B.Tech. Electronics and Communications Engineering (ECE)

KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme of Exams w.e.f academic session 2026-27

SEMESTER-V

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of exam (Hours)
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B24-HSM-201	Organizational Behaviour	3:0:0	3	3	70	30	--	100	3
2	B24-ECE-301	Digital Signal Processing	3:1:0	4	4	70	30	--	100	3
3	B24-ECE-303	Digital Communication	3:0:0	3	3	70	30	--	100	3
4	B24-ECE-305	Data Structure	3:0:0	3	3	70	30	--	100	3
5	B24-ECE-307	Antenna and Wave Propagation	3:0:0	3	3	70	30	--	100	3
6	B24-ECE-309	Digital Signal Processing Lab	0:0:3	3	1.5	--	40	60	100	3
7	B24-ECE-311	Communication Lab	0:0:3	3	1.5	--	40	60	100	3
8	B24-ECE-313	Data Structure Lab	0:0:2	2	1	--	40	60	100	3
9	B24-ECE-315	Industrial Training-I	0:0:2	2	1	--	100	--	100	3
10	B24-MAC-301	Constitution of India	2:0:0	2	1	--	100	--	100	3
TOTAL				**28**	**22**	**350**	**470**	**180**	**1000**	

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Scheme of Exams w.e.f academic session 2026-27

SEMESTER-VI

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of exam (Hours)
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B24-ECE-302	Computer Networks	3:0:0	3	3	70	30	--	100	3
2	B24-ECE-304	VLSI Design	3:0:0	3	3	70	30	--	100	3
3	B24-ECE-306	Wireless and Mobile Communication	3:0:0	3	3	70	30	--	100	3
4	B24-ECE-308	Control System Engineering	3:0:0	3	3	70	30	--	100	3
5	--	Program Elective-I	3:0:0	3	3	70	30	--	100	3
6	--	Open Elective-I	3:0:0	3	3	70	30	--	100	3
7	B24-ECE-310	Computer Networks Lab	0:0:2	2	1	--	40	60	100	3
8	--	Program Elective-I Lab	0:0:2	2	1	--	40	60	100	3
9	B24-ECE-312	Project-I	0:0:4	4	2	--	40	60	100	3
10	*B24-VAC-302/304/306/308/310	Hindi Language Skills/ Sanskrit Language Skills/ German Language Skills/ Japanese Language Skills/ French Language Skills	2:0:0	2	1	--	100	--	100	3
TOTAL				**28**	**23**	**420**	**400**	**180**	**1000**	

Note:

- The course of both Program Elective and Open Elective will be offered at 1/3rd strength or 20 students (whichever is smaller) of the section.
- **All students have to undertake the industrial training for 6 to 8 weeks after 6th semester which will be evaluated in 7th semester.**

*B24-VAC- 302/304/306/308/310 are value added courses that may be offered to students through the departments within university campus or institutes

List of Programme Elective and Open Elective Courses of 6th Semester		
PROGRAMME ELECTIVE-I	**PROGRAM ELECTIVE-I LAB**	**OPEN ELECTIVE-I**
B24-ECP -302 Internet of Things	**B24-ECP -314** Internet of Things Lab	**B24-OEC-302** Consumer Electronics
B24-ECP-304 Microwave Engineering	**B24-ECP-316** Microwave Engineering Lab	**B24-OEC-304** Transducers and their applications
B24-ECP-306 Biomedical Electronics	**B24-ECP-318** Biomedical Electronics Lab	**B24-OEC-306** Information Theory and Coding
B24-ECP-308 Digital Image Processing	**B24-ECP-320** Digital Image Processing Lab	**B24-OEC-308** Intellectual Property Rights (IPR) and Regulatory Framework
B24-ECP-310 Cyber Physical Systems	**B24-ECP-322** Cyber Physical Systems Lab	

B24-HSM-201	**Organizational Behavior**						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**0**	**-**	**3**	**70**	**30**	**100**	**3 Hours**
Course Outcomes							
Purpose	The objective of this Course is to make students conversant with the basic concepts of organization behaviour for nurturing managerial skills.						
CO1	An overview about organizational behavior as a discipline and understanding the concept of individual behavior.						
CO2	Understand the concept and importance of personality, emotions and its importance in decision making and effective leadership.						
CO3	Enabling the students to know about the importance of effective motivation and its contribution in group dynamics and resolving conflicts.						
CO4	Understand how to overcome organizational stress by maintaining proper organizational culture and effective communication.						

Unit- I

Introduction to organizational behavior: Concept and importance of organizational behavior, role of Managers in OB, challenges and opportunities for OB.

Foundation of individual behavior: Biographical characteristics, concept and types of abilities , concept of values and attitude, types of attitude, attitude and workforce diversity.

Unit- II

Introduction to personality and emotions: Definition and Meaning of Personality, Determinants of Personality, Personality Traits Influencing OB, Nature and Meaning of Emotions, Emotions dimensions, concept of Emotional intelligence.

Perception and individual decision making: meaning of perception, factors influencing perception, rational decision making process, concept of bounded rationality. Leadership-trait approaches, behavioural approaches, situational approaches, and emerging approaches to leadership.

Unit-III

Motivation: Concept and theories of motivation, theories of motivation-Maslow, two factor theory, theory X and Y, ERG Theory, McClelland's theory of needs, goal setting theory, application of theories in organizational scenario, linkage between MBO and goal setting theory.

Foundations of group behaviour and conflict management: Defining and classifying of groups, stages of group development, Informal and formal groups- group dynamics, managing conflict and negotiation , causes of group conflicts, managing intergroup conflict through resolution.

Unit-IV

Introduction to Organizational Communication: Meaning and importance of communication process, importance of effective communication, organizational stress: definition and meaning sources and types of stress, impact of stress on organizations, stress management techniques.

Introduction to Organization Culture: Meaning and nature of organization culture, types of culture, managing cultural diversity, managing change and innovation-change at work, resistance to change, a model for managing organizational change.

Text Books:

1. Colquitt, Jason A., Jeffery A. LePine, and Michael Wesson. Organizational Behavior: Improving Performance and Commitment in the Workplace. 5th ed. New York: McGrawHill Education, 2017.

2. Hitt, Michael A., C. Chet Miller, and Adrienne Colella. Organizational Behavior. 4th ed. Hoboken, NJ: John Wiley, 2015.

3. Robbins, Stephen P., and Timothy Judge. Organizational Behavior. 17th ed. Harlow, UK: Pearson Education, 2017. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.

Reference Books:

1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley.

2. Udai Pareek, Understanding Organisational Behaviour, Oxford Higher Education.

3. Mc Shane & Von Glinov, Organisational Behaviour, Tata Mc Graw Hill.

4. Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication.

B24-ECE-301	Digital Signal Processing						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**1**	**0**	**4**	**70**	**30**	**100**	**3 Hr.**
Course Outcomes							
CO1	Obtain Z-transformation of discrete time signals.						
CO2	Obtain DFT and FFT of discrete time signals.						
CO3	Implement structures for different discrete time systems.						
CO4	Design of FIR and IIR digital filters for various applications.						

UNIT I

Discrete Transforms: Z- transform and its properties, Inversion of Z-transform, One sided Z- transform and solution of differential equations. Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability test, relationship between Z-transform and Fourier transform.

Frequency Selective Filters: All pass filters, minimum-phase, maximum-phase and mixed- phase systems, Goertzel algorithm, Chirp Z-transform, applications of Z-Transform.

UNIT 2

Frequency Domain Sampling and DFT: DTFT, DFT, properties, Linear filtering using DFT, Frequency analysis of signals using DFT, radix 2 and radix-4 FFT, computation of DFT of real sequences.

Implementation Structures of Discrete Time Systems: Direct form, cascade form, frequency sampling and lattice structures for FIR systems. Direct forms, transposed form, cascade form parallel form. Lattice and lattice ladder structures for IIR systems.

UNIT 3

Design of FIR Filters: Characteristics of practical frequency selective filters, types of FIR filters, filter design specifications such as peak pass band ripple, minimum stop band attenuation etc., alternation theorem. Design of FIR filters using windowing method, frequency sampling method and Park-McClellan's method. Design of optimum equiripple FIR filters.

UNIT 4

Design of IIR Filters: Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse Invariance Method, Bilinear Transformation Method, Least Square Methods. Characteristics of Butterworth, Chebyshev and Elliptical analog filters, Frequency transformations, design of IIR filters in frequency domain.

Text Books

1. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms And Applications", 4th ed. Prentice Hall.
2. S. Salivahanan, "Digital Signal Processing", 3rd edition, McGraw Hill

Reference Books

1. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
2. S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.
3. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.
4. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.

B24-ECE-303	Digital Communication						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	**To learn digitization of analog signal by pulse modulation system and analyze their system performance**						
CO2	**To analyze different baseband transmission schemes and their performance**						
CO3	**To learn and understand different digital modulation schemes and compute the bit error performance**						
CO4	**To analyze different modulation tradeoffs and different equalization techniques .**						

UNIT-I

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM),Differential pulse codemodulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing. Quantization noise in delta modulation, The O/P signal to quantization noise ratio in delta modulation, O/P signal to noise ratio in delta modulation, Digital Multiplexers.

UNIT-II

Base Band Pulse Transmission: Matched filter and its properties, average probability of symbol error in binary enclosed PCM receiver, Intersymbol interference, Nyquist criterion for distortionless base band binary transmission, ideal Nyquist channel raised cosine spectrum, correlative level coding Duo binary signalling,

UNIT-III

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations.

Pass band Digital Modulation schemes- ASK, Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

UNIT-IV

Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver).Equalization Techniques—Tapped delay line equalizer, Adaptive equalizer. LMS algorithm, Eye pattern.

Synchronization and Carrier Recovery for Digital modulation.

Text Books:

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.

Reference Books:

1. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.
2. Lathi B.P., " Modern Digital and Analog Communication", 4th edition, Oxford university Press,2010

B24-ECE-305	Data Structure						
Lecture	Tutorial	Practical	Credit	End Semester Exam	Internal Assessment	Total	Time
3	-	-	3	70	30	100	3 Hr.
Course Outcomes (CO)							
CO1	Student will be able to understand the concept of data structure and arrays.						
CO2	Student will be able to conceptualize stacks and queues.						
CO3	Student will be able to implement linked list and its operations.						
CO4	Student will be able to implement the binary trees and graphs.						

Unit- I

Introduction: Concept of Data Structures, Design of suitable algorithm, algorithm analysis.
Arrays: 1-D arrays: Traversal, Selection, Searching, Insertion, Deletion and Sorting. Multi-D arrays, representation of arrays in physical memory, application of arrays

Unit- II

Stacks and Queues: Stacks: Stack operations, Application of Stacks, Queues: operations, circular queue, priority queue, deque
Pointers: Introduction, pointer variable, pointers and arrays, array of pointers, pointers and structures

Unit -III

Linked Lists: Introduction, Operations: Creation, Traversal, Searching, Insertion and Deletion. Circular and Doubly linked list, linked stacks and queues.

Unit-IV

Trees: Basic terminology, binary trees, representation of binary trees: linear and linked, traversal of binary trees
Graphs: Graph terminology, representation of graphs: array based, linked list based, set based.

Text Books:
1. Data Structures using C by A. K. Sharma , Pearson Publication
2. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH.

Reference Books:
1. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub
2. Data Structures and program design in C by Robert Kruse, PHI Expert Data Structures with C by R.B. Patel

Note: Question paper template will be provided to the paper setter.

B24-ECE-307	Antenna and Wave Propagation						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**0**	**0**	**3**	**70**	**30**	**100**	**3 Hrs.**
Purpose	*To familiarize the students with: Antennas used for various applications, performance parameters of antenna, methods of analysis of antenna, and different ways of propagating the signal.*						
CO1	*To Understand the structure and properties of various antennas.*						
CO2	*To understand the performance parameters of antenna.*						
CO3	*To design antenna of required specifications.*						
CO4	*To understand the different ways of signal propagation.*						

Unit-I

Fundamental concept: Physical concept of radiation, Retarded potential, Radiation pattern, near- and far- field regions. **Antenna Parameters:** Radiation Resistance, Gain, Directive Gain, Power Gain, Directivity, Efficiency, Beam width, Effective Height, Effective Aperture, Bandwidth and Antenna Temperature.

Radiation from Wires: Radiation from Hertzian Dipole, Short Dipole, Monopole Antenna, Folded Dipole Antenna and Half Wave Dipole.

Unit-II

Antenna Arrays: Uniform Linear Arrays - Broadside Arrays, Endfire Arrays. Analysis of arrays of 2 Isotropic Sources - Different Cases, Analysis of arrays of N Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Binomial Array, Chebyshev Array. **TV Transmission & Reception Antennas:** Turnstile Antennas, Yagi-Uda antennas. **Standard Antennas:** Loop Antenna (Rectangular & Circular), Helical Antenna, Biconical Antenna.

Unit-III

Aperture & Slot Antennas: Radiation from Rectangular Apertures, Uniform and Tapered Aperture, Horn antenna, Reflector Antenna , Cassegrain and Gregorian Feeding Structures, Rectangular Slot Antenna, Lens Antenna

Broadband Antennas: Huygens' Principle, The frequency independent concept: Rumsey's principle, Frequency Independent Planar Log Spiral Antenna, Frequency independent conical spiral antenna, Log periodic antenna, Lens Antenna.

Microstrip/Patch Antennas: Basic configurations of patch antennas: Rectangular, Circular. Different Feeding Techniques. Method to Analyze Patch antenna: Transmission Line Model.

Unit-IV

Propagation of Radio Waves: Introduction, Ground Wave Propagation, Space Wave Propagation and Sky Wave Propagation: Virtual Height, Critical Frequency, Maximum Usable Frequency (MUF) – Skip Distance, Fading, Multi Hop Propagation, Duct Propagation, Troposcatter Propagation, Flat Earth and Curved Earth Concept,.

REFERENCES:

1. J. D. Kraus, Antennas, McGraw Hill, 1988.
2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.
3. Antenna & Wave Propagation- K.D. Prasad, Satya Parkashan.
4. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
5. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
6. A.R. Harish, M. Sachidananda, Antenna and Wave Propagation, Oxford University Press.

B24-ECE-309	Digital Signal Processing Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
0	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hr.**
Course Outcomes							
CO1	Plot different discrete time signals.						
CO2	Verify the aliasing effects.						
CO3	Design digital FIR filters for various applications.						
CO4	Design digital IIR filters for various applications.						

List of Experiments

1. Write a program to plot the following functions: a) impulse function b) unit step c) unit ramp d) exponential and e) sinusoidal
2. Write a program to plot real part, imaginary part, magnitude and phase spectra of an exponential function.
3. Study the aliasing effect by using a sinusoidal signal. Show the plots of' continuous time signal, sampled signal and reconstructed signals by using subplot.
4. Write a program to compute and plot the convolution of two signals.
5. Define a function to compute the Z-transform of a finite length signal.
6. Verify the properties of Discrete Fourier Transform (DFT).
7. Study of different window functions available for design of FIR filters.
8. Design of FIR filters by using windowing method.
9. Design of equiripple High Pass and Low Pass FIR filters.
10. Study of magnitude and phase response of Butterworth, Chebyshev and Elliptic filters.
11. Design of IIR filters by using different analog filter approximation method.

Reference Books

1. J. G. Proakis and D.G. Manolakis, ‘‘Digital Signal Processing: Principles, Algorithms and Applications’’, 4th ed. Prentice Hall.
2. S. Salivahanan, ‘‘Digital Signal Processing’’, 3rd edition, McGraw Hill
3. John G Proakis and Vinay K. Ingle, ‘‘Digital Signal Processing using MATLAB’’, Cengage India Private Limited, 2017

Note: At least ten (10) experiments from the above list are mandatory to perform for the students.

B24-ECE-311	COMMUNICATION LAB						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
-	**-**	**3**	**1.5**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO) **Upon completion of the course, students will be able to**							
CO1	**Generate and analyze Analog Modulated and demodulated Signals.**						
CO2	**Test & observe the outputs of different types of analog detectors.**						
CO3	**Generate and analyze digital Modulated and demodulated Signals.**						
CO4	**Test & observe the outputs of different types of digital detectors.**						

List of experiments:

1: To study and Perform Amplitude Modulation & Demodulation.
2: To study and Perform Frequency Modulation and Demodulation.
3: To study and Perform Pulse Amplitude Modulation and Demodulation.
4: To study and Perform Pulse Width Modulation and Demodulation.
5: To study and Perform Pulse Position Modulation and Demodulation.
6: To study and Perform Pulse Code Modulation and Demodulation.
7: To study and Perform Time Division Multiplexing (TDM) system.
8: To study and Perform Amplitude Shift Keying (ASK) Modulation and Demodulation.
9: To study and Perform Frequency Shift Keying (FSK) Modulation and Demodulation.
10: To study and Perform Phase Shift Keying (PSK) Modulation and Demodulation.
11: To study and Perform Quadrature Phase Shift Keying (QPSK) Modulation and De-Modulation.
12: To study and perform Adaptive Delta Modulation and demodulation.
13. To study Base Band Transmission and calculate bit error rate.

Note: At least ten (10) experiments from the above list are mandatory to perform forthe students.

Reference Books:

1. Taub & Schilling, Principles of Communication Systems, McGraw Hill Publications,(1998) 2nd ed.
2. Simon Haykin, Communication Systems, John Wiley Publication, 3rd ed.
3. Sklar, Digital Communications, Prentice Hall-PTR, (2001) 2nd ed.
4. Lathi B. P., Modern Analog and Digital Communication, , Oxford University Press,(1998) 3rd

B24-ECE-313	Data Structure Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3 Hr.**
Course Outcomes (CO)							
CO1	Students will be able to implement various sorting and searching algorithms.						
CO2	Students will be able to implement various stack and queue operations.						
CO3	Students will be able to implement various tree operations.						
CO4	Students will be able to implement various graph operations.						

List of Experiments:

1. Write a program in C to create and traverse an array of N numbers.
2. Write a program in C implement linear and binary search in an array.
3. Write a program in C implement selection sort.
4. Write a program in C implement bubble sort.
5. Write a Program in C to implement stacks using arrays.
6. Write a program in C to create and traverse linked list.
7. Write a program in C to insert and delete node from linked list.
8. Write a program in C to implement stacks using linked list.
9. Write a Program in C to implement binary tree.
10. Write a program to implement the tree traversal methods.
11. Write a Program in C to implement graph.
12. Write a Program in C to traverse graph.

Note: At least ten (10) experiments from the above list are mandatory to perform for the students.

Reference Books:

1. Data Structures using C by A. K. Sharma , Pearson Publication
2. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH.
3. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub
4. Data Structures and program design in C by Robert Kruse, PHI Expert Data Structures with C by R.B. Patel

B24-ECE-315	Industrial Training-I						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
-	**-**	**2**	**1**	**--**	**100**	**100**	**3 Hrs.**

It is course in which the students will be evaluated for the industrial training undergone after 4th semester and students will be required to get passing marks to qualify.

B24-MAC-301	Constitution of India						
				Examination Schedule (Marks)			
Lecture	Tutorial	Practical	Credit	End semester exam	Internal assessment	Total	Duration of Exam (Hours)
2	-	-	1		100	100	3
Purpose	This course introduces students to the basic Philosophy of Indian Constitution.						
Course Outcomes: After completion of course the students will be able							
CO1	To explain the basic structure of Indian Constitution						
CO 2	To understand the structure of Indian Union						
CO 3	To write down roles and powers of Governor						
CO 4	To explain the election process under Indian Constitution.						

Unit 1

The Constitution - Introduction , The History of the Making of the Indian Constitution ,Preamble and the Basic Structure, and its interpretation , Fundamental Rights and Duties , Brief overview of Directive principles of State Policy.

Unit 2

Union Government, Structure of the Indian Union, President – Role and Power, Prime Minister and Council of Ministers, Brief overview of Lok Sabha and Rajya Sabha.

Unit 3

State Government , Governor – Role and Power, Chief Minister and Council of Ministers, State Secretariat, distributions of powers between state and centre under Indian Constitution.

Unit 4

Local Administration, District Administration, Municipal Corporation, Zila Panchayat.

Election Commission a. Role and Functioning b. Chief Election Commissioner c. State Election Commission

Suggested Learning Resources: 1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008

2 The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)

3 Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition Suggested Software/Learning Websites:

1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-ofindia/

B24-ECE-302	Computer Networks							
Lecture (Hrs.)	Tutorial (Hrs.)	Practical (Hrs.)	Credit	End Semester exam	Internal Assessment	Practical	Total	Time
3	-	-	3	70	30	-	100	3 Hrs.
Course Outcomes At the end of this course students will demonstrate the ability To								
CO1	Understand data communication and the functions of each layer of ISO-OSI protocols							
CO2	Perform computations and solve networking and routing problems.							
CO3	Find differences between Real time and Non Real time protocols using different techniques.							
CO4	Implement small connections between two or more processes running in single or different computing systems.							

UNIT-1

Introduction to computer networks and Internet: Introduction to Data Network and ISO-OSI protocol, Fundamentals of Physical Layer and different modes of data communication.

Link layer: ALOHA, Multiple access protocols, Local Area Networks, addressing, Ethernet, Hubs, Switches.

UNIT-2

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting.

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing.

UNIT-3

Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call.

Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

UNIT-4

Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing.

Text/ Reference books:

1. Andrew Tanenbaum, “Computer networks”, Prentice Hall
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition
3. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition
4. Bhavneet Sidhu, An Integrated Approach to Computer Networks, Khanna Publications.
5. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall
6. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
7. William Stallings, “Data and computer communications”, Prentice Hall

B24-ECE-304	VLSI Design						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hr.**
		Course Outcomes					
CO1	Student will be able to understand Fabrication flow & analyze MOS transistor characteristics						
CO2	Student will be able to design invertor of specific characteristics						
CO3	Student will be able to design combinational CMOS circuit of given Boolean equation						
CO4	Student will be able to design sequential CMOS circuit of given specification						

Unit- I

Introduction: Overview of VLSI Design Methodologies, VLSI Design flow, Design hierarchy, VLSI Design styles, Fabrication Process Flow: Basic steps, Stick-Diagram.
MOS Transistor: MOS structure, MOS system under external bias, structure and operation of MOSFET, C-V characteristics, channel length modulation & substrate bias effects, MOSFET scaling.

Unit- II

MOS Invertors: Introduction, resistive load invertor, invertor with n-type MOSFET load, CMOS invertor: circuit operation, noise margin, design of invertor, power and area consideration. .

Unit -III

Combinational MOS Logic: nMOS logic circuits with depletion nMOS load, CMOS logic circuits, complex logic circuits, CMOS pass gates logic design.

Unit-IV

Sequential MOS Logic circuits: Behaviour of bistable elemens, SR latch circuit, clocked latch and flip flop, CMOS D Latch and edge triggered flip flop

Text Books:

1. S. M. Kang and Y. Leblebici, CMOS Digital Integrated Circuits : Analysis and Design, Third Edition, MH, 2002.

Reference Books:

1. N. Weste, K. Eshraghian and M. J. S. Smith, Principles of CMOS VLSI Design : A Systems Perspective, Second Edition (Expanded), AW/Pearson, 2001.
1. J. P. Uyemura, CMOS Logic Circuit Design, Kluwer, 1999.

B24-ECE-306	WIRELESS AND MOBILE COMMUNICATION						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hrs.**

Course Outcomes (CO)

Upon completion of the course, students will be able to

CO1	It deals with introduction of Wireless Communication Systems and different generations of cellular networks.
CO2	Understand and analyze operations of cellular system and cellular design fundamentals.
CO3	It provides different Multiple Access Techniques used in Mobile Wireless Communications.
CO4	It presents different ways to wireless standards and mobility management.

UNIT – I:

Introduction to Wireless Communication Systems: Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

Modern Wireless Communication Systems: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area Networks.

UNIT – II:

Introduction to Cellular Mobile Systems: Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems analog cellular systems, digital Cellular Systems.

The Cellular Design Fundamentals: Frequency Reuse, channel allocation schemes, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity

UNIT – III:

Introduction to Multiple Access Techniques used in Mobile Wireless Communications: FDMA/TDMA/CDMA. Spread Spectrum Communication Multiple Access, Space Division Multiple Access, Packet Radio, Capacity of cellular System

UNIT – IV:

Wireless standards-GSM, IS-95, UMTS-IMT-2000, Signaling, Call Control, Mobility Management and location Tracing.

Text Books

1. T. S. Rappaport: Wireless Communications, PHI, 2002.
2. Jochen Schiller : Mobile Communication , Pearson. 3. Raymond Steel : GSM, cdma one and cdma 2000, Wiley.

Reference Books:

4. Andrea Goldsmith : Wireless Communications , Cambridge University Press.
5. William C.Y.Lec, Mobile Cellular Telecommunications, Analog and Digital Systems, McGraw Hill Inc.
6. David Tse & Pramod Viswanath: Fundamentals of Wireless Communication , Cambridge University Press.
7. Kamilo Feher, Wireless Digital Communications, Modernization & Spread Spectrum Applications, Prentice Hall of India, New Delhi.

B24-ECE-308	Control System Engineering						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**0**	**0**	**3**	**70**	**30**	**100**	**3 Hours**
Purpose	The purpose of this course is to create awareness about the various types of control systems with the techniques to analyze them so that the learner is able to mathematically design and evaluate the conditions for which a control system can provide stable output with improved performance.						
CO1	Learner will be able to design and simplify the mathematical and graphical models of a control system through block diagram and signal flow graph method.						
CO2	Learner can evaluate the conditions for which a system can work under stable conditions in time domain.						
CO3	Learner will know about easier graphically methods to evaluate the conditions of stability in frequency domain.						
CO4	Learner will able to apply the compensation technique using state variable approach to convert an unstable system into a stable system under certain conditions.						

UNIT-I

Introduction: The Control system-Open loop & Closed loop, servomechanism, Stepper motor. Mathematical Models of Physical Systems: Differential equation of physical systems, Transfer Function, Block Diagram Algebra, Signal Flow-Graphs, Mason's Formula & its application. Feedback Characteristics of Control Systems: Feedback and Non-Feedback systems, Effects of Feedback on sensitivity (to parameter variations), Stability, Overall gain etc.

UNIT-II

Time Response Analysis: Standard test signals, Time response of first order and second order systems, Steady-State Errors and Error Constants, Design Specification of second-order- systems. Stability: The concept of stability, necessary conditions for stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative Stability Analysis. The Root Locus Technique: The Root Locus Concept, Construction /development of Root loci for various systems, Stability considerations. Proportional, Integral and Derivative Controllers.

UNIT-III

Frequency Response & Stability Analysis: Correlation between Time and Frequency response, Polar Plots, Nyquist plots, Bode Plots, Nyquist Stability criterion, Gain margin & Phase margin, relative stability using Nyquist Criterion, frequency response specifications.

UNIT-IV

Compensation of Control Systems: Necessity of Compensation, Phase Lag compensation, Phase Lead Compensation, Phase Lag Lead Compensation, Feedback Compensation. State Variable Analysis: Concept of State, State Variable and State Model, State Models for Linear Continuous Time Systems, Diagonalization, Solution of state equations, Concept of Controllability and Observability.

Text Book: Control System Engg.: I. J. Nagrath & M.Gopal; New Age India.

Reference Books:

1. Automatic Control Systems: B.C. Kuo; PHI.
2. Modern Control Engg: K. Ogata; PHI.

B24-ECP -302	Internet of Things						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**0**	**0**	**3**	**70**	**30**	**100**	**3Hr.**
Course Outcomes							
CO1	Understand what IoT technologies are used for today, and what is required in certain scenarios.						
CO2	Understand the types of technologies that are available and in use today and can be utilized to implement IoT solutions.						
CO3	Understand the type of protocols and challenges for designing IoT systems.						
CO4	Apply these technologies to tackle scenarios in teams of using an experimental platform for implementing prototypes and testing them as running applications. Understand operating system requirements of IOT.						

Unit 1

Introduction to IoT: Defining IoT, Characteristics of IoT, benefits/Challenges of deploying an IoT, Functional blocks of IoT, Physical and logical design of IoT, Smart cities and IoT revolution, Difference between IoT and M2M, M2M and peer networking concepts, Software Defined Networks SDN, Cloud for IoT: IoT withcloud, challenges, introduction to fog computing, cloud computing

Unit 2

Developing IoTs: IoT design methodology, case study on IoT system for weather monitoring. IoT systemManagement,

Developing IoT applications through embedded system platform: Introduction to sensors & transducers, Introduction to electrodes & biosensors, Static and dynamic characteristics of sensors, Different types of sensors, Selection criteria's for sensors / transducers

IoT physicaldevices and endpoints, Raspberry pi, Raspberry pi interfaces, Arduino, arduino interfaces.

Unit 3

Protocols for IoT- Data transmission, Choice of channel (wired/wireless), messaging protocols, Communication and Networking in IoT: Review of Communication Protocols and Network protocols, Challenges in Networking of IoT Nodes, range, bandwidth, Medium Access Control (MAC) Protocols, transport protocols 6LoWPAN, IPv4, IPv6, URI,

Challenges in IoT: Design challenges, development challenges, security and legal considerations.

Unit 4

Logic design using Python: Introduction to python, data types, data structures, control flow, functions, modules, file handling and classes., implementing IoT concepts with python,

Applications of IoT, Connected cars IoT Transportation, Smart Grid and Healthcare sectors using IoT, Home Automation, Precision Agriculture, Industry 5.0

References:

1) A Bahaga, V. Madisetti, "Internet of Things- Hands on approach", University press,2014.
2) S.K.Vasudevan, A.S.Nagarajan, "Internet of Things", Wiley, 2019.
3) CunoPfister, "Getting started with Internet of Things", Maker Media, 1st edition,2011. Samuel Greenguard, "Internet of things", MIT Press, 2015.
4) Pethuru Raj, Anupama C. Raman, "The Internet of Things Enabling Technologies, Platforms, and Use Cases", CRC Press, Taylor And Francis Group, 2017

B24-ECP-304	Microwave Engineering						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**0**	**0**	**3**	**70**	**30**	**100**	**3 Hrs.**
Purpose	*To familiarize the students with: Antennas used for various applications, performance parameters of antenna, methods of analysis of antenna, and different ways of propagating the signal.*						
CO1	*Study and analyze the behavior of various types of waveguides, Cavity resonator, Quality factor and gain knowledge of measuring microwave power, frequency, impedance, and VSWR.*						
CO2	*Learn about various microwave generators and amplifiers such as Klystron, Magnetron and Travelling Wave Tube.*						
CO3	*Learn about Scattering Matrix, its properties and study about various microwave components like Tees, couplers, isolators and filters.*						
CO4	*Study about solid state microwave devices such as microwave diodes including GUNN, TRAPATT and BARITT etc.*						

UNIT – I:

Microwave Resonators: Brief description of waveguides, coplanar waveguides, cavity resonators: rectangular, cylindrical, spherical and coaxial, excitation and coupling of cavities, Q factor.

Microwave Measurements: Measurement of frequency, impedance (using slotted section) attenuation, power, dielectric constant, measurement of V.S. W. R., insertion loss and permeability.

UNIT – II:

Microwave Generators: Construction, characteristics, operating principle and typical applications of Klystron (two cavity, multicavity), Reflex Klystron, magnetron (Cylindrical magnetron and description of Π mode applications) and Traveling Wave Tube (TWT).

UNIT – III:

Matrix Description of Microwave Circuits: Scattering matrix-its properties, measurement of scattering coefficients, scattering matrices for common microwave systems.

Microwave Components: Waveguide tees- E-plane, H-plane, magic tee, rat race, directional coupler, tuning screws and stubs, isolators and circulators-their constructional features and applications. Microwave filters, Phase shifters, attenuators, Wavemeters.

UNIT-IV.

Solid State Microwave Devices:

Transferred electron devices- GUNN EFFECT; negative differential resistance phenomenon, field domain formation, GUNN diode structure. Avalanche transit time devices: IMPATT, TRAPATT, BARITT diodes, parametric amplifiers

Suggested Books:

1. Samuel Y. Liao, Microwave Devices and Circuits, Prentice-Hall of India.
2. David M. Pozar, Microwave Engineering, John Wiley and sons Inc.
3. Das, Annapurna & Sisir K. Das, Microwave Engineering, Tata McGraw-Hill.
4. POZAR DM, Microwave Engg, John Wiley & Sons Inc.

B24-ECP-306		Biomedical Electronics						
Lecture (Hrs.)	Tutorial (Hrs.)	Practical (Hrs.)	Credit	End Semester Exam	Internal Assessment	Practical	Total	Time
3	-	-	3	70	30	-	100	3

Course Outcomes

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

CO1	Understand and explain the concept of biomedical signals, electrodes and Instrumentation
CO2	Understand and explain the physiological transducers and recording systems
CO3	Understand and explain biomedical recorders and patient monitoring systems
CO4	Understand and explain cardiac pacemakers, defibrillator and patient safety

UNIT-I

Medical Instrumentation: Basic Medical Instrumentation System, Static and dynamic characteristics of medical instruments, Bio-signals and characteristics. Problems encountered with measurements from human beings. Sources of Bioelectric Potentials, Resting and Action Potentials.

UNIT-II

Bio- Potential Electrodes and Physiological Transducers: Electrode potential, Electrode equivalent circuit, Types of Electrodes - Surface Electrodes, Needle Electrodes, Micro Electrodes. Transducers for Biomedical Applications.

BIO-SIGNAL ACQUISITION: Electrical Conduction system of the heart, Electrocardiogram, ECG leads, Einthoven triangle, ECG amplifier, EEG 10-20 lead system and EMG.

UNIT-III

Bio- Signal Measurements: Blood flow meters - Electromagnetic blood flow meter, Ultrasonic Doppler blood flow meter. Blood pressure measurement - Ultrasonic blood pressure monitoring.

Physiological Assist Devices and Therapeutic Equipment: Pacemakers - External & internal, Defibrillators - External & internal, Hemodialysis machine.

UNIT-IV

Operation Theatre Equipment: Spirometry, Anesthesia machine, Ventilators.

Monitoring Equipment: Arrhythmia Monitor, Foetal Monitor, and Incubator.

Medical Imaging Equipment: X-ray machine, Computed Tomography (CT), Ultrasound Imaging system.

TEXT BOOKS:

1. R.S. Khandpur, "Handbook of Biomedical Instrumentation", TMH, 2nd Ed., 2003.
2. Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, "Biomedical Instrumentation and Measurements", PHI, 2nd ed, 1980.
3. Dr. M. Arumugam, "Biomedical Instrumentation", Anuradha publications, 2nd ed, 1994.

REFERENCE BOOKS:

1. Onkar N. Pandey, Rakesh Kumar, "Bio-Medical Electronics and Instrumentation", Katson Books, 2011.
2. John G. Webster, "Medical Instrumentation, Application and Design", John Wiley, 3rd ed., 2009.

B24-ECP-308	Digital Image Processing							
Lecture (Hrs.)	**Tutorial (Hrs.)**	**Practical (Hrs.)**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Practical Exam**	**Total**	**Time (Hrs.)**
3	-	-	3	70	30	-	100	3
Course Outcomes								
CO1	Student will be able to explain basic concepts of image processing							
CO2	Student will be able to describe various video processing systems							
CO3	Student will be able to analyze various compression and morphological operations							
CO4	Student will be able to describe various video processing systems							

Unit – I

Digital image processing fundamentals: Introduction, Image processing applications, Fundamental Steps in Digital Image Processing, Image Sampling and Quantization, Relationships between pixels, Color Fundamentals, color models.

Unit - II

Image Enhancement: Basics of intensity Transformations, Histogram processing, Spatial Domain filtering – Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering.

Frequency Domain Filtering- Sampling and Fourier Transform of sampled functions, 2-D Sampling, Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

Unit - III

Image Compression: Fundamentals, Image Compression models, Error Free Compression – Huffman Coding, Arithmetic Coding, LZW Coding, Lossy Compression – Block transform coding.

Morphological Image Processing: Introduction, Erosion and Dilation, Opening and Closing, Hit or Miss Transformations, Boundary Extraction. Image Segmentation: Fundamentals of image segmentation, Point, Line, and Edge Detection.

Unit - IV

Video Processing: video formation, Video Frame classifications- I, P and B frames, Application of motion estimation in video coding, Patterns and Pattern classes - Recognition based on matching.

Text Books:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2018.

Reference Books:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011
2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
3. M. Tekalp, Digital Video Processing. Signal Processing Series, Prentice Hall, 1995.
4. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.

Note: Question paper template will be provided to the paper setter.

B24-ECP -310	Cyber Physical Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**0**	**0**	**3**	**70**	**30**	**100**	**3Hr.**
Course Outcomes							
CO1	Understand what Cyber Physical Systems are used for today, and what is required in certain scenarios.						
CO2	Understand the type of protocols and challenges for designing and modeling Cyber Physical Systems. Understand the types of technologies that are available and in use today and can be utilized to implement IoT solutions.						
CO3	Understand the low energy technologies that are available and in use today and can be utilized to implement solutions to various Cyber Physical Systems.						
CO4	Apply these technologies to tackle scenarios in terms of using an experimental platform for implementing prototypes and testing them as running applications.						

Unit 1

Introduction to Cyber Physical Systems (CPS), evolution of cyber physical systems, characteristics and architecture of CPS, relationship between CPS, Embedded Systems and Internet of Things (IoT), components of CPS including sensors, actuators, microcontrollers and communication interfaces, basic signal acquisition and data processing, mathematical representation of physical processes, basic numerical problems related to sensor data interpretation and system parameters, applications of CPS in smart grid, smart cities, healthcare systems, transportation and industrial automation.

Unit 2

Embedded and real-time systems in CPS, architecture of ARM microcontrollers and processors, interfacing of sensors and actuators, communication protocols used in CPS such as UART, I2C, SPI and wireless protocols, networking concepts in CPS and IoT based systems, numerical analysis related to data rate, latency and network performance.

Modeling and control of cyber physical systems, continuous and discrete time system models, hybrid systems combining physical and computational processes, state-space representation and system dynamics, feedback control principles, PID controller design and tuning.

Unit 3

Introduction to Bluetooth Low Energy (BLE): overview of BLE roles as peripheral, central, broadcaster & observer. BLE Advertising, advertising channels & events. Advertising packets: understanding protocol data unit, payload format, AD types (Flags, UUIDs). Advertising intervals & their effects. BLE device name broadcasting, Scanning & discovering devices, Advertisement filtering based on UUIDs, RSSI, or payload data, importance of scan interval and scan window. BLE observer role, sensor data transmission, data format & optimization for sensor payloads. Low power modes, wake-up sources: GPIO interrupts, timers, BLE events. Power optimization trade-offs, deep sleep with GPIO wake-up.

Unit 4

Introduction to IoT Cloud Communication: overview of cloud platforms and their role in IoT. Gateway Fundamentals: Role of gateways in IoT including data aggregation, processing, and forwarding to the cloud. Data formats & protocols: JSON, MQTT, HTTP/HTTPS for transmitting sensor data. Understanding BLE gateways for multi-sensor data collection. Communication: pairing sensors and acquiring data using BLE. Synchronization: Techniques for data consistency and timestamping. Advanced Gateway configuration: processing data from multiple sensor types. Cloud integration using SDKs & APIs. Multi-Node Gateway: Collect & synchronize data from multiple nodes using single BLE (Node Aggregation), minimize latency and power consumption in multi-node scenarios. Applications of multi-node gateways in smart agriculture & smart cities.

References:

1) Raj Rajkumar, Dionisio De Niz, Mark Klein, "Cyber-Physical Systems", Pearson Education,2017.
2) Mohammad Afaneh "Intro to Bluetooth Low Energy", Novel Bits, 2023.
3) Raj kamal, "Internet of things IoT architecture and Design principles", McGraw Hill, 2022.

4) A Bahaga, V. Madisetti, “Internet of Things- Hands on approach”, University press,2014.
5) Pethuru Raj, Anupama C. Raman, “The Internet of Things Enabling Technologies, Platforms, and Use Cases”, CRC Press, Taylor And Francis Group, 2017

B24-OEC-302	Consumer Electronics						
Lecture (Hrs.)	Tutorial (Hrs.)	Practical (Hrs.)	Credit	End Semester Exam	Internal Assessment	Total	Time
3	---	-------	3	70	30	100	3 Hrs
PO	To familiarize the students with the concepts of basic television systems, advanced high definition television systems and different advanced electronic home appliances.						
Course Outcomes (CO)							
CO1	To understand fundamentals of Monochrome and Colour TV systems.						
CO2	To understand television receivers and digital TV system						
CO3	To understand audio fundamentals and systems.						
CO4	To maintain various electronic home appliances.						

UNIT-I

Monochrome TV Systems and Colour TV Systems: Monochrome picture signal transmission and reception, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, Composite video signal, vestigial sideband transmission.

Colour theory, Grassman's Law, hue, brightness, saturation, Different types of TV camera tube, channel bandwidth.

UNIT-II

Television Receivers: Monochrome and colour picture tube, receiver controls.

Television standards: PAL, SECAM, NTSC. Digital TVs: working principle of HDTV, Principle and working of LCD and LED TV, Block diagram and working principle of OLED.

UNIT-III

Audio Fundamentals: Basic characteristics of sound signal: level and loudness, pitch, frequency response, fidelity and linearity.

Microphone: working principle, characteristics, Types: carbon, crystal.

Loudspeakers: working principle, Types: electrostatic, dynamic, permanent magnet.

UNIT-IV

FAX, Microwave Oven, Washing Machine: wiring diagram, types of washing machine,

Air conditioner: Components features, types and applications, Digital camera.

TEXT BOOKS:

1 R.R. Gulati "Modern Television practices", New Age International Publication (P) Ltd. New Delhi• Year 2011, latest edition.

2 S.P. Bali., "Consumer Electronics", Pearson Education, 2010, latest edition.•

B24-OEC-304	Transducers and their Applications						
Lecture	Tutorial	Practical	Credit	End Semester Exam	Internal Assessment	Total	Time
3	-	-	3	70	30	100	3 Hrs.
Course Outcomes (CO) Upon completion of the course, students will be able to							
CO1	Understand the fundamentals of transducers, their classifications, and the importance of electrical signal output.						
CO2	Learn different types of transducers, including resistive, inductive, capacitive, piezoelectric, photoelectric, and Hall effect sensors.						
CO3	Gain knowledge of measurement techniques for displacement, pressure, temperature, force, velocity, and torque using transducers.						
CO4	Develop skills to analyze, compare, and select appropriate transducers for various engineering applications.						

UNIT-I

Definition of transducer. Advantages of an electrical signal as out-put. basic requirements of transducers, Primary and Secondary Transducer, Analog or digital types of transducers.
Resistive, inductive, capacitive, piezoelectric, photoelectric and hall effect transducers.

UNIT-II

Measurement of pressure – Manometers, Force summing devices and electrical transducers
Measurement of temperature – Metallic resistance thermometers, semi-conductor resistance sensors (Thermistors), thermo-electric sensors, pyrometers.

UNIT-III

Measurement of displacement – Potentiometric resistance type transducers, inductive type transducers, differential transformer (L.V.D.T), capacitive transducers, Hall effect devices, strain gage transducers.
Measurement of velocity – variable reluctance pick up, electromagnetic tachometers, photoelectric tachometer, toothed rotor tachometer generator..

UNIT-IV

Measurement of Force – Strain-gage load cells, pneumatic load cell, LVDT type force transducer.
Measurement of Torque – Torque meter, torsion meter, absorption dynamometers, inductive torque transducer, digital methods.

Text Books:

1. B.C. Nakra, K.K. Chaudhry, "Instrumentation Measurement and Analysis," Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. A.K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation," Dhanpat Rai & Sons, Delhi-6.

Reference Books:

1. Thomas G. Beckwith etc. all, "Mechanical Measurements (International Student Edition), Addison-Wesley Longman, Inc. England.

B24-OEC-306	Information Theory and Coding						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hr.**
Course Outcomes							
CO1	Students will be able to construct codes for given source.						
CO2	Students will be able to justify the various Linear Block Codes.						
CO3	Students will be able to produce convolutional codes for given input.						
CO4	Students will be able to compare various encryption algorithms.						

UNIT – I

Source Coding : Introduction to Information theory, uncertainty and information, entropy, source coding theorem, Huffman coding.

Channel Capacity and Coding : Channel model, channel capacity, channel coding.

UNIT-II

Linear Block Codes for Error Correction: Introduction to error correcting codes, matrix description of LBC, Parity check matrix, decoding of linear block codes, Syndrome decoding.

Cyclic Codes: Polynomials, division algorithm, generating cyclic codes, matrix description of cyclic codes.

UNIT – III

Convolutional Codes: Introduction, trellis codes, polynomial description of convolutional codes, distance notation for convolutional codes, matrix description, viterbi decoding, distance bounds for convolutional codes.

UNIT – IV

Cryptography: Introduction, overview of encryption techniques, operations used by encryption algorithm, symmetric cryptography, DES, IDEA, Assymetric encryption, RSA Algorithm.

Text Books:

1. Ranjan Bose, Information theory, coding and cryptography, Tata McGraw Hill, 2nd Edition
2. N. Abramson, Information and Coding, McGraw Hill, 1963.

Reference Books :

1. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
2. R.B. Ash, Information Theory, Prentice Hall, 1970.
3. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.

Note: Question paper template will be provided to the paper setter.

B24-OEC 308	Intellectual Property Rights (IPR) & Regulatory Framework						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
3	**-**	**-**	**3**	**70**	**30**	**100**	**3 Hours**
Course Outcomes							
Purpose	The course is designed to provide comprehensive knowledge to the students regarding the general principles of IPR, Concept and Theories, International Regime Relating to IPR						
CO1	Students will be familiarized with the introduction about patent concept and legal implications						
CO2	Students will be able understand the concept of copyright in detail						
CO3	Students will be able to understand trademark and law associated with it						
CO4	Students will be able to know about geographical Indications, industrial design and IPR in information Technology						

Unit-I

Indian patent law: The patents act, 1970, amendments to the patents act, patentable subject matter, patentability criteria, procedure for filing patent applications, patent granting procedure, revocation, patent infringement and remedies, relevant provisions of the biological diversity act, 2002, access and benefit sharing issues, objectives, rights, patent act 1970 and its amendments. procedure of obtaining patents, working of patents. infringement.

Unit-II

Copyrights: Introduction, works protected under copyright law, infringement. introduction to copyright, international protection of copyright and related rights- an overview Indian copyright act, 1957 with its amendments, copyright works, ownership, transfer and duration of copyright, renewal and termination of copyright

Industrial Designs : Need for protection of industrial designs, subject matter of protection and requirements, the designs act, 2000,procedure for obtaining design protection, revocation, infringement and remedies.

Unit-III

Trademarks : Objectives, types, rights, protection of goodwill, infringement, passing off, need for protection of trademark, kinds of trademark , Indian trademarks law, procedural requirements of protection of trademarks, content of the rights, exhaustion of rights, procedural requirements of protection of trademarks, content of the rights, exhaustion of rights, assignment under licensing, infringement, right of goodwill, passing off, domain names and effects of new technology (internet).

Unit-IV

Geographical Indications: Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position. Industrial Designs: Objectives, Rights, Assignments, Infringements, Information Technology Related Intellectual Property Rights, Computer Software and Intellectual Property, Database and Data Protection, Protection of Semi conductor chips, Domain Name Protection, Implications of intellectual property rights on the commercialization of Biotechnology products.

References:

- N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow
- David I. Bainbridge, Intellectual Property, Longman, 9th Edition, 2012
- Susan K Sell, Private Power, Public Law: The Globalization of Intellectual Property Rights, Cambridge University Press, 2003
- N.S. Gopalakrishnan & T.G. Ajitha, Principles of Intellectual Property, Eastern Book Company,2nd Edition , 2014
- Jayashree Watal, Intellectual Property Rights in the WTO and Developing Countries, Oxford University Press, 2001
- Lionel Bently & Brad Sherman, Intellectual Property Law, Oxford University Press, 3rd Edition, 2008
- Duggal Pavan, Legal Framework on Electronic Commerce & Intellectual Property Rights, Universal Publishing House, 2014
- Paul Torremans, Intellectual Property And Human Rights, Kluwer Law International, 2008
- Steven D Anderman, Interface Between Intellectual Property Rights and Competition Policy, Cambridge University Press, 2007.
- Philippe Cullet, Intellectual Property Protection and Sustainable Development, Lexis Nexis, 2005

B24-ECE-310	Computer Networks Lab							
Lecture (Hrs.)	Tutorial (Hrs.)	Practical (Hrs.)	Credit	End semester Exam	Internal Assessment	Practical exam	Total	Time
0	-	2	1	-	40	60	100	3 Hrs.

Course Outcomes

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

CO1	Do problem solving using algorithms
CO2	Design and test simple programs using Java for networking concepts
CO3	Document artifacts using applied addressing & quality standards
CO4	Design simple data transmission using networking concepts

LIST OF PRACTICALS

1. Create a socket for HTTP for web page upload and download.
2. Write a code simulating ARP/RARP protocols.
3. Study of TCP/UDP performance.
4. Performance comparison of MAC protocols.
5. Performance comparison of routing protocols.
6. WAP to implement data server and client in java using TCP sockets.
7. WAP to implement a chat server and client in java using UDP sockets.
8. To implement a simple calculator and invoke arithmetic operations from a remote client.
9. To implement bubble sort and sort data data using a remote client.
10. To implement a sliding window protocol using Go back N ARQ.

Text Books

1. Andrew Tanenbaum, “Computer networks”, Prentice Hall
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition
3. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition
4. Bhavneet Sidhu, An Integrated Approach to Computer Networks, Khanna Publications.
5. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall
6. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
7. William Stallings, “Data and computer communications”, Prentice Hall

B24-ECE-312	Project-I						
Lecture	Tutorial	Practical	Credit	Practical Exam	Internal Assessment	Total	Time
-	-	4	2	60	40	100	3 Hrs.

Course Outcomes (CO)

Upon completion of the course, students will be able to

CO1	Identify and define a problem statement from the requirements raised from literature survey /need analysis
CO2	Build and Test electronic circuits/prototype for developing real life small electronic applications
CO3	Work in teams, write comprehensive report and effective presentation of the project work
CO4	Rapid prototyping which will lead them towards entrepreneurship.

Project-I Guidelines: The project-I is a team activity having 3-4 students in a team. This is electronic circuit building and testing for developing small electronic applications. The project may be a complete hardware or hardware with software aspect. It should encompass electronics components, devices, analog or digital ICs, micro controller etc. Based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of project-I.

B24-ECP-314	Internet of Things Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
-	**0**	**2**	**1**	**60**	**40**	**100**	**3 Hr.**
Course Outcome: Students will be able to get the idea of Internet of Things technology.							
CO1	**Student will be able to get familiarize with Arduino and Raspberry Pi**						
CO2	**Student will be able to implement interfacing different sensorss with Arduino and Raspberry Pi**						
CO3	**Student will be able to understand the concept of cloud**						
CO4	**Student will be able to design module based on Internet of Things application**						

List of Experiments

1. Familiarization with concept of IoT, Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/ Buzzer using relay with Arduino/Raspberry Pi and write a program to turn ON/OFF LED/Buzzer.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a programto turn ON LED when push button is pressed.
4. To interface Analog sensors (Temperature/Humidity/ Ultrasonic) with Arduino/Raspberry Pi andwrite a program to display sensors data on the computer screen.
5. To interface OLED with Arduino/Raspberry Pi and write a program to print sensor data on it.
6. To interface sensor with Arduino/Raspberry Pi and write a program to turn ON/OFF Relay whensensor data is detected.
7. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON/OFF motor when push button is pressed.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data on smartphone using Bluetooth.
9. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF whena 1/0 is received from smartphone using Bluetooth.
10. Write a program to upload sensor data on cloud.
11. Write a program to retrieve sensor data from cloud.

B24-ECP-316	Microwave Engineering Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
	0	**2**	**1**	**60**	**40**	**100**	**3 Hours**
Purpose	The purpose of these experiments is to provide hands-on experience in understanding and analyzing microwave components and systems. Through practical experimentation, students will gain insights into the properties, performance, and behavior of various microwave devices like waveguides, antennas, and active devices such as klystrons, Gunn diodes, and microwave attenuators.						
CO1	Learner will be able to understand the functionality and application of various microwave components						
CO2	Learner will be able to gain an understanding of the Klystron tube's role in microwave systems and its tuning characteristics for frequency control.						
CO3	Learner will be able to measure and analyze key waveguide parameters such as frequency, wavelength, and standing wave ratio, understanding their impact on signal propagation.						
CO4	Learner will be able to measure the insertion loss and attenuation in microwave components, understanding their effects on signal integrity and system performance.						

LIST OF EXPERIMENTS

1. To study the microwave components.
2. To study the characteristics of the reflex Klystron tube and to determine its electronic tuning range.
3. To determine the frequency and wavelength in a rectangular waveguide working in TE IO mode. To determine the standing wave ratio and reflection coefficient.
4. To study the I-V characteristics of Gunn diode. To study the magic tee.
5. To study the isolator and attenuator.
6. To measure the coupling coefficient and directivity of a wave guide directional coupler To measure the polar pattern and the gain of a waveguide horn antenna.
7. To measure the insertion loss and attenuation.

B24-ECP-318	Biomedical Electronics Lab						
Lecture (Hrs.)	**Tutorial (Hrs.)**	**Practical (Hrs.)**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
-	**-**	**2**	**1**	**60**	**40**	**100**	**3 Hrs.**
Course Outcomes (CO) **At the end of the course, student will be able to**							
CO1	**Elaborate various biomedical signals**						
CO2	**Acquire and simulate ECG, EMG and EEG biomedical signals**						
CO3	**Simulate ECG Pulse missing detector**						
CO4	**Demonstrate the functions of defibrillator and pacemaker**						

List of Experiments:

1. Familiarization of various biomedical signals.
2. To simulate Electrocardiogram Waveform
3. To simulate Electroencephalogram Signal
4. To simulate Electromyogram Signal
5. To Simulate Defibrillator
6. To simulate Pacemaker
7. To simulate Haemodialysis Machine
8. To simulate Biopotential Amplifier
9. To simulate ECG Pulse missing detector.
10. To simulate 12 Lead ECG Signals.

B24-ECP-320	Digital Image Processing Lab						
Lecture (Hrs.)	**Tutorial (Hrs.)**	**Practical (Hrs.)**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
-	-	2	1	60	40	100	3 Hrs.

Course Outcomes (CO)

To give the students an idea about the study and analysis of digital image processing

CO1	Students will be able to explain the basics of Digital Image processing
CO2	Students will be able to explain sampling and quantization of digital image.
CO3	Students will be able to analyze the image enhancement operations on digital image.
CO4	Students will be able to analyze various image analysis and computer vision algorithm

List of Experiments

1. Study of Image processing toolbox of MATLAB.
2. WAP to read and show various images of at least five different formats.
3. WAP to extract R, G, B component of Color Image.
4. WAP to convert a color image into gray scale and save it in new format.
5. WAP to invert a gray scale image.
6. WAP to implement Morphological operations on an image.
7. WAP to implement Histogram equalization.
8. WAP to implement various edge detection algorithms.
9. WAP to implement image segmentation.
10. WAP to implement boundary extraction of basic structure.

B24-ECP-322	Cyber Physical Systems Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Practical Exam**	**Internal Assessment**	**Total**	**Time**
-	**0**	**2**	**1**	**60**	**40**	**100**	**3 Hr.**
Course Outcome: Students will be able to get the idea of Cyber Physical Systems.							
CO1	**Student will be able to interface different sensors with advanced microcontrollers and control various devices.**						
CO2	**Student will be able to understand Bluetooth Low Energy concepts for low power applications.**						
CO3	**Student will be able to understand the concept of cloud**						
CO4	**Student will be able to design module based on Cyber Physical System application**						

List of Experiments

1. To interface an LED with a microcontroller or embedded development and programming the microcontroller to implement LED blinking and different LED patterns using GPIO.
2. Interfacing actuators such as buzzer, relay or motor with a microcontroller and controlling them through push button.
3. Configure PWM output to control LED brightness and servo motor.
4. Configure ADC to read analog sensor data and control servo motor position using ADC and PWM using analog input from a joystick.
5. Implementation of basic communication protocols such as UART, I2C or SPI for data transfer between devices.
6. Interfacing of basic sensors (temperature, light or distance sensor) with a microcontroller or embedded development board and programming a microcontroller to read sensor data and display the output on serial monitor or display unit.
7. Interfacing multiple sensors and performing basic data acquisition and processing.
8. Build a BLE beacon to broadcast static message and send custom advertising data with adjustable intervals.
9. Development of a simple IoT-based monitoring system for transmitting sensor data to a computer or cloud platform.
10. Implementation of basic data processing and filtering techniques for sensor signals.
11. Simulation or programming of a simple control system using feedback principles.
12. Implementation of a basic PID control algorithm for controlling an actuator or simulated system
13. Design and development of a small cyber physical system prototype such as smart temperature monitoring or automatic lighting system.
14. Mini project based on CPS application integrating sensors, embedded system, communication and control.

B24-VAC-302	Hindi Language Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
2	**-**	**-**	**1**	**--**	**100**	**100**	**3**

This course will be offered through NPTEL/MOOC online courses with the following link - https://onlinecourses.nptel.ac.in/noc23_hs125/preview.
The syllabus of NPTEL/MOOC platform will be acceptable. Students can also learn online from videos and internal assessment can be made in the Institute by taking an internal exam of 100 marks.

B24-VAC-304	Sanskrit Language Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**End Semester Exam**	**Internal Assessment**	**Total**	**Time**
2	**-**	**-**	**1**	**--**	**100**	**100**	**3 Hrs**
Course Outcomes **At the end of this course, student will**							
CO 1	Learn behavioural science from Bhagwat Gita						
CO 2	Learn self awareness and spirituality from Bhagwat Gita						
CO 3	Learn mind management from Bhagwat Gita						
CO 4	Learn responsible behaviour from Bhagwat Gita						

SYLLABUS FOR SANSKRIT STUDIES

Unit 1	**<u>BEHAVIOURAL SCIENCE</u>** ● **Learning different personality types from Gita.** BG 14.6-8 ● Dealing with stress, depression and **self-destructive** urges. BG 2.14 ● Overcoming **procrastination and hyperactivity.** BG 18.35-36 ● **Developing *sattva* - platform of controlled action.** BG 18.33 ● Balancing physical, mental and emotional health. BG 6.16-17, 6.5 ● Increasing productivity in activity through spirituality. BG 2.47 ● **Mind Intelligence mechanism.** BG 3.42-43 ● **Tapping the power of meditation**. BG 6.10-15

Unit 2	**SELF-AWARENESS** ● **Understanding Different Layers of Self - Physical, Mental and Spiritual** – BG 2.13 ● Becoming Sensitive Towards Other Beings and Nature at Large – BG 5.18, 6.29-32 ● **Cultivating Culture of Respect** – BG 13.8-12 ● Dealing with Grief – BG 2.11, 2.27 ● **Holistic Wellbeing Through Self-Awareness** – BG 6.5, 6.7 ● Recognizing the Impermanence of the Body – BG 2.14 ● Cultivating Detachment for True Self-Awareness – BG 2.71, 5.29 ● **Connecting with the Higher Self Through Meditation** – BG 6.10 ● Transcending Ego for Inner Peace – BG 3.27 ● Self-Reflection for Personal Growth – BG 6.5 ● Overcoming False Identification with the Body – BG 2.30 ● Seeing the Divine in All Beings – BG 9.22
Unit 3	**MIND MANAGEMENT - ART OF MIND CONTROL** ● **The Root of Frustration & Anger** – BG 2.62-63 ● Discover the Real Reason Behind Lack of Motivation – BG 3.36, 3.41 ● **Controlling the Uncontrolled Mind** – BG 6.26 ● **Understanding the Mind & Its Power** – BG 6.6, 3.42 ● Mind Like a Boat in Stormy Waters – BG 2.67 ● **Learn to Stay Calm Under Pressure** – BG 2.14, 2.56 ● The Peaceful Mind of a Wise Person – BG 2.70, 2.56 ● Freedom from Attachment = Peace – BG 2.71, 5.26 ● Peace Through Detachment – BG 2.71, 5.20
Unit 4	**RESPONSIBLE ACTION** ● **Understanding Intricacies of Action and Reaction - Karma, Vikarma & Akarma** – BG 4.17 ● Principles of Forbearance and Tolerance – BG 2.14, 12.13-14 ● Coping with Adversities and Reversals in Life – BG 2.14-15, 18.11 ● **Becoming Responsible in Action - Karma Yogi** – BG 3.7, 3.19, 3.30, 5.10 ● Performing Actions Without Attachment to Results – BG 2.47, 3.19 ● Acting in Accordance with Dharma – BG 3.35 ● Surrendering the Fruits of Actions to God – BG 9.22, 18.66

	• Selflessness in Actions – BG 18.9 • Discerning Between Right and Wrong Actions – BG 18.63 • **Balanced Approach to Work and Rest** – BG 6.17 • Purifying Intentions Behind Actions – BG 18.11 • **Taking Responsibility for One's Actions and Their Impact** – BG 3.16

B24-VAC-306	German Language Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**End semester Exam**	**Internal assessment**	**Total**	**Duration of exam (Hours)**
2	**0**	**0**	**1**	**-**	**100**	**100**	**3 Hrs**
Purpose	**To learn about German Language Skills**						
Course Outcomes							
CO1	**Introduce students to basic German language.**						
CO2	**Enable basic communication in German (self-introduction, daily routine, etc.).**						
CO3	**Develop foundational skills in vocabulary and grammar.**						
CO4	**Develop foundational skills in reading, writing, listening, and speaking.**						

Course Outline

Unit 1: Introduction & Basics

- German alphabet and pronunciation
- Greetings and farewells
- Introducing oneself and others
- Numbers (0–100)
- Days, months, seasons

Unit 2: Vocabulary Building I

- Family and relationships
- Professions and nationalities
- Countries and cities
- Colors and clothing
- Weather

Unit 3: Grammar I

- Nouns: gender, singular/plural
- Articles: definite (der/die/das), indefinite (ein/eine)
- Personal pronouns (ich, du, er, etc.)
- Verb conjugation (regular verbs in Präsens)
- Sentence structure: main clause word order

Grammar II

- Verbs: haben, sein, modal verbs (möchten, können)
- Question words (wer, was, wo, etc.)
- Negation (nicht, kein)
- Possessive pronouns (mein, dein, etc.)
- Accusative case basics

Unit 4: Vocabulary Building II

- Food and drink

- Daily routine
- Time and date
- House and furniture
- Hobbies and leisure

Communication Practice

- Simple dialogues (in café, at university, at home)
- Role plays (shopping, asking directions, introductions)
- Listening practice (audio exercises)
- Writing practice (short texts, filling forms)

Assessment (Optional/Recommended)

- Vocabulary quizzes
- Short written assignments
- Oral presentation or role-play
- Final test (basic grammar and vocabulary)

B24-VAC-308	Japanese Language Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**End semester Exam**	**Internal assessment**	**Total**	**Duration of exam (Hours)**
2	**0**	**0**	**1**	**-**	**100**	**100**	**3 Hrs**
Purpose	**To learn about Japanese Language Skills**						
Course Outcomes							
CO1	**Introduce students to basic Japanese language.**						
CO2	**Enable basic communication in Japanese (self-introduction, daily routine, etc.).**						
CO3	**Develop foundational skills in vocabulary and grammar.**						
CO4	**Develop foundational skills in reading, writing, listening, and speaking.**						

Course Outline

Unit 1: Introduction & Basics

- Alphabet and pronunciation
- Greetings and farewells
- Introducing oneself and others
- Numbers (0–100)
- Days, months, seasons

Unit 2: Vocabulary Building I

- Family and relationships
- Professions and nationalities
- Countries and cities
- Colors and clothing
- Weather

Unit 3: Grammar I

- Nouns: gender, singular/plural
- Articles: definite and indefinite
- Personal pronouns
- Verb conjugation (regular verbs in present tense)
- Sentence structure: main clause word order

Grammar II

- Common verbs (e.g., to be, to have, modal verbs)
- Question words
- Negation
- Possessive pronouns
- Basic cases or particles (as applicable)

Unit 4: Vocabulary Building II

- Food and drink
- Daily routine

- Time and date
- House and furniture
- Hobbies and leisure

Communication Practice

- Simple dialogues (e.g., in café, at university, at home)
- Role plays (shopping, asking directions, introductions)
- Listening practice (audio exercises)
- Writing practice (short texts, filling forms)

Assessment (Optional/Recommended)

- Vocabulary quizzes
- Short written assignments
- Oral presentation or role-play
- Final test (basic grammar and vocabulary)

B24-VAC-310	French Language Skills						
Lecture	**Tutorial**	**Practical**	**Credit**	**End semester Examination**	**Internal assessment**	**Total**	**Duration of exam (Hours)**
2	**0**	**0**	**1**	**-**	**100**	**100**	**3 Hrs**
Purpose	**To learn about French Language Skills**						
Course Outcomes							
CO1	**Introduce students to basic French language.**						
CO2	**Enable basic communication in French (self-introduction, daily routine, etc.).**						
CO3	**Develop foundational skills in vocabulary and grammar.**						
CO4	**Develop foundational skills in reading, writing, listening, and speaking**						

Course Outline

Unit 1: Introduction & Basics

- Alphabet and pronunciation
- Greetings and farewells
- Introducing oneself and others
- Numbers (0–100)
- Days, months, seasons

Unit 2: Vocabulary Building I

- Family and relationships
- Professions and nationalities
- Countries and cities
- Colors and clothing
- Weather

Unit 3: Grammar I

- Nouns: gender, singular/plural
- Articles: definite and indefinite
- Personal pronouns
- Verb conjugation (regular verbs in present tense)
- Sentence structure: main clause word order

Grammar II

- Common verbs (e.g., to be, to have, modal verbs)
- Question words
- Negation
- Possessive pronouns
- Basic cases or particles (as applicable)

Unit 4: Vocabulary Building II

- Food and drink
- Daily routine
- Time and date

- House and furniture
- Hobbies and leisure

Communication Practice

- Simple dialogues (e.g., in café, at university, at home)
- Role plays (shopping, asking directions, introductions)
- Listening practice (audio exercises)
- Writing practice (short texts, filling forms)

Assessment (Optional/Recommended)

- Vocabulary quizzes
- Short written assignments
- Oral presentation or role-play
- Final test (basic grammar and vocabulary)