Gurugram University Gurugram

Curriculum for UG Degree Course

in

Electronics and Communication Engineering

(Engineering &Technology)

Gurugram University Scheme of Studies and Examination
Bachelor of Technology (Electronics & Communication Engineering)

Semester III

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks for Sessional	Marks for End Term Examination	Total Marks
				L	T	P				
1	PCC		Analog & Digital Communication Systems	3	0	0	3	30	70	100
2	PCC		Electromagnetic Field Theory	3	0	0	3	30	70	100
3	PCC		Digital Electronics	3	0	0	3	30	70	100
4	PCC		Network Analysis and Synthesis	3	0	0	3	30	70	100
5	PCC		Signal & Systems	3	0	0	3	30	70	100
6	BSC		Mathematical & Computational Techniques	4	1	0	5	30	70	100
7	LC		Analog & Digital Communication Lab (P)	0	0	2	1	50	50	100
8	LC		Digital Electronics Lab(P)	0	0	2	1	50	50	100
9	LC		Network Analysis and Synthesis Lab (P)	0	0	2	1	50	50	100
10	MC		Constitution of India	2	0	0	-	30	70	100*
Total				**28**			**23**	**330**	**570**	**900**

NOTE: Constitution of India*: The examination of the regular students will be conducted by the concerned college/Institute internally. Each student will be required to score a minimum of 40% marks to qualify in the paper. The marks will not be included in determining the percentage of marks obtained for the award of a degree.

ANALOG & DIGITAL COMMUNICATION SYSTEMS

Course Code					
Category	**Professional Core Courses**				
Course title	Analog & Digital Communication Systems				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**
	3	**0**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To introduce the students to the basics of different types of modulation techniques
2. To aim at a comprehensive coverage of design of radio transmitter and receiver
3. The course aims to make the student familiar with Digital Modulation and Demodulation techniques, Digital transmission, reception etc.

UNIT I

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

UNIT II

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.
Pulse modulation.Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

UNIT III

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations.Baseband Pulse Transmission- Inter Symbol Interference and Nyquist criterion.
Bandpass Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

UNIT IV

Information Measures: Discrete Source models – Memoryless and Stationary, Mutual Information, Self-Information, Conditional Information, Average Mutual Information, Entropy, Entropy of the block, Conditional Entropy, Information Measures for Analog Sources.

Course Outcomes: At the end of this course, students will demonstrate the ability to;

1. Illustrate the principles of amplitude and angle modulation techniques
2. Understand probability and random process.
3. Analyze the performance of waveform coding techniques.
4. Compare bandpass digital modulation techniques for bit error rate, bandwidth and power requirements
5. Understand the concept of information rate and channel capacity.
6. Understand the concepts of information measure.

Text/Reference Books:

1. B.P.Lathi,Zhi Ding “Modern Digital and Analog Communication”, Oxford, 4th Edition,2011
2. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
3. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
4. Taub H. and Schilling D.L., "Principles of Communication Systems",Tata McGraw Hill, 2001.
5. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.
6. R. Anand, Communication Systems, Khanna Book Publishing Company, 2011.

Electromagnetic Field Theory

Course Code					
Category	**Professional Core Courses**				
Course title	**Electromagnetic field Theory**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**
	3	**0**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To introduce the basic mathematical concepts related to electromagnetic vector fields.
2. To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.
3. To impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.
4. To impart knowledge on the concepts of Faraday‘s law, induced emf and Maxwell‘s equations.
5. To impart knowledge on the concepts of Concepts of electromagnetic waves and Transmission lines.

UNIT I

Transmission Lines- Equations of Voltage and Current on TX line, Propagation constant, Characteristic impedance and reflection coefficient, Impedance Transformation, Loss-less and Low Loss Transmission line and VSWR, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines, Impedance Matching, Lossy transmission line, Problems on Transmission line, Types of transmission line.

UNIT II

Maxwell’s Equations- Basics of Vectors, Vector calculus, Basic laws of Electromagnetics, Maxwell's Equations, Boundary conditions at Media Interface.

Uniform Plane Wave- Uniform plane wave, Propagation of wave, Wave polarization, Pioncere's Sphere, Wave propagation in conducting medium, Wave propagation and phase velocity, Power flow and Poynting vector, Surface current and power loss in a conductor Plane Waves at a Media Interface- Plane wave in arbitrary direction,

UNIT III

Plane wave at dielectric interface, Reflection and refraction at media interface, Total internal reflection, Polarization at media interface, Reflection from a conducting boundary.

Waveguides- Parallel plane waveguide,Wave propagation in parallel plane waveguide, Analysis of waveguide general approach,

UNIT IV

Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization and Attenuation in waveguide, Attenuation in waveguide continued.

Radiation- Solution for potential function, Radiation from the Hertz dipole, Power radiated by hertz, dipole, thin linear antenna, Radiation Parameters of antenna, receiving antenna, Monopole and Dipole antenna, Fourier transform relation between current and radiation pattern.

Course outcomes:

1. Appreciate the importance of transmission lines and analyse transmission line problems.
2. Solve Maxwell's equations to understand propagation of electromagnetic waves.
3. Analyse plane wave at dielectric interface.
4. Understand waveguides.
5. Analyse electromagnetic wave propagation in rectangular metallic waveguides and resonators.
6. Understand antenna characteristics, and design linear antennas and their arrays.

Text/Reference Books:

1. R.K. Shevgaonkar, „Electromagnetic Waves, Tata McGraw Hill India, 2005
2. R.L. Yadav, Electromagnetic Fields and Waves, Khanna Book Publishing, 2021
3. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
4.Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
5. David Cheng, Electromagnetics, Prentice Hall

DIGITAL ELECTRONICS

Course Code						
Category	**Professional Core Courses**					
Course title	**Digital Electronics**					
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**	
	3	**0**	**0**	**3**		
Class Work	30 Marks					
Exam	70 Marks					
Total	100 Marks					
Duration of Exam	3Hrs					

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To provide a comprehensive introduction to digital logic design leading to the ability to understand binary codes, binary arithmetic and Boolean algebra and its relevance to digital logic design.
2. To study number system and codes.
3. To design & analyze combinational circuits and synchronous sequential logic circuits.
4. To familiarize students with basics of digital logic families.

UNIT I

Number system and codes: Binary, octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers (8421-2421), gray code, excess–3 code, cyclic code, code conversion, ASCII, EBCDIC codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation.

UNIT II

Boolean Algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex_NOR and their truth tables,), Universal Gates, Laws of Boolean algebra, De-Morgan's theorem, Min term, Max term, POS, SOP, K_Map, Simplification by Boolean theorems, don't care condition

Logic Families: Introduction to digital logic family such as RTL, DTL, TTL, ECL, CMOS, IIR, HTL etc., theircomparative study, Basic circuit, performance characteristics, Wired logic, open collector output etc

UNIT III

Combinational Logic: The Half adder, the full adder, subtractor circuit. Multiplexer demultiplexer, decoder, BCD to seven segment decoder ,encoders.

Flip flop and Timing circuit : set-reset laches, D-flipflop, R-S flip-flop, J-K Flip-flop, Master slave Flip flop, edge triggered flip-flop, T flip-flop.

UNIT IV

Registers & Counters: Synchronous/Asynchronous counter operation, Up/down synchronous counter, application of counter, Serial in/Serial out shift register, Serial in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, parallel in/Serial out shift register, Bi-directional register.

Course outcomes:

1. To present a problem oriented introductory knowledge of Digital circuits and its applications.
2. Learn Number system and codes.
3. Study Boolean algebra and theorems
4. To focus on the study of electronic circuits
5. Design and analyze combinational circuits.
6. Design and analyze synchronous sequential logic circuits.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill.
2.Digital Fundamentals by Morris and Mano, PHI Publication
3 Fundamental of digital circuits by A.ANANDKUMAR,PHI Publication

NETWORK ANALYSIS AND SYNTHESIS

Course Code					
Category	**Professional Core Courses**				
Course title	**Network Analysis and Synthesis**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**
	3	**0**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To give students knowledge of AC theorems
2. To make the students understand concepts of two port networks, and network synthesis.
3. To give the students a fair knowledge on the Laplace transforms
4. To understand filters.

UNIT I

Node and mesh analysis, matrix approach of network containing voltage & current sources and reactance's, source transformation and duality.

Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power transfer, compensation and Tallegen's theorem as applied to A.C. circuits.

UNIT II

Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

UNIT III

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

UNIT IV

Transient behavior, concept of complex frequency, driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and two four port network and interconnections, behaviour of series and parallel resonant circuits, introduction to band pass, low pass, high pass and band reject filters.

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

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Understand Trigonometric and exponential Fourier series.
4. Apply Laplace transform for steady state and transient analysis.
5. Determine different network functions.
6. Appreciate the frequency domain techniques.

Text/Reference Books

1. Franklin F. Kuo, “Network Analysis and Synthesis,” Wiley India Education, 2nd Ed., 2006.
2. Van, Valkenburg, “Network analysis,” Pearson, 2019.
3. Sudhakar, A., Shyammohan, S. P., “Circuits and Network,” Tata McGraw-Hill New Delhi, 1994.
4. A William Hayt, “Engineering Circuit Analysis,” 8th Edition, McGraw-Hill Education.
5. A. Anand Kumar, “Network Analysis and Synthesis,” PHI publication, 2019.

SIGNALS AND SYSTEMS

Course Code					
Category	**Professional Core Courses**				
Course title	**Signals and Systems**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**
	3	**0**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To bring the Continuous-time and Discrete-time concepts, types ofsignals and systems.
2. To impart knowledge about representation, properties and applications of systems andsignals.
3. To impart knowledge about transforms and their applications to signals and systems.

UNIT I

Introduction to signals and systems- Signals and systems as seen in everyday life, and in various branches of engineering and science electrical, mechanical, hydraulic, thermal, biomedical signals and systems as examples. Extracting the common essence and requirements of signal and system Formalizing signals- energy and power signals, signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. Formalizing systems- system properties: linearity: additivity and homogeneity, shift invariance, causality, stability, realizability.

UNIT II

Continuous time and discrete time Linear shift-invariant (LSI) systems in detail-the impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of linear shift invariant systems.System representation through differential equations and difference equations. Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality.

UNIT III

The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and Orthogonal bases of signals. Properties of DTFT and DFT.

The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems

UNIT IV

The Laplace Transform for continuous time signals and systems- the notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. Generalization of Parseval's Theorem.

Advanced topics: time-frequency representation and the uncertainty principle, Short-time Fourier Transforms and wavelet transforms.

Course outcomes:

1. Identify the sources of signals, and systems in real life.
2. Characterize different types of signals and systems.
3. Represent continuous-time and discrete-time systems in different mathematical forms.
4. Analyse system behaviour using time and frequency domain techniques.
5. Analyze Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT).
6. Characterize Laplace transform

Text/Reference books:

1. R. Anand, Signals and Systems, Khanna Publishing House, 2019.
2. A.V. Oppenheim, A.S. Willsky and I.T. Young,"Signals and Systems", Prentice Hall, 1983.
3. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
4. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.
5. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998. 6. Douglas K. Lindner, "Introduction to Signals and Systems", Mc-Graw Hill International Edition: c1999.
6. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, c1998.

MATHEMATICAL & COMPUTATIONAL TECHNIQUES

Course Code					
Category	**Basic Science Courses**				
Course title	**Mathematical & Computational Techniques**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**
	4	**1**	**0**	**5**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To provide the numerical methods of solving the non-linear equations, interpolation, differentiation, and Integration.
2. This course is an introduction to a broad range of numerical methods for solving mathematical problems that arise in Science and Engineering.
3. The goal is to provide a basic understanding of the derivation, analysis, and use of these numerical methods

UNIT I

Interpolation by polynomials, error of the interpolating polynomial, piecewise linear and cubic spline interpolation. Numerical integration, Simpson rule, composite rules, error formulae, Gauss quadrature.

UNIT II

Solution of a system of linear equations, implementation of Gaussian elimination and GaussSeidel methods, partial pivoting, row echelon form, LU factorization, Cholesky's method, illconditioning, norms.

UNIT III

Solution of a nonlinear equation, bisection and secant methods.Newton-Raphson method, rate of convergence, solution of a system of nonlinear equations. Numerical solution of ordinary differential equations, Euler and Runge-Kutta methods, multistep methods, predictor-corrector methods, order of convergence,

UNIT IV

Finite difference methods, numerical solutions of elliptic, parabolic, and hyperbolic partial differential equations.Eigenvalue problem, power method, QR method, Gershgorin's theorem. Exposure to software packages like MATLAB.

Course Outcomes:

1. Understand different numerical integration techniques, and numerically solve differential equations.
2. Understand interpolation by polynomials.
3. Perform various matrix computations and solve simultaneous linear equations.
4. Find solution of nonlinear equation.
5. Find roots of a transcendental equation using different methods.
6. Implement different interpolation schemes.

Text/Reference Books:

1. S. D. Conte and Carl de Boor, Elementary Numerical Analysis- An Algorithmic Approach (3rd Edition), McGraw-Hill, 1980.
2. C. E. Froberg, Introduction to Numerical Analysis (2nd Edition), Addison-Wesley, 1981
3. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley (1999).
4. Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing (2022).
5. K. E. Atkinson, An Introduction to Numerical Analysis (2nd edition), Wiley-India, 1989
6. R. Agor, Elements of Mathematical Analysis, Khanna Publishing House, 2015.
7. Erwin Kreyzig ,Advanced Engineering ,Mathematics

DIGITAL ELECTRONICS LABORATORY

Course Code						
Category	**Laboratory Courses**					
Course title	**Digital Electronics Laboratory**					
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**	
	0	**0**	**2**	**1**		
Class Work	50 Marks					
Exam	50 Marks					
Total	100 Marks					
Duration of Exam	02 Hrs					

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS

1. To study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. To design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To study FLIP-FLOP conversion.
7. To verify the operation of bi-directional shift register.
8. To design & verify the operation of 3-bit synchronous counter.
9. To design and verify the operation of synchronous UP/DOWN decade counter using
10. J K flip-flops &drive a seven-segment display using the same.
11. To design and verify the operation of asynchronous UP/DOWN decade counter using
12. J K flip-flops &drive a seven-segment display using the same.
13. To design a 4-bit shift register and verify its operation.

Lab outcomes: At the end of this lab, student will be able to

1. To present a problem oriented introductory knowledge of Digital circuits and its applications.
2. Learn Number system and codes.
3. Study Boolean algebra and theorems
4. To focus on the study of electronic circuits
5. Design and analyze combinational circuits.
6. Design and analyze synchronous sequential logic circuits.

NETWORK ANALYSIS & SYNTHESIS LABORATORY

Course Code						
Category	**Laboratory Courses**					
Course title	**Network Analysis & Synthesis Laboratory**					
Scheme	**L**	**T**	**P**	**Credits**	**Semester : III**	
	0	**0**	**2**	**1**		
Class Work	50 Marks					
Exam	50 Marks					
Total	100 Marks					
Duration of Exam	02 Hrs					

Note:

1. At least 10 experiments are to be performed by students in the semester.
2. At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus
3. Group of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS:

1. Introduction of circuit creation & simulation software like MATLAB, TINAPRO etc.
2. Study of Transient response of RC, RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" & "Y" parameters and "ABCD" parameters of a two-port network.
5. To determine equivalent parameter of parallel-series, cascading and parallel connections of two port network.
6. To calculate and verify Compensation theorem and Tellegen's theorem.
7. To synthesize a network of a given network function and verify its response.
8. To calculate and verify Maximum power transfer and Reciprocity theorem.

Note: Use appropriate Software or simulation tool for experiments.

Lab Outcomes: At the end of this lab, students will demonstrate the ability to:

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Determine and verify different parameters.
4. Determine different network functions.

ANALOG & DIGITAL COMMUNICATION SYSTEMS LABORATORY

Course code					
Category	**Laboratory Courses**				
Course title	**Analog & Digital Communication Systems Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester : III**
	0	**0**	**2**	**2**	
Classwork	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**02 Hours**				

Note:-

1 Total ten experiments are to be performed in the semester

2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

COURSE OBJECTIVES:

1. To provide the basic understanding about various modulation techniques.
2. To analyze different characteristic parameters of these modulation techniques.

LIST OF EXPERIMENTS:

1. To study and waveform analysis of amplitude modulation and determine the modulation index of amplitude modulation.
2. To study and waveform analysis of amplitude demodulation by any method.
3. To study and waveform analysis of frequency modulation and determine the modulation index of frequency modulation.
4. To study and waveform analysis of frequency demodulation by any method.
5. To study Amplitude Shift Keying (ASK) modulation.
6. To study Frequency Shift Keying (FSK) modulation.
7. To study Phase Shift Keying (PSK) modulation.
8. To study and waveform analysis of phase modulation.
9. To study Phase demodulation.
10. 10.To study Pulse code modulation.
11. To study Pulse amplitude modulation and demodulation.
12. To study Pulse width modulation.
13. To study Pulse position modulation.

COURSE OUTCOMES:

1. Students are able to analyze digital communication signals.
2. Understand modulation and demodulation concept.
3. Students understand the basics of PAM, QAM, PSK, FSK, and MSK.
4. They can analyze noise and disturbance in modulated signals.
5. Know the methods use for analog and digital communication

CONSTITUTION OF INDIA

Course code					
Category	Mandatory courses				
Course title	Constitution of India				
Scheme and Credits	L	T	P	Credits	Semester : III
	2	0	0	-	
Classwork	-				
Exam	-				
Total	-				
Duration of Exam	-				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVE:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT - I

Philosophy of Indian Constitution: Salient features of Indian Constitution, Preamble, and Nature of Indian Constitution, Procedure for amendment of the Constitution.

UNIT - II

Federal structure and distribution of legislative and financial powers between the Union and the States

UNIT - III

Organs of Governance: President – Qualification and Powers of the President, Governor- Qualification and Powers of Governor,

Parliament: Composition, Qualifications and Disqualifications, Judiciary: Appointment, Tenure and Removal of Judges.

UNIT - IV

Fundamental Rights: Origin and development of Fundamental rights, Need for fundamental rights. Introduction to Rights to equality, right to freedom, right against exploitation, Right to freedom of religion, Cultural and Education rights and Fundamental duties.

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

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to a revolution in India.
3. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
4. Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail.
5. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
6. Discuss the passage of the Hindu Code Bill of 1956.

TEXT AND REFERENCE BOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S.N. Busi, Dr. B.R. Ambedkar framing of Indian Constitution, latest Edition
3. M.P. Jain, Indian Constitution Law, Lexis Nexis, latest edition
4. D.D. Basu, Introduction to Constitution of India, Lexis Nexis, latest edition.

NOTE: The examination of the regular students will be conducted by the concerned college/Institute internally. Each student will be required to score a minimum of 40% marks to qualify in the paper. The marks will not be included in determining the percentage of marks obtained for the award of a degree. However, these marks will be shown in the detailed marks certificate of the students.

Gurugram University Scheme of Studies and Examination
Bachelor of Technology(Electronics & Communication Engineering)

Semester IV

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks for Sessional	Marks for End Term Examination	Total Marks
				L	T	P				
1	PCC		Internet of Things	3	0	0	3	30	70	100
2	PCC		Digital & Data Communication	3	0	0	3	30	70	100
3	PCC		Electronic Measurement & Instrumentation	3	0	0	3	30	70	100
4	BSC		Probability Theory and Stochastic Processes	3	0	0	3	30	70	100
5	PCC		Computer Organization & Architecture	3	0	0	3	30	70	100
	PCC		Microprocessor & Interfacing	3	0	0	3	30	70	100
7	LC		Internet of Things Lab	0	0	2	1	50	50	100
8	LC		Electronic Measurement & Instrumentation Lab	0	0	2	1	50	50	100
9	LC		Microprocessor & Interfacing Lab	0	0	2	1	50	50	100
10	LC		PCB Design Lab	0	0	2	1	50	50	100
11	MC		Scientific & Technical writing Skills*	2	0	0	-	30	70	100*
Total				28			22	380	620	1000

NOTE:

1. Scientific & Technical writing Skills*: The examination of the regular students will be conducted by the concerned college/Institute internally. Each student will be required to score a minimum of 40% marks to qualify in the paper. The marks will not be included in determining the percentage of marks obtained for the award of a degree.

2. At the end of the 4th semester, each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ trainingcenter etc. and submit the typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

INTERNET OF THINGS

Course code					
Category	Professional Core Course				
Course title	Internet of Things				
Scheme and Credits	L	T	P	Credits	Semester :IV
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES: The objective of this course is to impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.

UNIT I

Introduction to IoT: Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNIT II

Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/ Node.js/ Arduino) for Communication. Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT III

IoT Application Development: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

UNIT IV

IoT Case Studies : IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

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

1. Understand internet of Things and its hardware and software components
2. Interface I/O devices, sensors & communication modules.
3. Understand various IoT protocols.
4. Analyse data processing in IoT.
5. Remotely monitor data and control devices
6. Develop real life IoT based projects

1. Vijay Madisetti, Arshdeep Bahga, Ïnternet of Things, "A Hands on Approach", University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
4. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
5. Adrian McEwen, "Designing the Internet of Things", Wiley
6. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
7. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

DIGITAL & DATA COMMUNICATION

Course Code					
Category	Professional Core Courses				
Course title	Digital & Data Communication				
Scheme	L	T	P	Credits	Semester : IV
	3	1	0	3	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. Understand the working principles of Data Communication.
2. Understand the Data link layer.
3. Understand the network security.

UNIT I

Data Transmission Basics: Communication model - Simplex, Half duplex, Full duplex transmission. Periodic analog signals - Sine wave, Amplitude, Phase, Wavelength, Time and frequency domain, Bandwidth. Analog & digital data and signals.Transmission impairments - Attenuation, Delay distortion, Noise. Data rate limits - Noiseless channel, Nyquist bandwidth, Noisy channel, Shannon's capacity formula.

UNIT II

Transmission Media: Guided transmission media - Twisted pair, Coaxial cable, Optical fiber. Unguided media - Radio waves, Terrestrial microwave, Satellite microwave, Infrared. Wireless propagation - Ground wave propagation, Sky wave propagation, Line-of-Sight (LoS) propagation.

Digital Transmission and Analog Transmission: Digital data to digital signal – Non-Return-to-Zero (NRZ), Return-to-Zero (RZ), Multilevel binary, Biphase. Analog data to digital signal - Sampling theorem, Pulse Code Modulation (PCM), Delta Modulation (DM).Digital data to analog signal - Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK). Analog data to analog signal - Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation (PM).

UNIT III

Multiplexing and Spread Spectrum: Multiplexing - Frequency Division Multiplexing (FDM), Wavelength Division Multiplexing (WDM), Time Division Multiplexing (TDM), Characteristics, Synchronous TDM, Statistical TDM. Spread spectrum techniques - Direct Sequence Spread Spectrum (DSSS), Frequency Hopping Spread Spectrum (FHSS), Code Division Multiplexing, Code Division Multiple Access (CDMA).

UNIT IV

Error Detection, Correction and Switching: Digital data communication techniques - Asynchronous transmission, Synchronous transmission. Detecting and correcting errors - Types of errors, Parity check, Checksum, Cyclic Redundancy Check (CRC), Forward Error Correction (FEC), Hamming distance, Hamming code. Basic principles of switching - Circuit switching, Packet switching, Message switching.

Course Outcomes

1. Identify the characteristics of signals for analog and digital transmissions
2. Identify the issues in data transmission .
3. Select transmission media based on characteristics and propagation modes
4. Choose appropriate signal encoding techniques for a given scenario
5. Illustrate multiplexing and spread spectrum technologies
6. Use error detection, correction and switching techniques in data communication

Text/Reference Books:

1. Forouzan B. A., Data Communications and Networking, 5/e, McGraw Hill, 2013.
2. William Stallings, Data and Computer Communication 9/e, Pearson Education, Inc. 273 COMPUTER SCIENCE AND ENGINEERING

References Books:

1. Schiller J., Mobile Communications, 2/e, Pearson Education, 2009.

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

Course Code					
Category	**Professional Core Courses**				
Course title	**Electronic measurement and Instrumentation**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : IV**
	3	**1**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To introduce the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors.
2. Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers.
3. To address the underlying concepts and methods behind Electronics measurements.

UNIT I

OSCILLOSCOPE:Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

GENERATION & ANALYSIS OF WAVEFORMS:Block diagram of pulse generators, signal generators, function generators wave analysers,distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

UNIT II

ELECTRONIC INSTRUMENTS:Instruments for measurement of voltage, current & other circuit parameters, Q meters, R.F. Power measurements, introduction to digital meters.

FREQUENCY & TIME MEASUREMENT:Study of decade counting Assembly(DCA), frequency measurements, period measurements, Universal counter, Introduction to digital meters.

UNIT III

DISPLAY DEVICES:Nixie tubes, LED's LCD's, discharge devices.

TRANSDUCERS:Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level &temperature.

UNIT IV

INTRODUCTION TO SIGNAL CONDITIONING:

DC signal conditioning system, AC signal conditioning system, data acquisition andconversion system

Course Outcome:

1. Analyze the performance characteristics of each instrument
2. Illustrate basic meters such as voltmeters and ammeters.
3. Explain about different types of signal analyzers.
4. Explain the basic features of oscilloscope and different types of oscilloscopes
5. Identify the various parameters that are measurable in electronic instrumentation.
6. Employ appropriate instruments to measure given sets of parameters.

TEXT / REFERENCE BOOKS.

1. A course in Electrical & Electronics Measurements &Instrumentation : A.K.Sawhney; Dhanpat Rai Sons.
2. Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Code					
Category	**Basic Science Courses**				
Course title	**Probability Theory and Stochastic Processes**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : IV**
	3	**0**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. To introduce the fundamentals of probability theory and random processes and illustrate these concepts with engineering applications.
2. To introduce random variables.
3. The course introduces the concept of Stochastic Processes.
4. To understand regression analysis.

UNIT I

Sets and set operations; Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models. Discrete random variables, probability mass function, probability distribution function, example random variables and distributions;Continuous random variables, probability density function, probability distribution function, example distributions

UNIT II

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds;

UNIT III

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.Random process.Stationary processes.Mean and covariance functions.Ergodicity.Transmission of random process through LTI.Power spectral density.

UNIT IV

Regression analysis (linear and non-linear) ,Confidence intervals, Hypothesis testing ,Error analysis

Course Outcomes:

1. Develop understanding of basics of probability theory.
2. Understand random variables.
3. Identify different distribution functions and their relevance.
4. Apply the concepts of probability theory to different problems.
5. Extract parameters of a stochastic process and use them for process characterization.
6. Apply regression analysis.

Text/Reference Books:

1. H. Stark and J. Woods, `Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International 4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers, 5. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press

COMPUTER ORGANIZATION & ARCHITECTURE

Course Code					
Category	**Professional Core Courses**				
Course title	**Computer organization & architecture**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester : IV**
	3	**0**	**0**	**3**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course are as under:

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization.
4. Summarize the Instruction execution stages.

UNIT-I

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uniprocessors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations. Case study - instruction sets of some common CPUs.
Fixed point Addition, Subtraction, Multiplication and Division.Floating Point arithmetic, High performance arithmetic, Subword parallelism.

UNIT-II

Introduction, Logic Design Conventions, Building a Datapath – A Simple Implementation scheme -An Overview of Pipelining – Pipelined Datapath and Control. Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions.

UNIT-III

MEMORY AND I/O ORGANIZATION:
Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory. Parallel Bus Architectures, Internal Communication Methodologies, Serial Bus Architectures, Mass storage, Input and Output Devices.

UNIT-IV

Parallel processing architectures and challenges, Hardware multithreading, Multicore and shared memory multiprocessors, Introduction to Graphics Processing Units, Clusters and Warehouse scale computers – Introduction to Multiprocessor network topologies.

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

1. Understand basics of a computer system.
2. Understanding Logic gates, flip flops and counter
3. Clear Understanding of Computer Architecture
4. Pipeline processing
5. RISC and CISC architectures
6. Develop a base for advance micro-processors Reference

Text/ reference books:

1. Computer System Architecture: By M. Morris Mano.
2. Structured Computer Organization: By Tanenbaum.
3. Computer Organization: By Stallings.
4. Computer Architecture and Organization: By Hayes.
5. Microprocessor Architecture, Programming, and Applications with the 8085 Ramesh S. Gaonkar Pub: Penram International

MICROPROCESSORS AND INTERFACING

Course Code						
Category	**Professional Core Courses**					
Course title	**Microprocessors and Interfacing**					
Scheme	**L**	**T**	**P**	**Credits**	**Semester : IV**	
	3	**1**	**0**	**3**		
Class Work	30 Marks					
Exam	70 Marks					
Total	100 Marks					
Duration of Exam	03Hrs					

NOTE: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective: The objectives of this course.

1. To develop an in-depth understanding of the operation of microprocessors.
2. To master the assembly language programming using concepts like assembler directives, procedures, macros, software interrupts etc.
3. To create an exposure to basic peripherals, its programming and interfacing techniques.
4. To understand the concept of Interrupts and interfacing details of 8086 .

UNIT-I

THE 8086 MICROPROCESSOR ARCHITECTURE: Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

UNIT II

INSTRUCTION SET OF 8086: Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

UNIT III

Concepts of virtual memory, Cache memory, Architecture & Instructions set of X86 family Microprocessors (80186, 80286, 80386, 80486). Enhanced features of Pentium, Pentium Pro, Pentium-II, Pentium-III, Pentium-IV, Multi-core Technology, Mobile Processor.

UNIT IV

INTERFACING DEVICE: Serial I/O, parallel I/O, A/D & D/A converters.8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.

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

1. Understand the fundamentals of Microprocessors.
2. Understand the internal design of 8086 microprocessor along with the features .
3. Analyze a detailed s/w & h/w structure of the Microprocessor
4. Illustrate how the different peripherals (8086) are interfaced with Microprocessor.
5. Analyze the programming. of Microprocessors
6. Evaluate the data transfer information through serial & parallel ports.

Text / References Books:

1. Douglas Hall, “Microprocessor & Interfacing”, 2nd Edition, TMH, 2006.
2. Muhammad A. Mazidi, “The 8051 Microcontroller And Embedded Systems Using Assembly and C”, 2nd Edition., PHI, 2012.
3. Text / Reference Books: 1. D. V. Hall, Microprocessors and interfacing, Tata McGraw-Hill, 2nd Edition, 2006.
4. Ray A. K. and Burchandi, Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002.
5. Brey, The Intel Microprocessors 8086- Pentium Processor, 8th Edition, Pearson Education.
6. M. A. Mazidi, J. P. Maizidi and Danny Causey, The X86 PC: Assembly Language, Design and interfacing, 5th Edition, Pearson Education, 2017.
7. Liu Yu-Chang and Gibson Glenn A., Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, 2nd Edition, Pearson Education, 2015.
8. L. B. Das, The X86 Microprocessor (Architecture, Programming and Interfacing), 2nd Edition, Pearson Education, 2014.
9. Daniel Tabak, Advanced Microprocessor”, Tata McGraw-Hill, 2nd Edition, 2012.
10. B. Ram, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Publications, 5th edition, 2008.

11. MICROPROCESSOR & INTERFACING LAB

Course code					
Category	**Laboratory Courses**				
Course title	Microprocessor & Interfacing Lab				
Scheme and Credits	L	T	P	Credits	**Semester : IV**
	0	0	2	2	
Classwork	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	02 Hours				

Note:

1. Total ten experiments are to be performed in the semester.
2. 2 At least seven experiments should be performed from the above list. Remaining three experiments
3. Should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Course Objectives: The objectives of this course are as under:

1. To introduce the students with 8086 kit.
2. To acquaint them to do assembly language programming of 8086.
3. To acquaint them to do assembly language programming of 8086 for interfacing of peripherals.

LIST OF EXPERIMENTS:

1. To study the architecture of 8086 microprocessor and 8086 microprocessor kit.
2. Write a program to add the contents of the memory location to the content of other memory location and store the result in 3rd memory location.
3. Write a program to add 16 bit number using 8086 instruction set.
4. Write a multiplication of two 16 bit numbers using 8086 instruction set.
5. Write a program for division of two 16 bit numbers using 8086 instruction set.
6. Write a program factorial of a number.
7. Write a Program to transfer a block of data with & without overlap.
8. Write a program to find the average of two numbers.
9. Write a Program to check whether data byte is odd or even
10. Write a program to find maximum number in the array of 10 numbers.
11. Write a program to find the sum of the first ‘n’ integers.
12. Write a program to generate a square wave.
13. Write a program to generate a rectangular wave.
14. Write a program to generate a triangular wave.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Understand the fundamentals of Microprocessors.
2. Do assembly language programming of 8086.
3. Do assembly language programming of 8086 for interfacing of peripherals.
4. Can generate different kind of wave forms using assembly language.

ELECTRONIC MEASUREMENT & INSTRUMENTATION LABORATORY

Course Code						
Category	**Laboratory Courses**					
Course title	**Electronic Measurement& Instrumentation Laboratory**					
Scheme	**L**	**T**	**P**	**Credits**	**Semester : IV**	
	0	**0**	**2**	**1**		
Class Work	50 Marks					
Exam	50 Marks					
Total	100 Marks					
Duration of Exam	02Hrs					

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus.

(iii) Group of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS

1. Study blocks wise construction of a analog oscilloscope & Function generator.
2. Study blocks wise construction of a Multimeter & frequency counter.
3. Study Measurement of different components & parameters like Q of a coil etc using LCRQ meter.
4. Study of distortion factor meter and determination of the % distortion of the given oscillator
5. Determine output characteristics of a LVDT and Measure displacement using LVDT
6. Study characteristics of temperature transducer like Thermocouple, Thermistor & RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
7. Measurement of Strain using Strain Gauge.
8. To study differential pressure transducer & signal conditioning of output signal.
9. Measurement of level using capacitive transducer.
10. Study of Distance measurement using ultrasonic transducer.

Lab Outcomes: At the end of this lab, students will demonstrate the ability to;

1. Analyze the performance characteristics of each instrument
2. Illustrate basic meters such as voltmeters and ammeters.
3. Explain about different types of signal analyzers.
4. Explain the basic features of oscilloscope and different types of oscilloscopes
5. Identify the various parameters that are measurable in electronic instrumentation.
6. Employ appropriate instruments to measure given sets of parameters.

INTERNET OF THINGS LAB

Course Code					
Category	**Laboratory Courses**				
Course title	**Internet of Things LAB**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester: IV**
	0	**0**	**2**	**1**	
Class Work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	02 Hrs				

Notes:
1. At least 10 experiments are to be performed by students in the semester.
2. At least 7 experiments should be performed from the list, remaining three experiments may either be Performed from the above list or designed and set by the concerned institution as per the scope of the syllabus.
3. Group of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS

1. To study the architecture and pins of Arduino
2. Write a program for blinking of LED and vary its intensity.
3. To sense the available networks using Arduino.
4. Measure the distance using ultrasonic sensor.
5. To detect the vibration of an object .
6. Sense the temperature and display it on LCD display.
7. Vary the intensity of light of LED using LDR.
8. MySQL Queries Database installation in Raspberry Pi
9. SQL Queries by Fetching data from Raspberry Pi.
10. Switch light ON and OFF based on the input of user using Raspberry Pi.

Lab Outcome: At the end of this lab, students will demonstrate the ability to;

1. Uunderstand the basics of IoT.
2. Learn Architecture and enabling technologies
3. Implement application of different sensors
4. Can design project using Arduino and Raspberry Pi

PCB & WORKSHOP LABORATORY

Course code					
Category	**Laboratory Courses**				
Course title	**PCB & WORKSHOP LAB**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester : IV**
	0	**0**	**2**	**2**	
Classwork	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**02 Hours**				

Course Objective: To create interest in Hardware Technology.

1. Winding shop: Step down transformer winding of less than 5VA.

2. Soldering shop: Fabrication of DC regulated power supply

3. PCB Lab: (a) Artwork & printing of a simple PCB.

(b) Etching & drilling of PCB.

4. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet.

5. Testing of regulated power supply fabricated.

Experiment to be performed

1. Introduction & Hands on experience to use circuit creation & simulation software like TINAPRO , MULTISIM, PSPICE or ORCAD etc.

2. Design a full wave centre tapped rectifier & study the effect of capacitive filter & its output on a virtual oscilloscope.

3. Design a RLC resonance circuit & verify the transient & phase response for different values of R,L &C.

4. Design a circuit for a fixed power supply.

5. Design a half adder using discrete components & verify the timing diagrams.

6. Convert the power supply circuit into PCB & simulates its 2D & 3D view.

7. PCB printing using screen printing or any other technique.

8. Etching of the above PCB.

9. UV exposure & Drilling of PCB.

10. Coating of etched PCB to protect it from oxidation.

11. Fabrication & placing of components as per above power supply circuit.

12. Testing of above circuit.

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

1. Understand the characteristics of diodes and filter circuits.

2. Understand the operation and characteristics of different types of rectifiers.

3. Understand the operation and characteristics of power supply.

SCIENTIFIC & TECHNICAL WRITING SKILLS

Course Code						
Category	**Mandatory Course**					
Course title	**Scientific & Technical writing Skills**					
Scheme	**L**	**T**	**P**	**Credits**	**Semester: IV**	
	2	**0**	**0**	**0**		
Class Work	30 Marks					
Exam	70 Marks					
Total	100 Marks					
Duration of Exam	3Hrs					

The following course content to conduct the activities is prescribed for the Scientific & Technical writing Skills Lab:

1. Activities on Writing Skills - Structure and presentation of different types of writing - letter writing/ Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing - planning for writing - improving one's writing.
2. Activities on Presentation Skills - Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.
3. Activities on Group Discussion and Interview Skills - Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews.

Text references:

1. A Course Book of Advanced Communication Skills (ACS) Lab published by Universities Press, Hyderabad.

Books Recommended:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson , 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence, Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications, 2011.
5. The Basics of Communication: A Relational Prespective, Stev Duck & David T. Mc Mahan. Sage South Asia Edition. Sage Publications, 2012.
6. English Vocabulary in Use series, Cambridge University Press 2008.
7. Management Shapers Series by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley, 2012. Cengage Learning.
9. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
10. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
11. Job Hunting by Colm Downes, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc graw Hill 2009.
14. Books on TOFEL/ GRE/ GMAT/ CAT/ IELTS by Barron's/ DELTA/ Cambridge University Press.
15. International English for Call Contres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.