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RAMDEOBABA UNIVERSITY, NAGPUR

Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

RAMDEOBABA UNIVERSITY, NAGPUR–440013

Established by the Maharashtra Private Universities (Establishement and Regulation) Act 2023
(Mah. Act No VIII of 2024)
Formerly, Shri Ramdeobaba College of Engineering and Management, Nagpur 440013

School of Electrical and Electronics Engineering

Department of
(Electronics and Communication Engineering)

PROGRAMME SCHEME & SYLLABI

of First Year as per National Education Policy (NEP)

(With effect from Academic Year 2024-25)

B. Tech.

ELECTRONICS AND COMMUNICATION ENGINEERING

Department Vision:

Pursue excellence in Electronics and Communication Engineering through quality education, research and innovation contributing to the emerging technologies to serve industry and society

Department Mission:

- M1: Provide stimulating environment for learning and imparting quality technical education for solving real life problems.
- M2: Foster research and innovation ecosystem in the field of Electronics and Communication Engineering.
- M3: Inculcate technical capabilities, professional ethics and values to address 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 in broader social context.
2. Engage in career enhancement through lifelong learning, research, higher studies and entrepreneurship to adapt to the changing professional and social needs.
3. Solve real life engineering problems by applying the knowledge of Electronics and Communication Engineering.

Program Outcomes:

Engineering Graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of Mathematics, Science, Engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, Formulate, Review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design / development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.
4. **Conduct investigation of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select and apply appropriate techniques resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentations, make effective presentations, and give and receive clear instructions.
11. **Project management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team to manage projects and in multidisciplinary environment.
12. **Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes:

The Graduates of Electronics & Communication will be able to:

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

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

Semester I

Sr. No.	Course Type	Code	Course	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	BSC	24HS05TH0103	Semiconductor Physics	3	0	3	50	50	100	3
2	BSC	24HS05PR0103	Semiconductor Physics Lab	0	2	1	25	25	50	-
3	BSC	24HS03TH0101	Calculus, Probability and Statistics	3	0	3	50	50	100	3
4	BSC	24HS03PR0102	Computational Mathematics Lab	0	2	1	25	25	50	-
5	PCC	24EE05TH0101	Digital Circuits	3	0	3	50	50	100	3
6	PCC	24EE05PR0101	Digital Circuits Lab	0	2	1	25	25	50	-
7	ESC	24EE05TH0102	Fundamentals of Electrical and Electronics Engineering	3	0	3	50	50	100	3
8	ESC	24EE05TH0103	Fundamentals of Programming	2	0	2	50	50	100	2
9	ESC	24EE05PR0103	Fundamentals of Programming Lab	0	2	1	25	25	50	-
10	AEC	24HS02TH0101	English for Professional Communication	2	0	2	50	50	100	2
11	AEC	24HS02PR0101	English for Professional Communication Lab	0	2	1	25	25	50	-
12	VEC	24HS02TH0104	Foundational course in Universal Human Values	1	0	1	50	0	50	-
			TOTAL	**17**	**10**	**22**				

Semester II

Sr. No.	Course Type	Code	Course	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	BSC	24HS03TH0211	Linear Algebra and Multivariate Calculus	3	0	3	50	50	100	3
2	PCC	24EE05TH0201	Electronic Devices and Circuits	3	0	3	50	50	100	3
3	PCC	24EE05PR0201	Electronic Devices and Circuits Lab	0	2	1	25	25	50	-
4	ESC	24EE05TH0202	Network Theory	3	0	3	50	50	100	3
5	ESC	24EE05PR0203	Electronics and Computer Workshop	0	2	1	25	25	50	-
6	VSEC	24EE05TH0204	Object Oriented Programming and Data Structures	3	0	3	50	50	100	3
7	VSEC	24EE05PR0204	Object Oriented Programming and Data Structures Lab	0	2	1	25	25	50	-
8	VEC	24HS01TH0202	Environmental Science	1	0	1	50	-	50	-
9	VEC	24HS01PR0202	Environmental Science Lab	0	2	1	25	25	50	
10	IKS	24HS02TH0203	Foundational Literature of Indian Civilization	1	0	1	50	-	50	-
11	CCA	24HS04PR0201	Sports-Yoga-Recreation Lab	0	2	1	25	25	50	-
12	CCA	24HS02PR0206	Liberal/Performing Art Lab	0	2	1	25	25	50	-
			TOTAL	**14**	**12**	**20**				

Liberal/Performing Art Lab		
Sr. No.	**Course Code**	**Course Name**
1	24HS02PR0206-01	Fundamentals of Indian Classical Dance: Bharatnatayam
2	24HS02PR0206-02	Fundamentals of Indian Classical Dance: Kathak
3	24HS02PR0206-03	Introduction to Digital Photography
4	24HS02PR0206-04	Introduction to Basic Japanese Language
5	24HS02PR0206-05	Art of Theatre
6	24HS02PR0206-06	Introduction to French Language
7	24HS02PR0206-07	Introduction to Spanish Language
8	24HS02PR0206-08	Art of Painting
9	24HS02PR0206-09	Art of Drawing
10	24HS02PR0206-10	Nature camp
11	24HS02PR0206-11	Developing Self Awareness
12	24HS02PR0206-12	Art of Poetry
13	24HS02PR0206-13	Creative and Content Writing
14	24HS02PR0206-14	Science of Life through Bhagwad Gita
15	24HS02PR0206-15	Sanskrit Sambhashan – Spoken Sanskrit
16	24HS02PR0206-16	Kirtan Kala
17	24HS04PR0202-1	Adventure Sports
19	24HS04PR0202-2	Introduction to Defense Forces & Obstacle Training
16	24HS04PR0202-3	Self Defense and Indian Martial Arts (Girls)
20		Self Defense and Indian Martial Arts (Boys)
21	24HS04PR0202-4	Basic Nutritional Course
22	24HS04PR0202-5	Disaster Management
23	24HS01PR0203	Remedies by Ayurveda
24	24HS01PR0204	Biodegradation of Kitchen Waste
25	24HS05PR0205	Herbal Home Remedies : A course for self care
26	24EE07PR0205	Day-to-Day Electrical Systems

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 / MOOC

OR

Technical Project

OR

One Month Internship at Industry

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

Semester III

Sr. No.	Course Type	Code	Course	Hours/ week		Credits	Maximum Marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	PCC	24EE05TH0301	Digital system Design with HDL	3	0	3	50	50	100	3
2	PCC	24EE05PR0301	Digital system Design with HDL Lab	0	2	1	25	25	50	-
3	PCC	24EE05TH0302	Analog Circuit Design	3	0	3	50	50	100	3
4	PCC	24EE05PR0302	Analog Circuit Design Lab	0	2	1	25	25	50	-
5	PCC	24EE05TH0303	Signals and Systems	3	0	3	50	50	100	3
6	PCC	24EE05TH0304	Microcontrollers & Peripherals	3	0	3	50	50	100	3
7	PCC	24EE05PR0304	Microcontrollers & Peripherals Lab	0	2	1	25	25	50	-
8	OE	24EEOEI05TH0305	Open Elective – 1/ MOOC	2	0	2	50	50	100	2
9	MDM	24EE05TH0306	MDM – 1	3	0	3	50	50	100	3
			TOTAL	**17**	**6**	**20**				

Semester IV

Sr. No.	Course Type	Course Code	Course Name	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	PCC	24EE05TH0401	Electromagnetic Fields	3	0	3	50	50	100	3
2	PCC	24EE05TH0402	Analog and Digital Communication	3	0	3	50	50	100	3
3	PCC	24EE05PR0402	Analog and Digital Communication Lab	0	2	1	25	25	50	-
4	PCC	24EE05TH0403	Computer Communication Networks	3	0	3	50	50	100	3
5	PCC	24EE05PR0403	Computer Communication Networks Lab	0	2	1	25	25	50	-
6	PCC	24EE05TH0404	Digital Signal Processing	3	0	3	50	50	100	3
7	PCC	24EE05PR0404	Digital Signal Processing Lab	0	2	1	25	25	50	-
8	ESC	24EE05PR0405	Fundamentals of Linux	0	2	1	25	25	50	-
9	SEC	24EE05PR0406	Skill Enhancement Course – I	0	2	1	25	25	50	-
10	OE	24EEOEI05TH0407	Open Elective – 2/ MOOC	2	0	2	50	50	100	2
11	MDM	24EE05TH0408	MDM – 2	3	0	3	50	50	100	3
			TOTAL	**17**	**10**	**22**				

Exit option 2(Additional 8 Credits)

Offline/Online (ESSC-India / NSQF skill) Course on –

Microprocessors/Microcontrollers based Product Design / PCB Design and Circuit Simulation or similar course/ MOOC

OR

Technical Project

OR

One Month Internship at Industry

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

Semester V

Sr. No.	Course Type	Course Code	Course Name	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	PCC	24EE05TH0501	Embedded Systems	3	0	3	50	50	100	3
2	PCC	24EE05PR0501	Embedded Systems Lab	0	2	1	25	25	50	-
3	PCC	24EE05TH0502	Internet of Things	3	0	3	50	50	100	3
4	PCC	24EE05PR0502	Internet of Things Lab	0	2	1	25	25	50	-
5	PCC	24EE05TH0503	Probability Theory and Random Processes	3	0	3	50	50	100	3
6	VSEC	24EE05PR0504	System Design Workshop	0	4	2	50	50	100	-
7	PEC	24EE05TH0505	Program Elective – 1	3	0	3	50	50	100	3
8	AEC	24HS02TH0501	Business Communication	1	0	1	50	-	50	-
9	AEC	24HS02PR0501	Business Communication Lab	0	2	1	25	25	50	-
10	OE	24EEOEI05TH0506	Open Elective – 3/ MOOC	2	0	2	50	50	100	2
11	MDM	24EE05TH0507	MDM – 3	3	0	3	50	50	100	3
			TOTAL	**18**	**10**	**23**				

Program Elective – 1	
Course Code	**Course Name**
24EE05TH0505 – 1	Control Systems
24EE05TH0505 – 2	Design and Analysis of Algorithms
24EE05TH0505 – 3	Information Theory and Coding

Semester VI

Sr. No.	Course Type	Course Code	Course Name	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	PCC	24EE05TH0601	Wireless Communication	3	0	3	50	50	100	3
2	PCC	24EE05TH0602	Machine Learning	3	0	3	50	50	100	3
3	PCC	24EE05PR0602	Machine Learning Lab	0	2	1	25	25	50	-
4	PCC	24EE05TH0603	Communication Protocols	3	0	3	50	50	100	3
5	PCC	24EE05PR0603	Communication Protocols Lab	0	2	1	25	25	50	-
6	PEC	24EE05TH0604	Program Elective – 2	3	0	3	50	50	100	3
7	PEC	24EE05TH0605	Program Elective – 3	3	0	3	50	50	100	3
8	PEC	24EE05PR0605	Program Elective – 3 Lab	0	2	1	25	25	50	-
9	SEC	24EE05PR0606	Skill Enhancement Course – II	0	2	1	25	25	50	-
10	PRJ	24EE05PR0607	Project Phase – I	0	4	2	50	50	100	-
11	MDM	24EE05TH0608	MDM – 4	3	0	3	50	50	100	3
			TOTAL	**18**	**12**	**24**				

Program Elective – 2	
Course Code	**Course Name**
24EE05TH0604 – 1	Smart Sensors
24EE05TH0604 – 2	Software Engineering
24EE05TH0604 – 3	Communication Technologies

Program Elective – 3	
Course Code	**Course Name**
24EE05TH0605 – 1	CMOS VLSI Design
24EE05TH0605 – 2	Database Management Systems
24EE05TH0605 – 3	Speech and Audio Processing

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/ MOOC **OR** Technical Project **OR** One Month Internship at Industry

Scheme of Teaching & Examination of Bachelor of Technology

Electronics and Communication Engineering

Semester VII

Sr. No.	Course Type	Code	Course	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	PCC	24EE05TH0701	5G and Next Generation Communication Systems	3	0	3	50	50	100	3
2	PCC	24EE05TH0702	Computer Architectures and Parallelism	3	0	3	50	50	100	3
3	PCC	24EE05TH0703	Digital Image Processing	3	0	3	50	50	100	3
	PCC	24EE05PR0703	Digital Image Processing Lab	0	2	1	25	25	50	-
4	PEC	24EE05TH0704	Program Elective 4	3	0	3	50	50	100	3
5	PEC	24EE05TH0705	Program Elective 5	3	0	3	50	50	100	3
6	CEP	24EE05PR0706	*Participative Learning	0	2	1	25	25	50	-
7	PRJ	24EE05PR0707	Project Phase – II	0	4	2	50	50	100	-
			TOTAL	**15**	**8**	**19**				

***Floating Credits:** To be acquired before VII Semester

Program Elective - 4	
Course Code	**Course Name**
24EE05TH0704 – 1	System Verilog
24EE05TH0704 – 2	Customer Relationship Management
24EE05TH0704 – 3	Smart Antennas

Program Elective - 5	
Course Code	**Course Name**
24EE05TH0705 – 1	RF Circuit Design
24EE05TH0705 – 2	Deep Learning
24EE05TH0705 – 3	Wireless Sensor Networks

NOTE: - Six Months Internship in VII Semesters: The scheme of VII semester will be applicable in the duration of VIII semester for the students opting internship in VII semester.

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

Semester VIII

Sr. No	Course Type	Course Code	Course Name	Hours/ week		Credits	Maximum marks			ESE Duration (Hrs)
				L	P		Continuous Evaluation	End Sem/ Internal Eval	Total	
1	PEC	24EE05TH0801	Program Elective 6	3	0	3	50	50	100	3
2	PEC	24EE05TH0802	Program Elective 7	3	0	3	50	50	100	3
3	PRJ	24EE05PR0803	Project Phase – III	0	12	6	50	50	100	-
			TOTAL	**6**	**12**	**12**				
4	**INT**	24EE05PR0804	Full Semester Internship	**0**	**24**	**12**	100	100	200	**-**

Program Elective - 6	
Course Code	**Course Name**
24EE05TH0801 – 1	VLSI Signal Processing
24EE05TH0801 – 2	Artificial Intelligence
24EE05TH0801 – 3	Computer Vision

Program Elective - 7	
Course Code	**Course Name**
24EE05TH0802 – 1	Real Time Operating Systems and Kernels
24EE05TH0802 – 2	Blockchain Technology
24EE05TH0802 – 3	Cryptography and Network Security

NOTE: - Six Months Internship in VII Semesters: The scheme of VII semester will be applicable in the duration of VIII semester for the students opting internship in VII semester.

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

Sem	Course Code	Name	L	P	Cr	Continuous Assessment	ESE	Total	ESE Duration
III	24EE05HT0301	Communication System Analysis	3	0	3	50	50	100	3
IV	24EE05HT0401	Multimedia Networks	3	0	3	50	50	100	3
V	24EE05HT0501	Cryptography and Information Security	4	0	4	50	50	100	3
VI	24EE05HT0601	Evolution of Air Interface towards 5G	4	0	4	50	50	100	3
VII	24EE05HP0701	Project	0	8	4	50	50	100	3
		TOTAL	**14**	**8**	**18**				

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

Sem	Course Code	Name	L	P	Cr	Continuous Evaluation	End Sem/ Internal Eval	Total	ESE Duration
VII	24EE05HT0701	Research Methodology	3	0	3	50	50	100	3
VII	24EE05HP0702	Research Project Phase – I	0	6	3	50	50	100	-
VIII	24EE05HP0801	Research Project Phase – II	0	24	12	50	50	100	-
		TOTAL	**3**	**30**	**18**				

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

Sem	Code	Name of the course	L	P	Cr	Continuous Assessment	ESE	Total	ESE Duration
III	24EE05MT0301	Fundamentals of Communication Engineering	3	0	3	50	50	100	3
IV	24EE05MT0401	Sensors for Intelligent Instrumentation	3	0	3	50	50	100	3
V	24EE05MT0501	IoT for Industrial Application	4	0	4	50	50	100	3
VI	24EE05MT0601	Future Generation Networks	4	0	4	50	50	100	3
VII	24EE05MP0701	Project	0	8	4	50	50	100	3
		TOTAL	**14**	**8**	**18**				

List of Program Elective Courses

Semester	Domain Name		
	VLSI	**Computer Science**	**Communication/ Signal Processing**
V	Control Systems	Design and Analysis of Algorithms	Information Theory and Coding
VI	Smart Sensors	Software Engineering	Communication Technologies
	CMOS VLSI Design	Database Management Systems	Speech and Audio Processing
VII	System Verilog	Customer Relationship Management	Smart Antennas
	RF Circuit Design	Computer Vision	Wireless Sensor Networks
VIII	VLSI Signal Processing	Artificial Intelligence	Deep Learning
	Real Time Operating Systems and Kernels	Blockchain Technology	Cryptography and Network Security

List of Open ElectiveCourses

Semester	Open Elective	Courses	Course Code
III	Open Elective – 1	DevOps for Cloud Infrastructure	24EEOEI05TH0305
IV	Open Elective – 2	CyberOps and Threat Detection	24EEOEC05TH0407
V	Open Elective – 3	Agentic AI	24EEOEC05TH0506

Multi Disciplinary Minor (MDM)

Track: Embedded systems and IoT

Semester	MDM	Course	Course Code
III	MDM – 1	Sensors for IoT	24EE05TH0306-1
IV	MDM – 2	Microcontrollers and IoT Applications	24EE05TH0408-1
V	MDM – 3	IoT System Architecture	24EE05TH0507-1
VI	MDM – 4	Use Cases of IoT	24EE05TH0608-1

Multi Disciplinary Minor (MDM)

Track: Communication Engineering

Semester	MDM	Course	Course Code
III	MDM – 1	Fundamentals of Communication	24EE05TH0306-2
IV	MDM – 2	Mobile Communication	24EE05TH0408-2
V	MDM – 3	LTE Technologies	24EE05TH0507-2
VI	MDM – 4	5G and 6G Systems	24EE05TH0608-2

I SEMESTER

SYLLABUS FOR SEMESTER I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS05TH0103 **Course: Semiconductor Physics**

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

Course Outcomes

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

1. Apply fundamental knowledge of quantum mechanics to examine electrons behavior in solids at the quantum level.
2. Classify materials on the basis of band theory and its importance for semiconductors.
3. Outline the difference between intrinsic and extrinsic semiconductors and explain their carrier transport phenomena in semiconductor.
4. Illustrate the working and design aspects for the various photonic devices like LEDs, solar-cells and LASER diodes.
5. Analyze the simple harmonic oscillator, damped oscillator and forced oscillator.

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,p-n junction diode, Zero-applied bias, forward bias, reverse bias.

Unit 5: Optoelectronic Devices

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

Unit 6: Oscillations

Quick review of simple harmonic motion, mechanical and electrical oscillators, vector and complex numbers, Phasor representation, damped oscillations: under, critical and over damping, forced oscillations, impedance, energy and power supplied by driving force, Q-factor, related numerical/problems.

Text Book(s):

1. Semiconductor Physics and Devices (Fourth Edition), Donald A. Neamen, McGraw-Hill 2012.
2. Optoelectronics and Photonics: Principles and Practices by S. O. Kasap, Prentice Hall2001
3. The Physics of Vibrations and Waves (Sixth Edition), H J Pain John-Wiley 2005.

References:

1. Physics of Semiconductor Devices, Simon M. Sze, Wiley-Interscience (1981)
2. Semiconductor Device Physics and Design, Umesh K Mishra and Jasprit Singh, Springer 2008.

SYLLABUS FOR SEMESTER I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS05PR0103 **Course: Semiconductor Physics Lab**

L: 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. Analyze 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 a basic PN Junction, Zener Diode and other optoelectronic devices.
5. Prepare laboratory reports on interpretation of experimental results

List of Experiments:

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

Reference:

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

SYLLABUS FOR Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS03TH0101 **Course Name: Calculus, Probability and Statistics**
L: 3 Hrs., P: 0 Hrs., Per week **Total Credits: 03**

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. Internalize multivariable calculus and apply it find Jacobians, maxima and minima of function.
5. Recognize and understand discrete, continuous probability distributions and apply Binomial distribution, Poisson distribution and Normal distribution to appropriate problems.

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

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

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

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

Module 3: Statistics: (7 hours)

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

Module 4: Differential Calculus (10 hours**)**

Taylor's and Maclaurin's series expansions, radius of curvature (Cartesian form), evolutes and involutes, Limit and continuity of functions of several variables and their partial derivatives, Euler's Theorem, chain rule, total derivative, Jacobians, Maxima, minima and

saddle points; Method of Lagrange multipliers.

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

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 BoundaryValue 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 HallIndia, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition,2000.
7. Theory and Problems of probability and statistics : 2nd ed :J. R. Spiegal ,Schaum series
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India).
9. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

SYLLABUS FOR B. Tech Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS03PR0102 Course: Computational Mathematics Lab

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

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	Applied optimization with SageMath	CO3
5	Analysis of solutions of differential equations in SageMath	CO3
6	Linear Algebra with Various applications	CO5
7	Curve Fitting to identify trends and patterns within dataset by using SageMath	CO6
8	Practical Applications of Integral Calculus with SageMath	CO4

Syllabus for Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05TH0101 **Course: Digital Circuits**
L: 3 Hrs, P: 0 Hrs. Per week **Total Credits: 03**

Course Outcomes

On completion of this course students will be able to:

1. Explain different logic families.
2. Perform number system conversions
3. Implement Boolean equations using logic gates.
4. Design different types of combinational circuits.
5. Design asynchronous and synchronous sequential circuits.

Module I

Basics of Digital Electronics: Motivation for digital systems, Number Systems and Digital Codes (conversion and arithmetic), representation of signed numbers, Boolean algebra, SOP, POS forms, Karnaugh-maps, Introduction to Logic family

Module II

Timing Issues in Digital Circuit: Fan-In, Fan-Out, Propagation Delay, Power dissipation, Noise Margin, Timing issues

Module III

Combinational Circuit Design: Multiplexers, De-multiplexers, Encoders, Decoders, Code Converters, Adders, Subtractor, BCD Adder/Subtractor, comparator.

Module IV

Sequential Circuit: Latches, Flip Flops – RS, D, JK, Master Slave JK, T flip flop, their excitation and truth table, Conversion of one Flip Flop to another, Timing and Clocking issues.

Module V

Sequential circuits Design: Design of asynchronous and synchronous counters, Shift Registers, Application of shift register

Module VI

Design of synchronous sequential circuit using Mealy model and Moore model: state transition diagram, State encoding techniques, State reduction techniques

Text books:

1. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989.
2. Modern Digital Electronics: R. P Jain, Tata McGraw Hill, 3rd Edition.

ReferenceBooks:

1. Digital Logic and Computer Design: Morris Mano, PHI, 3rd Edition.

Course Code: 24EE05PR0101 **Course: Digital Circuits Lab**
L: 0 Hrs, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes

On completion of this course students will be able to:

1. Verify Truth Table of Logic Gates.
2. Implement Boolean Identities.
3. Implement combinational circuits.
4. Implement sequential circuits.
5. Design code converters using logic gates.

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1. To verify the truth table of different logic gates.
2. Design basic logic gates using universal gate and verify its truth table.
3. To verify the following Boolean expressions using logic gates and Multisim software.
    a) A+A'B+AB
    b) AB(C+AC)
4. To implement the following arithmetic circuits using (a) logic gates IC's and (b) using Multisim software.
    a) Full adder
    b) Half subtractor
5. Implement the function F = Σm (1,3,5,7,8,9,11,13,15) using 16:1 and 8:1 multiplexer.
6. Verify the truth table of SR, JK, JKMS, T and D flip flop.
7. To study and analyse the following functions of Shift register using IC 7495
    a) SIPO
    b) PIPO
    c) PISO
    d) SISO
8. Design and verify 2-bit synchronous down counter using S-R flip-flop.
9. Design and verify the functionality of a sequence detector to detect the sequence 1101 usingMelay and Moore model and use J-K flop-flop to implement the design.

Syllabus for Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05TH0102 **Course: Fundamentals of Electrical and Electronics Engineering**

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

Course Outcomes

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

1. Apply the knowledge of basic laws to analyze simple DC circuits.
2. Construct and analyze the behavior of simple AC circuits.
3. Apply the knowledge of transformer operation to calculate and analyze different parameters, including voltage, current, efficiency and losses.
4. Calculate the performance parameters of induction motors and utilize them for various applications.
5. Identify, characterize diodes and analyze their behavior in simple electronic circuits.

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)

Single Phase Transformer: 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.

Module V: (6 Hours)

PN diode operation: forward bias and reverse bias , Volt-Ampere characteristics of p-n diode, Temperature dependence of VI characteristics, Current components in p-n diode,

Diode equation, Transition and Diffusion capacitances, Breakdown Mechanisms in Semiconductor diodes, Rectifiers: half wave and full wave, Wave shaping circuits

Module VI: (6 Hours)
Special Purpose diodes and their applications: Zener diode characteristics and application, Tunnel Diode, LED, LDR, Varactor, Photo diode, PIN diode, Schottky diode, LASER, Applications.

Text books

1. Basic Electrical and Electronics Engineering by S.K.Bhattacharya, Pearson Publications
2. Basic Electrical and Electronics Engineering by D.P. Kothari and I J Nagrath, TMH.
3. ATextbookofElectricalTechnology,Volume I and II, B.L.Thereja,S.ChandPublications,2005
4. BasicElectricalEngineering, D.C.Kulshreshtha, McGrawHill,2009.
5. BasicElectricalEngineering:S.B.Bodkhe,N.M.Deshkar,P.P.H.Pvt.Ltd.SecondEdition,2008

Reference Books

1. Basic Electrical Engineering by Fitzerald and Higginbotham, TMH.
2. Basic Electrical Engineering by I.J Nagrath, TMH.
3. Millman's Integrated Electronics: Jacob Millman, Christos Halkias, Chetan Parikh, McGraw Hill

Syllabus for Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05TH0103 **Course: Fundamentals of Programming**
L: 2 Hrs, P: 0 Hrs. Per week **Total Credits: 02**

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.

Module 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.

Module 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.

Module 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.

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

Text Books:

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

Reference Books:

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

Syllabus for Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05PR0103 **Course: Fundamentals of Programming Lab.**
L: 0 Hrs, P: 2 Hrs. Per week **Total Credits: 01**

Course outcomes

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

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

Experiments based on:

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

Syllabus for Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS02TH0101 **Course: English for Professional Communication**
L: 2 Hrs, P: 0Hr, Per Week **Total Credits: 2**

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.

Module-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

Module -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.

Module -3: Functional Grammar and Usage

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

3.2 Tenses

3.3 Subject-verb agreement, noun-pronoun agreement

3.4 Voice

Module-4: Writing Skills

4.1 Sentence Structures

4.2 Sentence Types

4.3 Paragraph Writing: Principles, Techniques, and Styles

Module-5: Writing Practices

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

5.2 Correspondence writing techniques and etiquettes – academic writing

5.3 Essay Writing

Reference Books

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

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

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

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

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

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

Syllabus for Semester I

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS02PR0101 **Course: English for Professional Communication Lab**
L: 0 Hrs, P: 2Hr, Per Week **Total Credits: 1**

Course Outcomes

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

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

CO2: Demonstrate the techniques of effective Presentation Skills

CO3: Evaluate and apply the effective strategies for Group Discussions

CO4: Analyze and apply the effective strategies for Personal Interviews

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

List of practicals:

Computer Assisted + Activity Based Language Learning

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

Practical 2: Pronunciation, Intonation, Stress, and Rhythm

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

Activity Based Language Learning

Practical 4: Presentation Skills: Orientation & Mock Session

Practical 5: Presentation Skills: Practice

Practical 6: Group Discussions: Orientation & Mock Session

Practical 7: Group Discussions: Practice

Practical 8: Personal Interviews: Orientation & Mock Session

Practical 9: Personal Interviews: Practice

Syllabus for Semester I,

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS02TH0104 **Course: Foundational course in Universal Human Value**

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

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:

Module 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.

Module 2:- Health

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

Module 3:- Relationships and Society

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

Reference Material

The primary resource material for teaching this course consists of

Text book:

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

Reference books:

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

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

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

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

e) Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to

Growth, Club of Rome's Report, Universe Books.

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

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

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

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

II SEMESTER

B. Tech Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS03TH0211 **Course Name: Linear Algebra and Multivariate Calculus**

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

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.

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) (7 hours)

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)

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.

Topics for self learning

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

Textbooks/References:

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

Syllabus for Semester II,

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05TH0201 **Course: Electronic Devices and Circuits**
L: 3 Hrs, P: 0 Hrs. Per week **Total Credits: 03**

Course Objectives

The objective of the course is to prepare the students:

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

Course Outcomes

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

1. Understand characteristics of electronic devices and their applications.
2. Comprehend the fundamentals of feedback amplifiers.
3. Apply biasing techniques in amplifiers.
4. Estimate performance parameters of amplifiers.
5. Analyze the need of multistage amplifiers.

Module I

Transistors and Biasing: AC/DC load line concept, Operating Point Analysis, need of biasing, biasing techniques, bias stabilization, compensation techniques, Application of BJT as Amplifier, Introduction to h-parameters, Introduction JFET and MOSFET

Module II

Feedback Amplifiers: Feedback Topologies, effect of feedback on bandwidth, gain, stability.

Module III

Multistage Amplifiers

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

Module IV

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

Module V

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

Text Books:

1. Integrated Electronics: Jacob Millman , Christos Halkias, Chetan Parikh, Second Edition,TMH.

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

Reference Books:

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

Syllabus for Semester II,

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05PR0201 Course: Electronic Devices and Circuits Lab

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

Course outcomes

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

1. Plot V-I characteristics of electronic components and verify parameters.
2. Estimate the frequency response of multistage amplifier.
3. Investigate Characteristics of power electronic devices.
4. Analyze the feedback topologies for amplifier configuration.
5. Analyze electronic circuits using EDA tool.

Experiments based on:

- Circuit Simulations using EDA tool
- Characteristics of transistors
- Biasing of Transistor
- Characteristics of Power Devices
- Single Stage and Two stage RC coupled amplifier using BJT
- Oscillator
- Feedback Amplifier

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05TH0202 **Course: Network Theory**

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

Course Outcomes

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

1. Understand the 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.

Module 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.

Module 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.

Module 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.

Module 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.

Module V: Two port network calculations for impedance, admittance, ABCD and hybrid parameters. Interconnections of 2-port networks. Introduction to passive low-pass, high-pass, band-pass filters using RLC.

Text Books:

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

Reference Books:

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

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05PR0203 Course: Electronics and Computer Workshop
L: 0 Hrs, P: 2Hr, Per Week Total Credits: 1

Course Objective

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

Course Outcomes

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

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

Module-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.

Module-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

Course Code: 24EE05TH0204 **Course: Object Oriented Programming and Data Structures**
L: 3Hrs, P: 0Hr, Per Week **Total Credits: 3**

Course Outcomes

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

1. Understand principles of object-oriented programming; create classes, instantiate objects and invoke methods.
2. Understand object oriented features like Abstraction, Encapsulation, Inheritance and Polymorphism.
3. Understand basic data structure and algorithms
4. Understand implementation and application of various data structures such as stacks, queues and Linked List.

Module I:

Procedural Language vs Object Oriented Language, Features of Java, basic data types and Operators in Java, Control Statements, Access Specifiers, arrays in Java, Naming Conventions, Creating and importing packages.

Module II:

Class, Member functions, Constructors, static members, instantiating a class, constructor andmethod overloading, Object as a variable, object as an argument, object arrays.

Module III:

Abstraction, Encapsulation, Inheritance andPolymorphism. Inheritance: methods of derivation, super and final keyword, run time polymorphism, abstract class, interface, implementation of interface.

Module IV:

Elementary data organization, Algorithm, Time and Space Complexity, Asymptotic notations:Big-Oh Notation, Abstract Data Types (ADT), Arrays: Definition, Single & Multidimensionalarrays and their complexity.

Module V:

Primitive Stack operations: Push & Pop, Prefix and Postfix Expressions evaluation using stack. Concept of Queue, Operations on Queue: Insert, Add, Delete, Full and Empty, CircularQueue, Doubly Ended Queue.

Module VI:

Singly Linked Lists: representation in memory, algorithms of several operations: traversing, searching, insertion, deletion, reversal, ordering, etc. time and space complexity of these operations. Doubly Linked Lists: operations and algorithmic analysis

Text Books:

1. Programming with Java, E. Balaguruswamy, Tata McGraw Hill publication.
2. Data Structures Schaum‟s Outlines: Seymour Lipschutz, Tata McGraw Hill publication

Reference Books:

1. Herbert Schildt; JAVA The Complete Reference; Ninth Edition, Tata McGraw- Hill Publishing Company Limited.
2. D. Samanta; Classic Data Structure; PHI Publications; 2004

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24EE05PR0204 **Course: Object Oriented Programming and Data Structures Lab.**

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

Course Outcomes

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

1. Apply principles of object-oriented programming; create classes, instantiate objects and invoke methods.
2. Implement object oriented features like Encapsulation, Inheritance and Polymorphism.
3. Implement data structures such as stacks, queues and Linked List and apply them to solve common computer science problems.

Experiments based on

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

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS01TH0202 **Course: Environmental Science**

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

Unit 1: Sustainability Engineering

Multidisciplinary nature of Environmental Science, air and water pollution; solid waste management; local and global environmental challenges; climate change; sustainable cities; sustainable sources of energy, Introduction to the idea of sustainability and its relevance; environment-related legislation; Green Chemistry

Unit 2: E-Waste and Green Computing

E-waste Management: Sources, Legislation, Prevention, Control, Recent developments.

Waste due to Nano-materials and Micro-Plastics.

Green Computing: Green Computing, Computing in Environment and Research, Green devices and Green data Servers.

Text Books:

1. Shikha Agrawal, Engineering Chemistry: Fundamentals and Applications, Cambridge University Press.
2. Dr. Rajshree Khare, A Textbook of Engineering Chemistry (AICTE), S.K. Kataria & amp; Sons.
3. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand Publications.
4. M Afshar Alam, Sapna Jain, Hena Parveen, Green Computing Approach Towards Sustainable Development, Wiley Interscience Publications.

Reference Books:

1. E-waste recycling and management: present scenarios and environmental issues, Khan, Anish, and Abdullah M. Asiri. 2019, Springer, Vol. 33. ISBN: 978-3-030-14186-8.
2. Hans-Eckhardt Schaefer, Nanoscience: The Science of the Small in Physics, Engineering, Chemistry, Biology and Medicine, Springer-Verlag Berlin Heidelberg.

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS01PR0202 **Course: Environmental Science Lab.**

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

The students will learn to:

1. Apply the fundamental principles of measurement and skills in preparation and handling of Environmentally hazardous materials and interpret the statistical data related to measurements.
2. Use of the computational tools for searching, interpretation of results, etc. and preparation of case study regarding Environmental Issues.

List of Experiments:

Any Eight Experiments from the following:

1) Demonstration of Handling of hazardous chemicals, MSDS (material safety data sheet), waste minimization strategies and chemical waste disposal.
2) Preparation of different Solutions: Molar solution, Normal solution and percent solution and Determination of concentration in their various forms.
3) Basic statistical analysis of results of neutralization of acid against the base and preparing acceptable graphs using software.
4) Estimation of Copper ions from acid digested PCB solution.
5) Estimation of free CO2 present in the given sample.
6) Estimation of Dissolved Oxygen present in the given water sample
7) Prediction of NMR spectra and analytical data of molecules using Computational Software and its analysis.
8) Spectroscopic determine of wavelength of maximum absorption of chemical/biological compound in solution and plotting of calibration curves.
9) Estimation of Fe (II) ions from e-waste rust spectrophotometrically / calorimetrically using 1, 10-Phenanthroline method.
10) Determination of Air quality index (AQI).
11) Determination of rate of the reaction at room temperature and analysis of experimental data using Computational Software
12) Use of various open online search tools for Environmental Case Studies.

Text Books

1. S. S. Dara, A Textbook on Experiments and Calculations in Engineering Chemistry, S. Chand Publications.
2. J. B. Yadav, Advanced Practical Physical Chemistry, Krishna's Prakashan Media (P) Limited.
3. A. J. Elias, Collection of Interesting General Chemistry Experiments, Universities Press Publications.
4. V. K. Ahluwalia, S. Dhingra and A. Gulati, College Practical Chemistry, Universities Press Publications.

Reference Books:

1. David Young, Computational Chemistry: A Practical Guide for Applying Techniques to Real World Problems, Wiley Interscience Publications

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS02TH0203 Course: Foundational Literature of Indian Civilization
L: 1 Hrs, P: 0 Hrs. Per week Total Credits: 01

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:

Module 1:

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

Module 2:

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

Module 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

Module 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, VinayakRajatBhar, NagendraPavana R. N., “Introduction to Indian Knowledge System: Concepts and Applications” PHI, 2022

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

Syllabus for Semester II

B. Tech. Electronics & Communication Engineering [School of Electrical and Electronics Engineering]

Course Code: 24HS04PR0201 **Course: Sports-Yoga-Recreation Lab**

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

Aim of the Course: The course aims to foster Health and wellness through Healthy and Active Lifestyle and creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness through practical experiences and hands on activities.

Objectives of the Course:

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:

Module – 1:

- Warm up and Cool Down and Stretching Exercises.
- General and Specific Exercises.
- Calculation of BMI & Resting Pulse Rate.
- General and Specific exercises for strength, Speed, Agility, Cardiovascular Endurance, Flexibility, Coordinative abilities.
- Practice of Fundamental Skills of Volleyball, Table Tennis and Chess, etc.
- Knowledge and practice of the Equipment used in a Gymnasium and its application.

Module – 2:

- Yoga: Standing, Sitting, Prone & Supine positions.
- Suryanamaskar.
- Pranayama, Meditation and Relaxation Techniques.
- Recreational Games.
- Practice of Fundamental Skills of Basketball, Football, Carrom, etc.
- Health related Physical Fitness Test.

Assessment Pattern:

Assessment Type	Weightage in Marks	Total Marks
Practical	Physical Efficiency Test – 30 Marks Sports/Games skill Activity/Project – 10 Marks Yoga Activities – 10 Marks	50
		Total – 50 Marks

References:

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

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-01	**Fundamentals of Indian Classical Dance: Bharatnatayam**	I/II	2	1	50

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 ofBharatnatayam).

Syllabus

Practical -1: Orientation in Bharatnatayam

Practical-2: TattuAdavu till 8, NaattaAdavu 4 Steps, PakkaAdavu 1 step, MettaAdavu 1 Step, KudittaMettaAdavu 4 Steps,

Practical -3: Practice sessions

Practical-4: TattaKudittaAdavu (Metta), TattaKudittaAdavu (Metta) 2 Steps, TirmanamAdavu 3 Steps, KattuAdav - 3 Steps, KattuAdav - 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'sNatyasastra*, AdyaRangacharya, 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*, EshwarJayalakshmi, 2011

Syllabus for Semester II

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-02	**Fundamentals of Indian Classical Dance: Kathak**	I/II	2	1	50

Course Outcomes

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

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

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

Syllabus

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

Practical -2: practice sessions of practical 1

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

Practical -4: practice sessions of practical 3

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

Practical -6: practice sessions of practical 5

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

Practical -8: Final performances.

Recommended reading

1. Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), MaramiMedhi&DebasishTalukdar, 2022, Anshika Publication (13 September 2022)

Syllabus for Semester II

[School of Electrical and Electronics Engineering]Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-03	**Introduction to Digital Photography**	I/II	2	1	50

Course outcome:

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

CO1: Develop an understanding of the technical aspects and aesthetics of Photography.

CO2: Apply the rules of digital photography for creating photographs.

CO3: Develop skills to enhance photographs through post processing.

CO4: Create a portfolio of their photographs in selected genre.

Syllabus

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

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

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

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

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

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

Reference material

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

Syllabus for Semester II

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-04	**Introduction to Basic Japanese Language**	I/II	2	1	50

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 AmeyaPatki, Daiichi Japanese Language Solutions (ISBN: 9788194562900)

Syllabus for Semester II

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-05	**Art of Theatre**	I/II	2	1	50

Course Outcomes:

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

CO1: Understand and synthesize the working of the prominent genres of theatre across the world.

CO2: Apply the skill of voice and speech in theatre and public speaking

CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.

CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus:

Syllabus

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

Reference books:

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

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-06	**Introduction to French Language**	I/II	2	1	50

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 CivilisationFrançaises by G. Mauger Vol. 1.1
3. Cosmopolite I by Natalie Hirschsprung, Tony Tricot

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-07	**Introduction to Spanish Language**	I/II	2	1	50

Course objective:

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

Course outcomes:

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

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

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

Syllabus

List of Practicals

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

Recommended reading

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

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-08	**Art of Painting**	I/II	2	1	50

Course outcome:

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

CO1: Become familiar with the basic methods, techniques & tools of painting.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of painting.

Syllabus

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

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

Reference material

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

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-09	**Art of Drawing**	I/II	2	1	50

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 Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-10	**Nature camp**	II	2	1	50

Course outcome:

After the completion of the course the students will be able to do the following:
CO1: Develop an affinity with nature by observing and understanding it marvels with guidance from experts
CO2: Develop an understanding of the challenges and solutions associated with nature and its conservation.

Course content

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

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

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-11	**Developing Self Awareness**	II	2	1	50

Course objectives:

The course aims to develop students in their personal as well as professional life by means of graphotherapy, NLP, and Neurobics

Course Outcomes:

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

CO1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth

CO2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey

CO3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.

CO4: Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

Syllabus:

Practical 1: The Power of Handwriting (Handwriting is Brainwriting)

Practical 2: Know yourself through handwriting

Practical 3: The Role of Signature in your life

Practical 4: Graphotherapy to enhance yourself in all ways

Practical 5: Neurolinguistic Programming , S.M.A.R.T Goal

Practical 6: Effective Communication Model, Rapport Building and Anchor

Practical 7: Brain Directives & Linguistic Presuppositions

Practical 8: Neurobics

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credi ts	Maximum Marks (Continuous Evaluation)
24HS02PR0206-12	**Art of Poetry**	II	2	1	50

Course objectives:

To familiarize the students with the art of poetry and develop a sense of appreciation for the art

Course Outcomes:

At the end of the course the student will be able to achieve the following:
CO1: Understand the origin and development of poetry
CO2: Appreciate the art of poetry in life
CO3: Develop aesthetic sense
CO4: Develop holistic perspective to their personality

Syllabus

Practical 1: Art of poetry – orientation
Practical 2: Forms of poetry – orientation
Practical 3: Forms of poetry – recitation
Practical 4: Application of poetry – orientation
Practical 5: Application of poetry – practical session
Practical 6: Poetry and aesthetics
Practical 7: Writing poetry – orientation
Practical 8: Writing poetry – writing sessions

Reading material

I. The Art of Poetry

1. Fry, S. (2005). The ode less travelled: Unlocking the poetic mind. HarperCollins.
2. Addonizio, K., & Laux, D. (1997). The poet's companion: A guide to the pleasures of writing poetry. W.W. Norton & Company.
3. Lucy, J. (Ed.). (2001). The art of poetry. Penguin Books.

II. Understanding and Interpretation of Poetry

1. Hirsch, E. (1999). How to read a poem: And fall in love with poetry. Harcourt Brace & Company.
2. Pinsky, R. (1998). The sounds of poetry: A brief history. Farrar, Straus and Giroux.
3. Meyer, M. (2005). Poetry: An introduction. Bedford/St. Martin's.

III. Writing Poetry

1. Hugo, R. (1979). The triggering town: Lectures and essays on poetry and writing. W.W. Norton & Company.
2. Bradbury, R. (1990). Zen in the art of writing: Releasing the creative genius within you. Bantam Books.
3. Behn, R., & Twichell, C. (Eds.). (1992). The practice of poetry: Writing exercises from poets who teach. HarperCollins.

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-13	**Creative and Content Writing**	II	2	1	50

Course objective:
The objective of the course is to equip students with comprehensive skills in creative and content writing through experiential learning and real-world applications.

Course outcomes:
On completion of the course, student will be able to achieve the following:
CO1: Understand and apply fundamental concepts and techniques of creative writing.
CO2: Apply storytelling techniques to create engaging narratives.
CO3: Develop and implement effective SEO and digital content strategies
CO4: Create and refine content using various tools and applying diverse writing styles and formats.
CO5: Utilize digital tools to craft multimedia narratives and create a professional portfolio.

Syllabus

Creative Writing

Practical 1: **Introduction to Creative and Content Writing**

Practical 2: **Character and Story Development**

Practical 3: **Crafting Compelling Narratives**

Content Writing

Practical 4: **SEO and Digital Content Strategies**

Practical 5**: Writing for Media**

Practical 6: **Tools**

Content Creation

Practical 7: **Digital Storytelling**

Practical 8: **Creative Portfolio Launch**

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-14	**Science of Life through Bhagwad Gita**	II	2	1	50

Course Objective

The objective of the course is to seek directions from the Bhagwad Gita to garner life skills for a successful and happy life

Course Outcome

CO1: To understand the methodology to correctly interpret and analysis the scripture

CO2: To understand the application of various teaching of the Bhagwad Gita

CO3: Use meditation and breathing techniques for healthy mind and body.

Syllabus

Practical 1: **Introduction to Bhagwad Gita - methodology**

Practical 2: **Real life application of chapter 1-3**

Practical 3: **Real life application of chapter 4-6**

Practical 4: **Real life application of chapter 7-9**

Practical 5: **Real life application of chapter 10-12**

Practical 6: **Real life application of chapter 13-15**

Practical 7: **Real life application of chapter 16-18**

Practical 8: **Meditation and breathing techniques**

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-15	**Sanskrit Sambhashan – *Spoken Sanskrit***	II	2	1	50

Course objectives:

The objective of the course is to enhance the communication skills of the students in Sanskrit

Course outcome

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

CO1: Enhanced writing skills in Sanskrit

CO2: Enhanced speaking skills in Sanskrit

CO3: Enhanced listening skills in Sanskrit

CO4: Enhanced writing skills in Sanskrit

Syllabus:

संस्कृतसम्भाषणशिबिरस्य पाठ्यक्रमः

प्रथमं दिनम्

- गीतम् - पठत संस्कृतम्.....।
- मम नाम -भवतः नाम किम्? भवत्याः नाम किम्? द्वयोः मध्ये परिचयः। परस्परं 5 जनान्।
- सः कः? सा का? तत् किम्?
- एषः, एषा, एतत्।
- अहम्, भवान्, भवती..... ...अभिनयः।
- आम्,न, वा/किम्.....अभिनयः।
- अस्ति × नास्ति.....अभिनयः।
- अत्र, तत्र, कुत्र, सर्वत्र, अन्यत्र, एकत्र - अभिनयः।
- षष्ठी - तस्य, एतस्य, कस्य, तस्याः, एतस्याः, कस्याः, मम, भवतः, भवत्याः.....अभिनयः।
  मम नासिका, भवतः नासिका, भवत्याः नासिका।
  एतत् कस्य? अङ्गानि प्रदर्श्य प्रश्नः।
- दशरथस्य..., सीतायाः..., लेखन्याः..., पुस्तकस्य...,। स्फोरकपत्रस्य (Flash Card) उपयोगः करणीयः। 'पुत्रः' 'पतिः' इत्यादीनां वाक्यपत्राणाम् (Charts) उपयोगः करणीयः।
- गीतम् - मनसा सततं स्मरणीयम्।
- आवश्यकम्, मास्तु, पर्याप्तम्, धन्यवादः, स्वागतम्।
- पूर्वनिश्चितसम्भाषणप्रदर्शनम्।
- क्रियापदानां पाठनम् - गच्छति। आगच्छति। पठति। लिखति। खादति।पिबति। क्रीडति। वदति। उत्तिष्ठति। उपविशति।
- गच्छामि। आगच्छामि.....।
- गच्छतु। आगच्छतु.....।
- सङ्ख्याः - (अ) 1, 2, 3, 4,.....10। (आ) 10, 20, 30,.....100।
- समयः - 5.00, 5.15, 5.30, 4.45 ।
- कथा - गतानुगतिको लोकः। (काचित् कथा सरलया भाषया वक्तव्या)।
- रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित् वाक्यानि वाचनीयानि)।
- एकं वाक्यम् (प्रत्येकं छात्रः एकं वाक्यं वदेत्।)
- सूचना।
- ऐक्यमत्रः।

द्वितीयं दिनम्

- गीतम्।
- पुनस्स्मारणम्।
- शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा कुञ्जिका, तत् पुष्पम्।
- बहुवचनपाठनम् – बालकाः..., बालिकाः..., लेखन्यः..., पुस्तकानि...।
- ते, के, ताः, काः, तानि, कानि, एते, एताः, एतानि, भवन्तः, भवत्यः, वयम्। (चित्राणि उपयोक्तव्यानि।)
- वचनपरिवर्तनाभ्यासः। यथा - सः बालकः - ते बालकाः।
- अस्ति - सन्ति।
- कति?
- सप्तमी - हस्ते। उत्पीठिकायाम्। लेखन्याम्। पुस्तके। (स्फोरकपत्रस्य प्रयोगः करणीयः।) वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि।
- कदा?
- उत्तराणां प्रश्नाः। (शिक्षकः आरम्भे उत्तरं वदेत्, अनन्तरं छात्राः तस्य प्रश्नं पृच्छेयुः।) यथा - रामः प्रातःकाले शालां गच्छति। रामः कदा शालां गच्छति?
- अद्य, श्वः, परश्वः, प्रपरश्वः, ह्यः, परह्यः, प्रपरह्यः, इदानीम्।
- गीतम्।
- गच्छन्ति। गच्छामः। गच्छन्तु।
- शिष्टाचारः - सुप्रभातम्/नमस्कारः/शुभरात्रिः/हरिः ओम्/क्षम्यताम्/चिन्ता मास्तु।
- प्रातर्विधिः - दन्तधावनम् इत्यादयः शब्दाः पाठनीयाः।
- सङ्ख्या - 1-50।
- समयः - 6.05, 6.10, 5.55, 5.50
- स्वागतसम्भाषणम्। (शिक्षकः सहशिक्षकेण सह कृत्वा प्रदर्शयेत्)
- कथा।
- रटनाभ्यासः।
- वाक्यद्वयम् (प्रत्येकम् अपि छात्रः वाक्यद्वयं वदेत्।)
- सूचनाः।
- ऐक्यमत्रः।

तृतीयं दिनम्

- गीतम्।
- पुनस्स्मारणम्।
- क्रियापदानां बहुवचनरूपाणि।
  गच्छन्ति - गच्छामः - गच्छन्तु (Chart दर्शनीयम्)
  पिबन्ति - पिबामः - पिबन्तु।
  लिखन्ति - लिखामः - लिखन्तु।
  इत्यादिपरिवर्तनाभ्यासः कारणीयः।
- द्वितीयाविभक्तिः - स्फोरकपत्राणाम् उपयोगः।
  (वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि।)
- कृपया ददातु - वस्तूनि प्रदर्श्य।
  शिक्षकः एकैकं वस्तु प्रदर्शयति।
  उदा. – ग्रन्थः, घटी,.....
  छात्राः - कृपया ग्रन्थं ददातु, कृपया घटीं ददातु इत्यादि वदेयुः। (स्फोरकपत्रस्य उपयोगः)
- पुरतः, पृष्ठतः, वामतः, दक्षिणतः, उपरि, अधः।
  (चित्रं दर्शनीयम्)
- इतः, ततः, ...तः, गृहतः, कुतः?
  (स्फोरकपत्राणाम् उपयोगः)
  वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि।
- गीतम्।
- कथम्? सम्यक्।
- शीघ्रम् × मन्दम्। उच्चैः × शनैः।
- पठनार्थम्, किमर्थम्?
- सप्तककाराः - किम्, कुत्र, कति, कदा, कुतः, कथम्, किमर्थम् (Chart प्रदर्शनीयम्)।
  एकैकम् उपयुज्य परस्परं प्रश्नाः।
- अपि।
- अस्तु।
- अहं न जानामि। - कानिचन वाक्यानि।
- भूतकालीनक्रियापदानां पाठनम्।
  गतवान् - पठितवान् - लिखितवान्।
  गतवती - पठितवती - लिखितवती।
- क्रियापदकोष्ठकस्य प्रथमपृष्ठस्य अभ्यासः।
- द्वितीयपृष्ठस्य सर्वाणि क्रियापदानि उपयुज्य छात्राः वर्तमानकाले वाक्यानि वदन्ति। (ए.व - ब.व.)
- विशिष्टक्रियापदानाम् अभ्यासः -
  करोमि - कुर्मः। करोति - कुर्वन्ति।
  ददामि - दद्मः। ददाति - ददति।
  शृणोमि – शृण्मः। शृणोति - शृण्वन्ति।
  जानामि – जानीमः। जानाति – जानन्ति।
- सम्बोधनम् - भोः !, श्रीमन् !, मान्ये !, भगिनि!, मित्र !, ...महोदय!, राम !, सीते ! इत्यादि।
- सङ्ख्या- 1-100।
- समयः - 1.00, 2.00, 3.00, 4.00।
- सम्भाषणप्रदर्शनम् (मित्रसंलापः)।
- कथा।
- वाक्यत्रयम् एकैकोऽपि छात्रः वदेत्।
- सूचना।
- ऐक्यमत्यः।

चतुर्थं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- च
- अतः
- एव
- इति
- अस्मि
- यदि -तर्हि
- यथा - तथा
- तः - पर्यन्तम् (वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि।)
- अद्य आरभ्य
- कृते (वाक्यपत्रस्य उपयोगः करणीयः)
- क्तवतुप्रत्ययान्तानाम् अभ्यासः
  गतवान् - पठितवान् - लिखितवान् (ए.व. पुंलिङ्गे)।
  गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे)।
  गतवन्तः - पठितवन्तः - लिखितवन्तः (ब.व. पुंलिङ्गे)।
  गतवत्यः - पठितवत्यः - लिखितवत्यः (ब.व. स्त्रीलिङ्गे)।
- सः गतवान् - सा गतवती - लिङ्गपरिवर्तनाभ्यासः।
- अहं गतवान् - अहं गतवती - लिङ्गपरिवर्तनाभ्यासः।
- क्रियापदानां कालपरिवर्तनाभ्यासः।
  यथा - गच्छति - गतवान्, गतवती।
- गीतम्।
- विशेषपाठनम् - आसीत्, आसन्, आसम्।
- एकः, एका, एकम् - लिङ्गभेदः ज्ञापनीयः।
  (स्फोरकपत्रस्य उपयोगः)

- भोजनसम्बन्धिशब्दाः यथा - सूपः, शाकम्, इत्यादयः।
- सङ्ख्या।
- समयः।
- ॐ – सङ्ख्याक्रीडा।
- कथा।
- सम्भाषणप्रदर्शनम्।
- चत्वारि वाक्यानि।
- सूचना।
- ऐक्यमत्यः।

पञ्चमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- वाहनानां नामानि।
- तृतीयाविभक्तिः - दण्डेन, मापिकया, लेखन्या, पुष्पेण।
  (वाक्यपत्रस्य आधारेण वाक्यानि वाचनीयानि।)
- सह, विना।
- अद्यतन, ह्यस्तन, श्वस्तन, पूर्वतन, इदानीन्तन
- भविष्यत्कालीनक्रियापदानां पाठनम्।
  गमिष्यति, पठिष्यति, लेखिष्यति।(कोष्ठकस्य साहाय्येन)
- गत,आगामि।
- गीतम्।
- स्म।
- अभवत्।
- क्त्वाप्रयोगः (कोष्ठकस्य साहाय्येन)।
- यदा – तदा।
- बन्धुवाचकशब्दाः।
- वेशभूषणानां नामानि।
- वर्णाः।
- रुचयः।
- क्रीडा - एकश्वासेन सङ्ख्याकथनम्।
- कथा।
- पञ्च वाक्यानि।
- सूचना।
- ऐक्यमत्यः।

षष्ठं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- नूतनम् x पुरातनम्,
- बहु x किञ्चित्,
- दीर्घः x ह्रस्वः।
- उन्नतः x वामनः।
- स्थूलः x कृशः।
- एतादृश, तादृश, कीदृश?
- तुमुन् (कोष्टकस्य साहाय्येन)।
- किन्तु।
- निश्चयेन।
- बहुशः / प्रायशः।
- किल / खलु।
- शक्नोति।
- गीतम्।
- विशेषणविशेष्यभावस्य अभ्यासः।(प्रथमाविभक्तौ)
  सः उत्तमः बालकः।
  सा उत्तमा बालिका।
  तत् उत्तमं पुस्तकम्।
- इव। विनोदकणिका।(गतवान् 'इव' अभिनयं कृतवान्!)
- अपेक्षया।
- पशूनां नामानि।
- अवयवानां नामानि।
- वाक्यविस्तारणाभ्यासः।
  (सः मम पुस्तकं प्रातःकाले पञ्चवादने पठितवान्।)
- इतः पूर्वम् - इतः परम्।
- 'रामकृष्ण' सङ्ख्याक्रीडा।
- कथा।
- षट् वाक्यानि।
- सूचना।
- ऐक्यमत्यः।

सप्तमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- क्त्वा - तुमुन् - परिवर्तनाभ्यासः।
- बहिः x अन्तः।
- रिक्तम् x पूर्णम्।
- इतोऽपि।
- इत्युक्ते।
- अन्ते।
- चेत् - नो चेत्।

- गीतम्।
- आरोग्यसम्बन्धिशब्दाः – वैद्यरोगिसम्भाषणम्।
- प्रश्नोत्तरस्पर्धा।
- ऋषीणां नामानि।
- कथा - शिक्षकः एकां कथां वदति। अनन्तरं छात्रेषु एकैकः तस्याः कथायाः एकैकं वाक्यम् उक्त्वा कथां सम्पूर्णां करोति।
- सङ्ख्या - दीर्घसङ्ख्यापाठनम्।
- प्रश्नोत्तरम्।
- क्रीडा - (गणद्वये नामस्मरणक्रीडा)
- कथा।
- पुस्तकानां परिचयः।
- सप्त वाक्यानि।
- सूचना।
- ऐक्यमन्त्रः।

अष्टमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- वारम्।
- अतः - यतः परिवर्तनाभ्यासः।
- यद्यपि – तथापि।
- यत्र – तत्र।
- कति - कियत् - एतयोः भेदज्ञापनम्।
- यावत् – तावत्।
- यत् – तत्।
- यः - सः।
- या – सा।
- गीतम्।
- अस्माकम्।
- चर्चा।
- सङ्ख्या - 'शतायुः - गतायुः' क्रीडा।
- विनोदकणिकाकथनम्।
- कथा।
- अष्ट वाक्यानि।
- समाजनिधिविषये सूचना।
- ऐक्यमन्त्रः।

नवमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- चित्।
- ....द्वयम्।
- सङ्ख्यासु लिङ्गभेदः।
  एकः - एका - एकम्
  द्वयम् - द्वयम् - द्वयम्
  त्रयः - तिस्रः - त्रीणि
  चत्वारः - चतस्रः - चत्वारि
- शिश्रकः - अहं वैद्यः - मम नाम सुरेशः
  (छात्राः तमुद्दिश्य प्रश्नान् पृच्छेयुः।)
- ..... अर्थम् (समाजार्थम्, संस्कृतकार्यार्थम्...)।
- गीतम्।
- तव्यत् – अनीयर्।
- अनन्त्यकथारचना।
- सङ्ख्यान्वेषणम् (क्रीडा)।
- छात्रैः सह प्रश्नोत्तरम्।
- समाजनिधिविषये पुनःस्मारणम्।
- ऐक्यमन्त्रः।

दशमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- पत्रलेखनम्।
- दूरवाणीसम्भाषणम्।
- मार्गनिर्देशः – कुत्र गन्तव्यम् इत्यादि।
- तव्यत् अभ्यासार्थम् – अद्य किं किं करणीयम् ?
- सान्दर्भिकभाषणम् –
  1. प्रवासात् प्रतिनिवर्तनस्य।
  2. आपणिकस्य इत्यादि।
- क्रीडा – सङ्ख्यायोजनम् (गणद्वये)।
- शुभाशयाः।
- असत्यकथनम् / कल्पनाकथनम्।
- समारोपः (सर्वैः शिक्षार्थिभिः भारतमातुः पूजां कृत्वा निधिसमर्पणं करणीयम्।)
- पत्राचारप्रगतशिक्षणादिविषये सूचना।
- ऐक्यमन्त्रः।

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS02PR0206-16	**Kirtan Kala**	II	2	1	50

Course objectives:
The objective of the course is to provide the students with a spiritual experience as well as its benefits to them in the form of better abilities to concentrate and develop the ability to create a peaceful mind.

Course outcome
At the end of the course, the students will be able to achieve the following:
CO1: Learn from the inspiring spiritual journey of the saints and the history of Kirtan tradition
CO2: Learn about the musical instruments used in the art of Kirtan
CO3: Develop communication skills

- कीर्तन परंपरेचा इतिहास आणि अखिल भारतातील कीर्तन परंपरांचा परिचय
- चार महिन्यात वीस संतचरित्रांचा परिचय अधिक त्याविषयी प्रवचन
- वीस संतांचा वाङ्मयीन परिचय
- प्रमुख पाच कीर्तन पद्धतींचे मांडणी तंत्र.
- पूर्वरंग – उत्तररंग सहित कीर्तनप्रक्रियेतील सर्व महत्वाचे टप्पे.
- कीर्तनासाठी आवश्यक असणारी कंठ संगीतात्मक माहिती
- टाळ, मृदंग, वीणा, तबला, पेटी या वाद्यांची ओळख.
- प्रवचनांसाठी अभ्यासग्रंथांचे मार्गदर्शन.
- वकृत्व कला, संभाषण कला, संवाद कौशल्य, कथाकथन यांची रहस्ये
- कीर्तनाचे अनुषंगाने संस्कृत मराठी श्लोक, सुभाषिते व प्रमाणाधार अशी ओव्या अभंगांची शिदोरी.

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS04PR0202 – 1	**Adventure Sports**	II	0	1	50

Course Objective:
This course introduces adventure sports, emphasizing experiential learning through participation in various activities. The course will cover the fundamentals, safety procedures, and physical and mental benefits of adventure sports. Students will engage in outdoor activities such as wall climbing, rappelling, and more, fostering a connection with nature and understanding the principles of risk management.

Course Outcome: By the end of this course, students will:

- Understand the principles and benefits of adventure sports.
- Develop basic skills in selected adventure sports.
- Learn and apply safety measures and risk management techniques.
- Foster teamwork, leadership, and problem-solving skills.
- Cultivate a greater appreciation for nature and outdoor activities.

Syllabus:

- Tent pitching, knot practice session and Tent allotment
- Activities like Jumaring and Climbing
- Individual challenge like Burma bridge, ladder bridge, multi vine
- Group Task like improvise raft making and Kayaking
- Activities like Archery rifle shooting, cycle ride

Pattern of Classes: 2 Days and 1 Night Camp.

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS04PR0202 – 2	**Introduction to Defense Forces & Obstacle Training**	II	0	1	50

Course Objective:

- Understand the Structure and Function of Defense Forces
- Familiarize with Defense Force Training and Discipline
- Learn Basic Obstacle Course Techniques
- Apply Problem-Solving and Teamwork in Obstacle Training
- Explore the Role of Obstacle Training in Defense Preparedness

Course Outcome:

Upon successful completion of the course, students should be able to:

- Describe the Structure and Functions of Defense Forces
- Demonstrate Knowledge of Defense Training Protocols
- Navigate Basic Obstacle Courses
- Collaborate and Problem-Solve in Team-Based Exercises
- Connect Obstacle Training to Defense Preparedness
- Evaluate and Reflect on Training Experiences

Syllabus:

- Knot and Hitch practice session
- Activities like Rappelling & Wall Climbing
- Burma bridge & ladder bridge
- First Aid
- Rifle Shooting
- Horse riding
- Group Task and Team building activities

Pattern of Classes: 2 Days and 1 Night Camp.

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS04PR0202 – 3	**Self Defense & Indian Martial Arts**	II	0	1	50

Course Objective:
This course provides students with practical knowledge and skills in self-defense, focusing on personal safety and awareness. Students will learn basic techniques for self-defense, including striking, blocking, and evasion, while also discussing the legal and ethical considerations of self-defense. The course will emphasize both physical techniques and mental preparedness.

Course Outcome: By the end of this course, students will:

- Understand the principles of personal safety and awareness.
- Learn and practice basic self-defense techniques.
- Develop strategies to avoid dangerous situations.
- Understand the legal and ethical implications of using self-defense.
- Build confidence and physical fitness through regular practice.

Syllabus:

1. **Mental Awareness**
    - Importance of Self Defense
    - Types of Self Defense
    - Rules of Self Defense
2. **Physical Session**
    - Various Self Defense Techniques
    - Different Situational Defense Techniques
3. **Improvise Weapon**
    - Knowledge and practice of different equipment's which can be used for self defense
4. **Martial Arts**
    - Introduction of Indian Martial Arts
    - Demonstration of Indian Martial Arts
    - Training of Indian Martial Arts (Lathi Kathi)

Pattern of Classes: 12 Classes in a Semester. Classes will be held once a week.

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS04PR0202 – 4	**Basic Nutritional Course**	II	0	1	50

Course Objective:

In the "Basics of Nutrition" course, students will develop a comprehensive understanding of essential nutrients and their roles in supporting overall health. They will learn to apply dietary guidelines effectively, tailoring recommendations to various age groups and health conditions. Additionally, students will cultivate the skills needed to assess and improve their own and others' eating habits for better health outcomes.

Course Outcome:

By the end of the course, students will be able to accurately describe the functions of key nutrients and their impact on health, create balanced meal plans based on established dietary guidelines, and critically evaluate nutrition information to distinguish between credible and misleading sources.

Syllabus:

Unit I

- Introduction to Nutrition – Define Balanced Diet, Nutrition, Optimum Nutrition, Nutrients, Concept of Health, Recommended Dietary Allowances (RDA)
- Carbohydrates (sources, functions and digestion)
- Proteins (sources, functions and digestion)
- Fats (sources, functions and digestion)
- Micronutrients (vitamins and minerals-sources, functions and digestion)

Practical I

- Display of all the foods with the help of students and while demonstrating teacher will again explain role and importance of nutrition in daily life. Deficiency will lead to chronic diseases and its prevention is very necessary for the quality of life.

Unit II

- What is Body Mass Index?
- What is Basal Metabolic Rate?
- What is Ideal Body Weight? (Male/Female)
- How to read labels on Food Packets?
- How to choose smart food and Concept of Rainbow diet, My Food Pyramid or My plate given by ICMR-NIN.

Practical II

- Calculation of Body Mass Index, Basal Metabolic Rate, Ideal Body Weight (Male/Female) with the use of self-body measurements.
- Demonstration of Rainbow diet, My Food Pyramid or My plate in a class.

Pattern of Classes:

Theory Classes – 10
Practical Classes – 2

Syllabus for Semester II

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS01PR0203	**Remedies by Ayurveda**	II	2	1	50

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 Bramhitel, BramhiAwala, 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 MukundSabnis, ChaukhambhaAmarbharatiPrakashan.
2) Everyday Ayurveda by ShaileshRathod
3) A text Book of Rasashastra by Vikas Dhole and Prakash Paranjpe
4) A text Book of BhaiajyaKalpanaVij¯nana

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS01PR0204	**Biodegradation of Kitchen Waste**	II	2	1	50

Course outcomes:

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

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

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

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

List of experiments:

1) Introduction to cookery : does and don'ts
2) Introduction to Indian cuisine, philosophy and classification.
3) Regional influence on Indian Food- factors affecting eating habits
4) Preparation of Garam masala and or Chat masala with ingredients and their importance
5) Preparation of different gravies such as white, yellow or brown gravies with ingredients and theirimportance
6) Preparation of Indian sweets like Besankeladdu 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

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

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

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

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

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

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

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24HS05PR0205	**Herbal Home Remedies: A Course for Self-Care**	II	2	1	50

Course Objectives:

1. To identify and recognize common medicinal herbs and plants.
2. To understand the basics of herbalism and safety precautions.
3. To learn to prepare and use herbal remedies for common ailments.

Course outcome:

By the end of this course, students will be able to:

1. Confidently identify and use local herbs for health benefits
2. Increase their observational skills of natural objects
3. Prepare and apply herbal remedies for self-care
4. Integrate herbalism into daily routines for wellness

Outline of Syllabus

Module 1 - Learn about sustainable foraging and gardening practices.

Module 2 - Understand how to create a herbal home remedy kit

Module 3 - Develop self-care routines using herbal remedies.

Practical/visit based on above syllabus.

Extended Activities

Creating a Plant Collection, Awareness, Slogan, poem etc.

Syllabus for Semester II,

[School of Electrical and Electronics Engineering]

Course Code	Course Name	Sem.	Hours/ week	Credits	Maximum Marks (Continuous Evaluation)
24EE07PR0205	**Day-to-Day Electrical Systems**	II	2	1	50

Course Outcomes: After completion of the course, students will be able to	
CO1	Understand how to measure and interpret electrical parameters of home appliances & calculate residential bills.
CO2	Comprehend the concept of energy star ratings and their significance.
CO3	Gain practical knowledge of residential wiring techniques.
CO4	Identify and understand the components of a residential solar PV system.
CO5	Understand the importance of ELCB, MCB, and fuses in electrical safety
CO6	Conduct market surveys to evaluate different electric two-wheelers.

Syllabus
Identification of parameters of home appliances using the Power guard meter.
Calculation and verification of the residential energy bill.
Energy efficiencies of home appliances- Introduction to Star ratings: Case Study.
Implementation of simple wiring used in residential installations.
Identification of components of Solar Photovoltaic systems for residential consumers.
Understanding the necessity and application of Earth Leakage Circuit Breaker (ELCB) and Miniature Circuit Breaker (MCB) and Fuse.
Comparative study of Electric Two-Wheelers (Market Survey)
Hands-on training in Digital meters.

Text/ Referencebooks:	
1	Electrical Measurement, Signal Processing, and Displays" by John G. Webster.
2	trical Installation Design Guide: Calculations for Electricians and Designers" by The Institution of Engineering and Technology.
2	Solar Photovoltaic Technology and Systems: *Chetan Singh Solanki, PHI learning Pvt. Ltd.,2014*
3	Modern Wiring Practice: Design and Installation" by W. E. Steward and R. A. Beck.
4	trical Safety Handbook" by John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, and Al Winfield.

SEMESTER – III

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

Course Code: 24EE05TH0301 Course: Digital System Design with HDL

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

Course outcomes

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

1. Understand the fundamentals of Verilog.
2. Describe Test Bench for testing Verilog designs effectively.
3. Design Finite State Machines using Verilog.
4. Design combinational and sequential circuits using Verilog.
5. Implement digital functions using Programmable Logic Devices.

Unit I :

Introduction to Verilog, Fundamentals of Verilog including language basics andrelation to circuit implementation, Modules and Ports in Verilog, Modeling techniques in Verilog, Verilog constructs and codes, Synthesis and Simulation.

Unit II :

Combinational Circuits Design in Verilog: Comparators, Multiplexers and De-multiplexer, Encoder, Decoder, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit III –

Sequential Circuits Design in Verilog: Latches/buffers and Flip-Flops as memory storage elements, Counters, Shift registers, Memory and its internal organization.

Unit IV –

FSM design, Task and Functions, User Defined Primitive, Timing and delays, Test bench, Advanced concepts.

Unit V -

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

Text Books:

1. Samir Palnitkar, “Verilog HDL: A Guide to Digital Design and Synthesis”, Prentice Hall; 2nd edition (21 February 2003)
2. Stephen Brown and ZvonkoVranesic, “Fundamentals of Digital Logic with Verilog Design” TataMcGrawHill, 3rd ed, 2009.

Reference Books:

1. W.H. Gothmann, “Digital Electronics- An introduction to theory and practice” , PHI, 2nd edition ,2006
2. M. Morris Mano and Michael Ciletti,“Digital Design: With an Introduction to Verilog HDL”, 5e, 2011
3. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989

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

Course Code: 24EE05PR0301 **Course: Digital System Design with HDL Lab**

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

Course outcomes

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

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

Experiments based on following topics:

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

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

Course Code: 24EE05TH0302 **Course: Analog Circuits Design**

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

Course outcomes

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

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

Unit I:

Introduction to Differential amplifiers, Characteristics of an operational amplifier, Open loop and closed loop Op-amp Configuration, Op-amp Parameters & their analysis.

Unit II:

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

Unit III:

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

Unit IV:

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

Unit V:

Integrated Circuits: Timer IC LM-555, Internal block schematic, astable, monostable configurations and its application, Introduction to PLL and its application, Integrated Circuit Voltage Regulators, Serdes– serializer and deserializer, Double Data Rate – DDR, GDDR, HBM

Text Books:

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

Reference Books:

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

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

Course Code: 24EE05PR0302 **Course: Analog Circuits Design Lab**

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

Course outcomes

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

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

Experiments based on following topics:

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

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

Course Code: 24EE05TH0303 **Course: Signals and Systems**

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

Course outcomes-

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

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

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Text Books:.

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

Reference Books:

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

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

Course Code: 24EE05TH0304 Course: Microcontrollers and Peripherals

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

Course outcomes

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

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

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Text Books:

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

Reference Books:

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

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

Course Code: 24EE05PR0304 Course: Microcontrollers and Peripherals Lab

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

Course outcomes

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

1. Understand programming for microcontrollers 8051 and ARM7TDMI LPC2148
2. Demonstrate hardware interfacing with microcontroller and its programming requirements.
3. Formulate algorithms of microcontroller in regards to the circuit requirement.
4. Simulate and analyze the developed algorithm on a simulator
5. Design solution for the complex systems using microcontroller.

Experiments based on following topics:

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

SEMESTER – IV

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

Course Code: 24EE05TH0401 **Course: Electromagnetic Fields**
L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes

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

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

Unit – I

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

Unit – II

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

Unit – III

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

Unit – IV

Time-Varying Fields and Maxwell's Equations: Displacement current and Displacement current Density, Continuity equation for Time varying Fields, Faraday's law, Maxwell’s equations for steady fields, Maxwell’s equations for time varying fields, Maxwell’s equations in phasor form.

Unit – V

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

Text Books:

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

Reference Books:

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

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

Course Code: 24EE05TH0402 **Course: Analog and Digital Communication**
L: 3 Hrs, T: 0 Hr, P: 0 Hrs. Per week **Total Credits: 03**

Course outcomes :

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

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

Unit I:

Need for modulation, Amplitude Modulation, Linear modulation schemes, Angle Modulation, Frequency Modulation, Non linear effects in FM Systems, Superheterodyne receiver, Spectrum Analysis of AM and FM, Noise in amplitude modulation Systems, FM Stereo Multiplexing

Unit II

Sampling Process, Analog Pulse Modulation Methods, PCM, DPCM, DM and Adaptive DM, SNR in PCM and DM, FDM in Telephone System, Synchronization in TDM System, Data Multiplexers, Voice coder (Vocoders)

Unit III

Line Coding Review, Digital Data Transmission, Intersymbol Interference (ISI),Eye Diagrams for Binary and Quaternary Systems, Correlative Coding, Duobinary Encoding, Partial Response Signaling, Scramblers, Digital Receivers and Regenerative Repeaters

Unit IV

Digital Modulation Techniques: ASK, FSK, M-Ary FSK, MSK, Gaussian MSK, PSK, DPSK, QPSK, QAM, Probability of Error evaluations for ASK, FSK, PSK, Optimum Filter, Matched Filter, Signal Space Analysis of Optimum Detection, Multiuser Detection

Unit V

Spread Spectrum, Pseudo noise Sequences, Direct Sequence Spread Spectrum, Frequency hop Spread Spectrum, ML and Gold codes, Convolutional Codes, Decoding Methods of Convolutional Codes: Viterbi Algorithm, Sequential Decoding

Text Books:

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

Reference books:

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

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

Course Code: 24EE05PR0402 Course: Analog and Digital Communication Lab

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

Course outcomes

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

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

Experiments based on the following topics

- Amplitude Modulation
- Frequency Modulation
- SNR calculation
- Pulse Code Modulation
- Delta Modulation
- FDM and TDM
- Communication Receiver
- Communication Software Study
- Digital Modulation Scheme

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

Course Code: 24EE05TH0403 **Course: Computer Communication Networks**

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

Course outcomes

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

1. Understand computer networks and reference models.
2. Identify components of computer networks, multiple access, switching and routing techniques.
3. Comprehend the concepts of network security, layer services and protocols
4. Analyze error, flow and congestion control techniques, associated protocols and LAN standards
5. Design a network using addressing mechanisms.

Unit I

Introduction to computer networks and the Internet, Network types: LAN, MAN, WAN, Layered architecture, Reference models- OSI and TCP/IP, design issues for layers, protocols and standards, Transmission media.

Unit II

Multiple Access Resolution, Data Link Control- Framing, Error Control and Flow Control: Sliding Window Protocols, LAN standards, IEEE 802.

Unit III

Circuit Switching, Message Switching and Packet Switching, Virtual circuit and Datagram networks, WAN technologies - ATM and SONET, Network Layer: IP Addressing: IPv4, IPv6, Routing Algorithm.

Unit IV

Transport layer protocols, Congestion control and Quality of Service in transport layer.

Application Layer: The Web and Hyper Text Transfer Protocol, File transfer, Domain name system, E-mail.

Unit V

Introduction to Cryptography, Symmetric-Key Cryptography and Asymmetric-Key Cryptography, Security Services, key distribution and certification, digital signature, management of public keys.

Text Books:

1. Forouzan, " Data Communications and Networking" , Tata McGraw Hill, 4th Edition
2. J.F. Kurose and K. W. Ross, " Computer Networking – A top down approach featuring the Internet" , Pearson Education, 5th Edition

Reference Books:

1. Andrew Tanenbaum, " Computer networks" , Prentice Hall
2. William Stallings, " Data and computer communications" , Prentice Hall
3. T. Viswanathan, " Telecommunication Switching System and Networks" , Prentice Hall
4. L. Peterson and B. Davie, " Computer Networks – A Systems Approach" Elsevier

   Morgan Kaufmann Publisher, 5th Edition.
5. S. Keshav, " An Engineering Approach to Computer Networking" , Pearson Education

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

Course Code: 24EE05PR0403 Course: Computer Communication Networks Lab

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

Course outcomes

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

1. Use simulation tools to configure and analyze network performance.
2. Configure host, server, switches and routers for networking.
3. Configure the network for sharing of resources.
4. Analyze protocols for the computer networking.
5. Design and configure a network using addressing mechanisms and protocols.

Experiments based on following topics:

- Simulate & configure different types of networks using network stimulation tools.
- Configure different devices like routers, host machines for setting up a network
- networking concepts like client-Server and addressing mechanism
- Static and Dynamic Routing

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

Course Code: 24EE05TH0404 **Course: Digital Signal Processing**

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

Course outcomes

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

1. Understand DFT and FFT algorithms, filter design techniques, multirate systems and digital signal processors.
2. Apply DFT and IDFT to signals and systems.
3. Design of digital filters for given specifications.
4. Design of multirate systems for given specifications.
5. Optimize and realize complex structures of discrete systems using digital signal processors.

Unit I

Discrete Fourier Transform (DFT), Properties of DFT, Inverse Discrete Fourier Transform (IDFT), Circular Convolution using DFT/IDFT, Use of DFT in linear filtering. Fast Fourier Transform (FFT) Algorithms.

Unit II

Structures for realization of LTI discrete-time systems in z domain: IIR systems: Direct Form-I, Direct Form-II, Cascade form and parallel form. FIR systems: Direct form, cascade form and linear phase realization.

Unit III

Design of discrete time IIR filters from continuous time filters, IIR filter design by the Bilinear Transformation, Butterworth filters, Chebyshev filters.

Design of FIR filters by windowing method – Bartlet, Blackman, Hanning, Hamming and Kaiser.

Unit IV

Multirate signal processing, Sampling Rate Conversion, Decimation, Interpolation, Multistage Decimators and Interpolators design, Applications of multirate signal processing such as subband coding, digital filter banks, QMF filter banks.

Unit V

DSP processor memory Architecture, Some examples of DSP Processors, Overview of TMS320 Family DSP processors.

Text Books:

1. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
2. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall, 1997.
3. Salivahanan, Digital Signal Processing, Tata McGraw Hill.

Reference Books:

1. S. K. Mitra, Digital Signal Processing: A computer based approach.TMH
2. Jonathan Stein, Digital Signal Processing, Wiley India Ltd.

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

Course Code: 24EE05PR0404 **Course: Digital Signal Processing Lab**

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

Course outcomes

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

1. Understand the basics of software tool used for digital signal processing.
2. Analyze discrete signals in time and frequency domain.
3. Design digital filters along with its realization (Structures).
4. Design multirate signal processing systems such as decimators, Interpolators.
5. Implement DSP applications on DSP (processor) starter kit.

Experiments based on following topics:

- To find DFT, IDFT of given discrete signals.
- To find circular convolution by DFT-IDFT method.
- To find FFT of given discrete signals.
- Designing Structures for realization of LTI discrete-time systems in z domain.
- Design of IIR filters.
- Design of FIR filters.
- Design of decimators.
- Design of Interpolators.
- Study and experimentation with DSP processor kit.

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

Course Code: 24EE05PR0405 **Course: Fundamentals of Linux Lab**

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

Course outcomes

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

1. Understand the basic commands of linux operating system and can write shell scripts
2. Create file systems and directories and operate them
3. Create processes background and foreground etc.by fork () system calls
4. Create shared memory segments, pipes,message queues and can exercise interprocess communication

LIST OF EXPERIMENTS:

1. Study and Practice on various commands like man, passwd, tty, script, clear, date, cal, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w.

2. Study and Practice on various commands like cat, tail, head, sort, nl, uniq, grep, egrep,fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.

3. a) Write a Shell Program to print all .txt files and .c files.
   b) Write a Shell program to move a set of files to a specified directory.
   c) Write a Shell program to display all the users who are currently logged in after a
      Specified time.
   d) Write a Shell Program to wish the user based on the login time.
4. a) Simulate cat command.
   b) Simulate cp command.
5. a) Simulate head command.
   b) Simulate tail command.
6. a) Simulate mv command.
   b) Simulate nl command.
7. Write a program to handle the signals like SIGINT, SIGQUIT, SIGFPE.

8. Implement the following IPC forms

a) FIFO

b) PIPE

9. Implement message queue form of IPC.

10. Implement a shared memory form of IPC. Write a Socket program to print system date and time (Using TCP/IP).

HONORS COURSES

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

Course Code: 24EE05HT0301 **Course: Communication System Analysis (HONORS Course)**

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

Course Outcomes:

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

1. Describe the basic building blocks of communication systems.
2. Explain the concepts of advanced communication systems.
3. Apply convolution techniques in the context of communication signals
4. Demonstrate the application of software-defined radio (SDR) and cognitive radio in modern communication systems
5. Analyze the performance benefits of using spread spectrum techniques in communication systems

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Unit 1:

Introduction to Communication Systems

Basic building blocks of communication systems, overview of Analog and Digital communication systems, channel types, channel capacity, modeling, noise, performance indices.

Unit 2:

Signal Analysis

Applications of Fourier Transform, Properties, Autocorrelation, Energy Spectral Density, Convolution, Random Variables, Probability Density Functions in communication systems.

Unit 3:

Introduction to Wireless Communication

Basics of Cellular Systems, Wireless Channel Models, Large Scale Fading, Small Scale fading, Error Performance in AWGN and Fading channel, Multiple Access techniques.

Unit 4:

Spread Spectrum Communication Systems

Spreading sequences, Properties of Spreading Sequences, Pseudo- noise sequence, Orthogonal Sequences, Types of spread spectrum systems, probability of error.

Unit 5:

Modern Communication Systems

Introduction to 5G and Beyond, MIMO Systems and Spatial Diversity, Software-Defined Radio (SDR), Cognitive Radio, Communication System Security and Privacy

Textbooks

1. "Communication Systems" by Simon Haykin, 4th Edition, Wiley Publications
2. "Digital Communication" by John G. Proakis, McGraw Hill Publications
3. "Modern Wireless Communication" by K. Sam Shanmugan

Reference books:

1. Ke-Lin Du & M N S Swamy, "Wireless Communication System", Cambridge University Press, 2010
2. Behrouz A Forouzan, "Data Communications and Networking", 4th Edition, McGraw Hill.
3. William H. Tranter, K. Sam Shanmugan, T. S Rappaport, Kurt L. Kosbar, Principles of Communication System Simulation with Wireless Applications, 2011, 1st Edition, Prentice Hall Press, USA

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

Course Code: 24EE05HT0401 **Course: Multimedia Networks (HONORS Course)**

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

Course outcomes

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

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

MINOR COURSES

Syllabus for Semester III,

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

Course Code: 24EE05MT0301 **Course: Fundamentals of Communication Engineering (MINOR Course)**

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

Course Outcomes:

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

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

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

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

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

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

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

Text Books:

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

Reference Books:

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

Syllabus for Semester IV,

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

Course Code: 24EE05MT0401 **Course: Sensors for Intelligent Instrumentation (MINOR Course)**

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

Course Outcomes:

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

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

UNIT I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

MDM COURSES

(Embedded Systems and IoT Track)

Syllabus for Semester III,

(MDM – 1 [Embedded Systems and IoT Track])

Course Code: 24EE05TH0306 – 1 **Course:** Sensors for IoT **(MDM Course)**

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

CO1 Understand the definitions, classifications, and characteristics of sensors and actuators.
CO2 Illustrate the working principles and characteristics of physical sensing mechanisms.
CO3 Explain the types, principles, and control mechanisms of actuators.
CO4 Interpret the structure, function, and communication of smart sensors.
CO5 Select suitable sensors/actuators for a given application and analyze constraints.

Unit I: Introduction to Sensors and Transducers

- Definitions: Sensor, Transducer, Actuator
- Classification of sensors and actuators
    - Based on signal type: Analog/Digital
    - Based on energy domain: Active/Passive, Mechanical, Electrical, Thermal
- Measurement system: block diagram
- Static and dynamic characteristics: accuracy, resolution, drift, linearity, hysteresis
- Error sources, standards, and calibration procedures

Unit II: Physical Sensing Mechanisms and Sensors

- **Mechanical/Displacement Sensors:** Potentiometers, LVDT, capacitive sensors
- **Thermal Sensors:** Thermistor, RTD, Thermocouples – characteristics and comparison
- **Pressure/Force Sensors:** Strain gauge (resistive), piezoelectric sensors
- **Motion and Acceleration:** MEMS accelerometers, gyroscopes
- **Light and Radiation:** LDR, photodiode, phototransistor, photoconductive and photovoltaic sensors
- **Chemical and Bio-sensors:** Gas sensors (MQ series), pH sensors, glucose, ECG, SpO2

Unit III: Actuators and Their Operating Principles

- Classification of actuators: mechanical, electrical, fluidic
- **Electromagnetic Actuators:** DC motors, stepper motors, servo motors – working and control
- **Thermal Actuators:** Shape memory alloys (SMA), thermopiles
- **Piezoelectric Actuators:** Operating principle and applications
- **Hydraulic and Pneumatic Actuators:** Force generation and control applications
- Signal conditioning and driver circuits (qualitative overview)

Unit IV: Smart Sensors

- Smart sensors: architecture, on-chip signal processing, self-calibration
- Comparison between conventional and smart sensors
- Digital communication protocols: UART, I2C, SPI (basics only)
- Microelectromechanical Systems (MEMS): basics, applications in sensing and actuation
- Miniaturization and integration trends in sensor-actuator systems

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Unit V: Sensor and Actuator Selection and Applications

- Selection criteria for sensors and actuators: range, sensitivity, resolution, linearity, power
- Case studies in:
    - **Industrial Automation:** position sensing, pressure control
    - **Health Care Systems:** wearable sensors, haptic feedback
    - **Automotive:** proximity sensors, throttle/steering actuators
    - **Consumer Electronics:** touch sensors, vibration motors
- Reliability, environmental considerations, lifecycle, cost constraints

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Textbooks

1. **Clarence de Silva**, *Sensors and Actuators: Engineering System Instrumentation*, CRC Press
2. **E. A. Doebelin**, *Measurement Systems: Application and Design*, McGraw-Hill

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Syllabus for Semester IV,

(MDM – 2 [Embedded Systems and IoT Track])

Course Code: 24EE05TH0408 – 1 **Course:** Microcontrollers and IoT Applications **(MDM Course)**

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

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

CO1: Understand the architecture and features of modern microcontrollers with a focus on ESP32.
CO2: Interface ESP32 with sensors, actuators, and communication modules.
CO3: Develop embedded software for data acquisition, control, and IoT communication.
CO4: Implement basic IoT projects using Wi-Fi, Bluetooth, and cloud services.
CO5: Analyze and optimize IoT solutions for power, connectivity, and scalability.

Module 1: Introduction to IoT and Microcontrollers

- What is IoT? Applications and Ecosystem
- Role of microcontrollers in IoT
- Comparison: Arduino, ESP8266, ESP32, Raspberry Pi Pico
- Introduction to ESP32: Features, architecture, GPIO, memory, peripherals

Lab: Setting up ESP32 with Arduino IDE

Module 2: ESP32 Programming Fundamentals**

- GPIO programming
- Digital and analog I/O
- Pulse Width Modulation (PWM)
- Interrupt handling

Lab: Blinking LED, Button control, PWM control of LED/Buzzer

Module 3: Sensors and Actuators Interfacing

- Analog sensors: Temperature, light
- Digital sensors: DHT11, Ultrasonic
- Actuators: Relays, motors
- ADC and DAC with ESP32

Lab: Sensor reading and data display on serial monitor or OLED

Module 4: Communication Interfaces

- I2C and SPI with ESP32
- UART communication
- Interfacing external modules like RFID, OLED, GPS

Lab: I2C OLED display + SPI sensor module integration

Module 5: Wireless Communication

- ESP32 Wi-Fi setup and connectivity
- Web server creation with HTML/CSS
- Bluetooth Classic and BLE communication
- MQTT protocol and cloud integration (e.g., ThingSpeak, Blynk, Firebase)

Lab: IoT weather station (sensor → Wi-Fi → cloud dashboard)

Module 6: Power Management & Deployment

- Deep sleep modes and power optimization
- Battery and solar power options
- Flashing, OTA updates
- Case study: Real-world IoT deployments using ESP32

Lab: ESP32 deep sleep + wakeup using timer or sensor

Mini Project (Final Assessment)
Each student/team will build a basic IoT system (e.g., smart home device, weather station, security alarm) using ESP32, sensors, and cloud integration.

Tools and Platforms:

Hardware: ESP32 DevKit, sensors, actuators, breadboard, jumper wires
Software: Arduino IDE, Blynk/ThingSpeak/Firebase, MQTT Broker
Languages: C/C++

MDM COURSES

(Communication Engineering Track)

Syllabus for Semester III,

(MDM – 1 [Communication Engineering Track])

Course Code: 24EE05TH0306 – 2 **Course: Fundamentals of Communication (MDM Course)**

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

Course Outcomes:

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

1. Understand the components of digital communication systems and summarize fundamental concepts such as entropy, channel capacity, and coding techniques.
2. Apply sampling, quantization, and various pulse code modulation techniques
3. Compare different digital modulation techniques
4. Illustrate and differentiate various multiplexing and multiple access techniques
5. Analyze the use of spread spectrum modulation schemes

Unit - I Digital Communication System and Coding Methods

Elements of basic digital communication system, advantages and disadvantages of digital communication, Communication channel characteristics: bit rate, baudrate, bandwidth, Concept of entropy and information rate, channel, capacity: Hartley's law and Shannon-Hartley theorem forchannel capacity, Source coding: Huffman coding, Error detection codes: Vertical Redundancy Check,(VRC) code, Longitudinal Redundancy Check (VRC)code, Cyclic Redundancy Check (CRC) code and Checksum code, Linear block code, error correction capability, Line coding

Unit - II Pulse Code Modulation Techniques

Sampling & quantization process: Nyquist samplingtheorem, types of sampling (natural & flat top sampling), aliasing effect, quantization process, quantization error,companding, PAM, PWM, PPM, Pulse code modulation (PCM), Differential pulse codemodulation (DPCM), Delta modulation (DM), Adaptive Delta modulation (ADM)

Unit - III Digital Modulation Techniques

Types of digital modulation techniques, coherent and non-coherent, detection,shift keying techniques: Amplitude ShiftKeying (ASK), Frequency Shift keying (FSK), Phase Shiftkeying (PSK), Differential Phase Shift keying (DPSK), Quadrature Phase Shift keying (QPSK), M-ary FSK and M-ary PSK, Quadrature amplitude modulation (QAM)

Unit - IV Multiplexing and Multiple Access Technique

Time DivisionMultiplexing (TDM), Frequency Division Multiplexing(FDM), Code Division Multiplexing (CDM), Time DivisionMultiple Access (TDMA), Frequency Division MultipleAccess (FDMA), Code Division Multiple Access(CDMA), Space Division Multiple Access (SDMA),

Unit - V Spread Spectrum (SS) Modulation

application of spreadspectrum modulation, model of spread spectrummodulation system, Pseudo-noise (PN) sequences, Direct sequence spreadspectrum (DSSS), jamming margin, processing gain, Eb/No ratio, Frequency hopped spread spectrum, slow andfast frequency hopping, Communication Technologies: SONET, Digital Switching Technologies, Video Compression

Text Books

1. Simon Haykin, Digital communications, John Wiley and sons, 1998
2. K Sam Shanmugam, Digital and Analog Communication Systems, John Wiley and sons (Asia) Pvt Ltd.

Reference Books

1. B.P. Lathi Modern digital and analog communication systems, 3rd Edition, Oxford University Press
2. Bernard Sklar, Digital Communications: Fundamentals and Applications, Pearson 2021, ISBN-9780134588568

Syllabus for Semester IV,

(MDM – 2 [Communication Engineering Track])

Course Code: 24EE05TH0408 – 2 **Course: Mobile Communication (MDM Course)**

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

Course Outcomes:

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

1. **CO1:** Realize the evolution of wireless communication technologies
2. Explain cellular system concepts such as frequency reuse, handoff strategies
3. Compare different wireless standards
4. Analyze the architecture and protocols of 2G and 3G cellular systems
5. Interpret next generation wireless technologies like LTE, MIMO, NOMA etc.

UNIT I: Introduction to Wireless Communication System:

Evolution of mobile communications, Trend in Cellular radio and personal communication, Cellular Network structure, Wireless Local Area network , Personal Area Networks, Concepts of small and large scale fading, delay spread

UNIT II – 2G and 3G Cellular Systems

The Cellular Concept- frequency reuse, Channel Assignment Strategies, Channel & co-channel interference reduction, Handoff Strategies, Improving Coverage & Capacity in Cellular System, GSM Architecture, overview of UMTS Architecture, Handover

UNIT III – Mobile Communication Standards

IEEE 802.11 WLAN standard and its variants, IEEE 802.15 WPAN standard, IEEE 802.16 Wireless broadband access standard, PHY and MAC layer overview, WiMAX network architecture, Initialization and handover procedures

UNIT IV – Beyond 3G

HSPA and LTE, Architecture, Radio interface and channels, Quality of Service, OFDM, NOMA, Heterogeneous Networks, Internetworking, MIMO Systems, Beamforming Techniques

Unit V - Recent Trends in mobile communication

Introduction to Wi-Fi, WiMAX, ZigBee Networks, Software-Defined Radio, UWB Radio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network.

Text Books:

1. Wireless Communication, Theodore S. Rappaport, Prentice hall
2. Mobile Communications Engineering, William C. Y. Lee, Mc Graw Hill Publications

Reference books:

1. Iti Saha Misra, "Wireless Communication and Networks – 3G and Beyond", Mc Graw Hill Education, Second Edition, 2013.
2. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition, 2012.

Credit Distribution in the Scheme of B. Tech. (ECE)

Category		Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Sem VII	Sem VIII	Total Credits (Actual)	Total Credits (as per NEP)
Basic Science Course	BSC/ESC	08	03	--	--	--	--	--	--	**11**	14-18
Engineering Science course		06	04		01 Linux	--	--	--	--	**11**	12-16
Program Core Course (PCC)	Program courses	04	04	15	15	11	11	10	--	**70**	44-56
Program Elective Course (PEC)		--	--	--	--	03	07	06	06	**22**	20
Multidisciplinary minor (MDM)	Multi Disciplinary courses			03	03	03	03	--	--	**12**	12
Open Elective (OE) Other than a particular program		--	--	02	02	02	--	--	--	**06**	06
Vocational and skill enhancement course(VSEC)	Skill courses	--	04 DS	--	01 Coding	02 w/s	01 Coding	--	--	**08**	08
Ability Enhancement course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	03 Eng	--	--	--	02 BC	--	--	--	**05**	04
Entrepreneurship /Economics/Management Course		--		--	--	--	--	--	--	**--**	04
Indian Knowledge System (IKS)			01 FLIC		--	--	--	--	--	**01**	02
Value Education Course(VEC)		01 UHV	02 EVS	--	--	--	--	--	--	**03**	04
Research Methodology	Experimental Learning Courses	--	--	--	--	--	--		--	**--**	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	--	--	--	--	01 PL	--	**01**	02
Project (PRJ)		--	--	--	--	--	02	02	06	**10**	04
Internship/OJT (INT)		--	--			--	--	--	12*	**12***	12
Co-curricular Courses(CC)	Liberal Learning Courses	--	02 Sports + Liberal		--	--	--	--	--	**02**	04
Total Credits		**22**	**20**	**20**	**22**	**23**	**24**	**19**	**12**	**162**	**162**

Open Electives

Semester	Open Elective	Courses
III	Open Elective – 1	1. Basics of Cloud Computing 2. Solar Technology
IV	Open Elective – 2	1. Fundamentals of Web Services using Cloud Computing 2. Renewable Energy using Solar Cells
V	Open Elective – 3	1. Introduction to DevOps

Program Electives

Semester	Program Elective	Courses
V	Program Elective – 1	1. Control Systems 2. Design and Analysis of Algorithms 3. Information Theory and Coding
VI	Program Elective – 2	1. Smart Sensors 1. Software Engineering 2. Communication Technologies
	Program Elective – 3	1. CMOS VLSI Design 2. Database Management Systems 3. Speech and Audio Processing
VII	Program Elective – 4	1. System Verilog 2. Customer Relationship Management 3. Smart Antennas
	Program Elective – 5	1. RF Circuit Design 2. Computer Vision 3. Wireless Sensor Networks
VIII	Program Elective – 6	1. VLSI Signal Processing 2. Artificial Intelligence 3. Deep Learning
	Program Elective – 7	1. RTOS and Kernels 2. Blockchain Technology 3. Cryptography and Network Security