50	50	100	3 Hrs
5.	VII	ECPM7100	Project	0	0	8	4	50	50	100	3 Hrs
TOTAL				14	0	8	18				



Syllabus for B. Tech. Semester I

Department of Electronics and 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 Hall 2001
2. Physics of Semiconductor Devices, Simon M. Sze, Wiley-Interscience (1981)





Syllabus for B. Tech. Semester I
Department of Electronics and 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 Hall 2001





Syllabus for B. Tech. Semester I

Department of Electronics and Communication Engineering

Course Code : MAT1001

Course : Applied Mathematics I

L: 2 Hrs. T: 1 Hrs. P: 0 Hrs. Per week

Total Credits : 3

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's type, 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. Spiegel, Schaum series
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune - 411030 (India).
9. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.





Syllabus for B. Tech. Semester I
Department of Electronics and Communication Engineering

Course Code : MAP1001

Course : Applied Mathematics-I Lab

L: 0 Hrs. T: 0 Hrs. 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 B. Tech. Semester I

Department of Electronics and Communication Engineering

Course Code : EET1004

Course : Basic Electrical Engineering

L: 2 Hrs. T: 1 Hrs. P: 0 Hrs. Per week

Total Credits : 2

Course Objectives

The objective of the course is to make the students familiar 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 / References 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 B. Tech. Semester I

Department of Electronics and Communication Engineering

Course Code : ECT1001

Course : Digital Circuits and Fundamental of Microprocessors

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

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, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Morris Mano and Michael Ciletti, "Digital Design: With an Introduction to Verilog HDL", 5e, 2011





Syllabus for B. Tech. Semester I
Department of Electronics and Communication Engineering

Course Code : ECP1001 **Course : Digital Circuits and Fundamental of Microprocessors Lab**
L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week **Total Credits : 1**

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 B. Tech. Semester I

Department of Electronics and Communication Engineering

Course Code : ECT1002

Course : Programming for Problem Solving

L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. Per week

Total Credits : 2

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 B. Tech. Semester I

Department of Electronics and Communication Engineering

Course Code : ECP1002

Course : Programming for Problem Solving Lab

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 B. Tech. Semester I

Department of Electronics and Communication Engineering

Course Code : HUT1002

Course : English for Professional Communication

L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. 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 Heasley. Cambridge University Press. 2006.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press





Syllabus for B. Tech. Semester I
Department of Electronics and Communication Engineering

Course Code : HUP1002

Course : English for Professional Communication Lab

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. 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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : HUP0001-1

Course : Fundamentals of Indian

Classical Dance: Bharatnatayam

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 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 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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : HUP0001-2

Course : Fundamentals of Indian
Classical Dance: Kathak

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 andsteppings

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, practicesessions

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 B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : HUP0001-3

Course : Introduction to Digital Photography

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

Course Objective

The course aims to develop basic skills of students in digital photography to lay a foundation for the mas 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 B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : HUP0001-4

Course : Introduction to Japanese Language and Culture

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : HUP0001-5

Course : Art of Theatre

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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

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 Handbook for the Actor (1st ed.). Vinatge Books New York.





Syllabus for B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : HUP0001-6

Course : Introduction to French Language

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

Course Objective

To help build a foundation and interest in French 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 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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : HUP0001-7

Course : Introduction to Spanish Language

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : HUP0001-8

Course : Art of Painting

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 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 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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : HUP0001-9

Course : Art of Drawing

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 drawing.

Practical - 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 B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : HUP0001-10

Course : Nature Camp

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 its 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 B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : PEP0001-21

Course : Disaster Management through Adventure Sports

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

Course Objectives

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 and situations.

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 B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : PEP0001-22

**Course : : Self-defense Essentials and
Basic Knowledge of Defense Forces**

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

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 B. Tech. Semester I / II

Department of Electronics and Communication Engineering

Course Code : CHP0001-31

Course : : Art of Indian traditional cuisine

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 be able to achieve the following:

CO1: Understand the factors that affect regional eating habits and the unique ingredients found in various states 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 the irimportance
- 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, ISBN8-8204-054-X
- [6] Dubey Krishna Gopal; The Indian Cuisine;PHI Learning Pvt. Ltd.ISBN978-81 203- 4170-8





Syllabus for B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : CHP0001-32

Course : : Introduction to Remedies by Ayurveda

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 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 Bha ajya Kalpana Vijñana





Syllabus for B. Tech. Semester I / II
Department of Electronics and Communication Engineering

Course Code : HUT1004 **Course : : Foundational course in Universal Human Value**
L: 1 Hrs. T: 0 Hrs. P: 0 Hrs. 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

1. 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

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidyaek Parichay, Divya Path Sansthan, Amarkantak.
8. E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
9. A. N. Tripathy, 2003, Human Values, New Age International Publishers.





Syllabus for B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : CHT2002

Course : Chemistry of Functional Materials

L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. Per week

Total Credits : 2

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.



Unit- 4 : 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. Smart nanomaterials for sensor application, Li S, Ge Y, Li H, 2012, Bentham Science Publishers, ISBN: 9781608055425.
4. Fundamentals of analytical chemistry: An introduction, Douglas A. Skoog et al., 2004 Thomson Asia pte Ltd., 8th, ISBN: 978-0-495-55828-6.
5. Chemistry in microelectronics, Yannick Le Tiec, 2013, Wiley Publications, ISBN: 978184-8214361.
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 B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : CHP2002

Course : Chemistry of Functional Materials Lab

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

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.



Syllabus for B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : MAT2001

Course : Applied Mathematics-II

L: 2 Hrs. T: 1 Hrs. P: 0 Hrs. Per week

Total Credits : 3

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, Scalar potential 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.

Text Books / 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. Spiegel (McGraw Hill) Schaum Series.





Syllabus for B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : ECT2001

Course : Network Theory

L: 3 Hrs. T: 0 Hrs. P: 0 Hrs. Per week

Total Credits : 3

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 B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : ECT2002

Course : Electronic Devices

L: 3 Hrs. T: 0 Hrs. P: 0 Hrs. Per week

Total Credits : 3

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, MOSFET I-V characteristics, 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. Solid State Electronic Devices: Ben G Streetman, Sanjay Kumar Banerjee, Sixth Edition, PHI.





Syllabus for B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : ECP2002

Course : Electronic Devices Lab

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 1

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 B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : ECT2003

Course : Object Oriented Programming

L: 3 Hrs. T: 0 Hrs. P: 0 Hrs. 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, Treetset.



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 Press 2008.
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw Hill Education Private Ltd. 2013.





Syllabus for B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : ECP2003

Course : Object Oriented Programming Lab

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per 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 B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : ECP2004

Course : Computer Workshop-1 Lab

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. 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 B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : HUT2001

Course : Foundational Literature of Indian Civilization

L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. Per week

Total Credits : 2

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 B. Tech. Semester II

Department of Electronics and Communication Engineering

Course Code : PET2001/PEP2001

Course : Sports-Yoga-Recreation

L: 1 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Total Credits : 2

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

- Shukshma Vyayam
- 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: RasthrothannaPrakashana.
5. Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS 'Science)

