SCHEME

&

SYLLABUS

B.Tech Electronics & Communication Engineering
Choice Based Credit Scheme w.e.f. 2018-19

Department of Electronics & Communication Engineering
Deenbandhu Chhotu Ram University of Science &
Technology, Murthal (Sonipat), Haryana, 131027

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
Department of Electronics & Communication Engineering
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. IInd YEAR (SEMESTER –III)
Choice Based Credit Scheme w.e.f. 2019-20

S.	Course	Course Title	Teaching Schedule	Marks of Class	Examination Marks	Total	Credit	Duration of Exam	Contact Hrs./wk.

Approved in 14th meeting of Academic Council held on 11.06.2019. Effective from Academic Session 2019-20 and applicable to all students admitted in 2018 and onwards.

No.	No.		L	T	P	work	Theory	Practical				
1	ECE201C	Electronic Devices	3	0	-	25	75	-	100	3	3	4
2	ECE281C	Electronic Devices lab	0	0	2	25	-	75	100	1	3	2
3	ECE203C	Digital System Design	3	0	-	25	75	-	100	3	3	3
4	ECE283C	Digital System Design lab	0	0	2	25	-	75	100	1	3	2
5	ECE205C	Signals and Systems	3	0	-	25	75	-	100	3	3	3
6	ECE207C	Network Theory	3	0	-	25	75	-	100	3	3	4
7		(Slot for BS/ES/HS courses)*								6		
8	MC203C or MC201C	Constitution of India **(Gr.-A)** **or** Environmental Studies**(Gr.-B)**	3	0	0	25	75	-	100	-	3	3
Total			**18**	**0**	**4**	**200**	**450**	**150**	**800**	**20**		

Note:

1. (*) Select any two subjects from table given below:-

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam	Contact Hrs./wk.
			L	T	P		Theory	Practical				
1	MGT201C	Engineering Economics	3	0	0	25	75	-	100	3	3	3
2	CSE201C	Data Structures & Algorithms	3	0	0	25	75	-	100	3	3	3
3	CSE203C	Computer Organization & Architecture	3	0	0	25	75	-	100	3	3	3

2. Environmental Studies (MC201C)/ Constitution of India (MC203C) are mandatory & qualifying courses.

3. For DCRUST Murthal: GROUP A: BME, BT, CSE, ECE. GROUP B: CE, CHE, EE, ME.

4. Engg. Economics (MGT201C) is common with 3rd Semester Mech, CSE, ECE and 4th Semester Civil & Chemical Engg.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
Department of Electronics & Communication Engineering
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. IInd YEAR (SEMESTER –IV)
Choice Based Credit Scheme w.e.f. 2019-20

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam	Contact Hrs./wk.
			L	T	P		Theory	Practical				
1	ECE202C	Communication System	3	0	-	25	75	-	100	3	3	4
2	ECE282C	Communication System lab	0	0	2	25	-	75	100	1	3	2

3	ECE204C	Analog Circuits	3	0	-	25	75	-	100	3	3	4
4	ECE284C	Analog Circuits lab	0	0	2	25	-	75	100	1	3	2
5	ECE206C	Microprocessor & Interfacing	3	0	-	25	75	-	100	3	3	3
6	ECE286C	Microprocessor & Interfacing lab	0	0	2	25	-	75	100	1	3	2
7		(Slot for BS/ES/HS courses)*								8		
8	MC201C or MC203C	Environmental Studies **(Gr.-A) or** Constitution of India **(Gr.-B)**	3	0	0	25	75	-	100	-	3	3
Total			**15**	**0**	**10**	**250**	**375**	**375**	**1000**	**20**		

Note:

1. (*) Select any two subjects (along with respective lab) from table given below:-

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam	Contact Hrs./wk.
			L	T	P		Theory	Practical				
1	CSE214C	Object Oriented Programming	3	0	0	25	75	-	100	3	3	3
2	CSE284C	Object Oriented Programming Lab	0	0	2	25	-	75	100	1	3	2
3	MATH311C	Numerical Methods	3	0	0	25	75	-	100	3	3	3
4	MATH313C	Numerical Methods lab	0	0	2	25	-	75	100	1	3	2
5	CSE303C	Data Base Management System	3	0	0	25	75	-	100	3	3	3
6	CSE383C	Data Base Management System Lab	0	0	2	25	-	75	100	1	3	2

2. At the end of 4th semester each student has to undergo Professional Training (level-2) of atleast four weeks from industry, institute, research lab, training centre during summer vacation and its evaluations shall be carried out in the 5th semester.
3. Environmental Studies(MC201C)/ Constitution of India (MC203C) are mandatory & qualifying courses.
4. For DCRUST Murthal: GROUP A: BME, BT, CSE, ECE. GROUP B: CE, CHE, EE, ME.

ECE201C Electronic Devices

B.Tech. 2nd YEAR (SEMESTER –III)
Electronics & Communication Engineering

L	T	P	Credits
3	0	0	3

Class Work	: 25
Examination	: 75
Total	: 100
Duration of Exam	: 3 Hours

Unit 1 (9 Lectures)

Basic Semiconductor And Pn-Junction Theory: Introduction, Atomic Structure, Band Theory of Semiconductors, Covalent Bond, Metals, Insulators & Semiconductors, Effect of Temperature on Conduction, Drift Current ,Donor & Accepter Impurities in Semiconductor, Law Of Mass Action, Hall's Effect, Hall Coefficient & Mobility, Poisson and continuity equation.

Characteristics Of Diode:PN-Junction, Construction Types, Unbiased Junction, Biased Junction, Space Charge Region, Diode Characteristics & Parameters, Diode Capacitance, Diode Resistance, DC And AC Load Lines, Diode Testing, Zener And Avalanche Breakdown Diodes, Tunnel Diode, Temperature Characteristics of Diode, Reverse Recovery Time, Switching Characteristics of Diode.

Unit 2 (12 Lectures)

Diode Applications: Half Wave, Full Wave Center Tapped, Full Wave Bridge(Rectification), Series Clipping Circuit, Shunt Clipping Circuit, Clamping Circuit, Bridge Voltage Doubler, Filtering Circuit Using Capacitor & Inductor.

Junction Transistor: Introduction, Construction Of Junction Transistor, Circuit Symbols, Transistor Operation, Unbiased Transistor, Operation Of Biased Transistor, Transistor Current Components, DC & AC Load Line, Operating Point, Transistor Configuration CB, CE, CC, Input/Output Characteristics, Early Effect(Base Width Modulation), Eber's-Moll-Model of Transistor, Maximum Rating of Transistor, Transistor Testing, Transistor as an Amplifier, Transistor as Oscillator.

Unit 3 (12 Lectures)

Bjt Biasing: Bias Stability, Instability Due To β, Thermal Stability, Stability Factor, Fixed Biased Circuits, Effect of Emitter Resistor, Collector to Base Bias, Voltage Divide Biasing, Advantage & drawbacks of Biasing Techniques, Stability Factor calculation of Biasing Techniques, Bias Compensation by various device, Thermal Runway, Transistor Dissipation, Thermal Resistance, Condition of Thermal Stability

Small Signal Circuit: Two Port Network, Hybrid(H-Parameter)Model, Typical Values of H-Parameter Model, Conversion of CE, CB, CC Configuration to Equivalent Hybrid Model, CB Circuit Analysis, CE circuit with & without R_E analysis, CC circuit analysis, Analysis of CE, CB & CC Configuration with approximate Hybrid Model, Miller's Theorem, Dual of Miller Theorem.

Unit 4 (9 Lectures)

FET: Introduction, The Junction FET, Basic Construction, Operation, P- Channel FET, N-Channel FET, High Frequency Model of FET, Low Frequency FET Amplifiers, Transfer Characteristics of FET, MOSFET, Enhancement Mode, Depletion Mode of FET, Circuit Symbol of MOSFET,V-MOSFET.

Special Semicondutor Devices: Optoelectronic Devices, Photoconductors, Photo Diode, Photo Transistor, Photo Voltaic Sensor, Photo Emission, Solar Cells, LED, LCD, Laser Diode, Schottky Diode, SCR, TRIAC, DIAC, UJT, Single Electron Transistor. Infrared LEDs, IGBT, Opto Coupler.

Text/Reference Books:

1. Basic Electronics By Debashion DE. – Pearson Education.
2. Electronics Device & Circuit, By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education,2015.
3. Electronics Device Circuit By David.A.Bell -- Oxford
4. Integrated Electronics By Millman Halkias -- TMH.
5. Electronics Device &Circuit By Dharam Raj Cheruku -- Pearson Education.
6. Electronics Device &Circuit By B.P Singh and Rekha Singh 2nd Edition – Pearson Education.

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

1. Understand the working of switching devices and apply the same in designing complex circuits with fewer devices.
2. Design amplifier and other complex circuits with the help of special semiconductor devices which will further increase real time applications and reduce runaway situations.
3. Apply the mathematical modeling for the electronic devices and circuits in turn helps in improvement in design in terms of size, power requirement and ease of use.
4. Use variety of electronic devices for designing society friendly electronic gadgets used for security and other useful purposes.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE281C Electronic Devices Lab

B.Tech. 2nd YEAR (SEMESTER –III)
Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

LIST OF EXPERIMENTS:

1 Analysis & study of half wave and full wave rectifiers
2 Analysis & study of power supply filter.
3 Analysis & study of diode as a clipper and clamper.
4 Analysis & study of zener diode as a voltage regulator.
5 Analysis & study of CE amplifier for voltage, current and Power gains input, output impedances.
6 Analysis & study of CC amplifier as a buffer.
7 Analysis & study the frequency response of RC coupled amplifier.
8 Analysis & study of transistor as a constant current source in CE configuration .
9 To study characteristics of FET.
10 Analysis & study of FET common source amplifier.
11 Analysis & study of FET common drain amplifier.
12 Study and design of a DC voltage doubler.
13 To study characteristics of SCR.
14 To study characteristics of DIAC.
15 To study UJT as a relaxation oscillator.

Text/Reference Books:

1. Basic Electronics By Debashion DE. – Pearson Education.
2. Electronics Device & Circuit, By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education,2015.
3. Electronics Device Circuit By David.A.Bell -- Oxford
4. Integrated Electronics By Millman Halkias -- TMH.
5. Electronics Device &Circuit By Dharam Raj Cheruku -- Pearson Education.
6. Electronics Device &Circuit By B.P Singh and Rekha Singh 2nd Edition – Pearson Education.

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

1. Understand the characteristics of diodes, transistors, JFETs, and op-amps.
2. Understand the operation and characteristics of different configurations of BJT.
3. Understand the operation and characteristics of different special semiconductor devices.
4. Design complex electronic circuits with fewer devices.
5. Optimize power requirement in design of complex electronic circuits.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE203C Digital System Design

B.Tech. 2nd YEAR (SEMESTER –III)

(Common for ECE and CSE)

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (9 Lectures)

Logic Simplification: Review of Boolean Algebra and DeMorgan's Theorem, SOP & POS forms, Canonical forms, Realization Using Gates. Karnaugh maps up to 6 variables, VEM technique, Binary codes, Code Conversion. Numericals.

Unit 2 (12 Lectures)

Combinational & Sequential Logic Design: Comparators, Multiplexers, Encoder, Decoder, Display devices, Half and Full Adders, Subtractors, Parallel Adders, Adder with Look Ahead Carry, BCD Adder. Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Sequence Generator, Shift registers.

Unit 3 (12 Lectures)

Finite state machines: Introduction, Design of synchronous FSM: Serial Binary Adder, Sequence detector, Parity Bit Generator, pulse train generator. Algorithmic State Machines charts: Introduction, Component of ASM chart, Introductory examples of ASM chart.

Unit 4 (12 Lectures)

Logic Families and PLDs: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing. Concept of Programmable logic devices like PAL, PLA, ROM, CPLD and FPGA. Logic implementation using Programmable Devices.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009
2. A.Anand Kumar, "Switching Theory & Logic Design", PHI.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989.
5. Morris Mano, "Digital Design: With an Introduction to the Verilog HDL", 5th Edition, Pearson Education, 2013.
6. Morris Mano, "Logic & Computer Fundamentals",4th Edition, Pearson Education.

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

1. Understand binary codes, binary arithmetic, minimization techniques and their relevance to digital logic design.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder and sequential logic circuits.
3. Understand finite state machines and develop a digital logic to find out sustainable solution of a real life problem.
4. Understand and implement various digital integrated circuits using different logic families and simple systems composed of PLDs.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE283C Digital System Design Lab

B.Tech. 2nd YEAR (SEMESTER –III)

(Common for ECE and CSE)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100

Duration of Exam : 3 Hours

LIST OF EXPERIMENTS:

1 To study & design basic gates.
2 To realize and minimize five & six variables using K-Map method.
3 To verify the operation of Multiplexer & De-multiplexer.
4 To perform Half adder and Full adder
5 To perform Half substractor and Full substractor.
6 To verify the truth table of S-R,J-K,T & D Type flip flop .
7 To study FLIP- FLOP conversion.
8 To design & verify the operation of 3 bit synchronous counter.
9 To design & verify the operation of synchronous UP/DOWN decade counter using JK flip
10 To design & verify operation of Asynchronous counter.
11 To design and implement a circuit to detect a Count Sequence.
12 Conversion of state diagram to the state table and implement it using logical circuit.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009
2. A.Anand Kumar, "Switching Theory & Logic Design", PHI.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.

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

1. Implement the basic digital theory concepts practically and will be able to verify various results derived in theory.
2. Design, analyze and troubleshoot broad range of combinational and sequential circuits for various practical problems using basic gates and flip flops I.C's.
3. Develop technical writing skills to communication effectively and present one's own work.
4. Acquire teamwork skills for finding sustainable solution of a complex problem and working effectively in groups.

Note:-

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/ disallowed.

ECE205C Signals and Systems

B.Tech. 2nd YEAR (SEMESTER –III)
Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(10 Lectures)

Introduction To Signal: Signal Definition, Classification with examples: Continuous –Time & Discrete –Time, Continuous –valued & Discrete –valued, Analog & Digital, Deterministic & Random, One Dimensional & Multi Dimensional, Even/Symmetric & Odd/Anti symmetric signals, Causal, Non causal & Anti causal; Real & Complex, Periodic & Aperiodic, Energy & Power signals; Representation of Discrete –Time signals, Elementary Discrete Time Signals.

Introduction To Discrete-Time Systems And Their Properties: Systems & Their Representation, Independent variable transformations: Time Shifting, Time Reversal, Time Scaling, time shifting and reversal; classification of Systems: Hardware, Software & Mixed Systems; Linear & Nonlinear Systems; Static/without memory & Dynamic/ with memory Systems, Causal & Non causal System; Invertible & Noninvertible; Stable & Unstable System, Time variant & Time Invariant Systems.

Unit 2(12 Lectures)

Linear-Time Invarient (Lti) Systems And Their Advantages:LTI Systems, Discrete –time Signal representation in terms of impulses, Impulse Response of Discrete Time LTI Systems, Finite Impulse Response System, Infinite Impulse Response System, LTI Systems Properties, LTI systems representation by Constant –Coefficient Difference Equation, LTI System Characterization, Cascade & Parallel Connection of LTI Systems.

Introduction To Frequency Domain Representation: Concept of frequency for analog signals and discrete –time signals, Fourier Series Representation of Periodic Signals, I/P O/P Relationship for LTI Systems using Fourier Series, Filtering Concept. Fourier Transform representation for Discrete –Time Signals, Properties of Discrete –Time Fourier Transform, Systems Characterized by Linear Constant Coefficient Difference Equations.

Unit 3(12 Lectures)

Laplace Transform: Definition and Region of Convergence, Laplace transform applications to LTI systems, Transfer function of LTI systems, Poles and Zeros in S-plane, Stability in S-domain.

Z-Transform And Its Inverse: Introduction to Z-Transform, Region of Convergence (ROC) for Z-Transform, ROC for: Finite & Infinite Duration; Causal, Anti causal & Noncausal signals; Z-Transform Properties, Relationship with Fourier Transform, Inverse Z-Transform, Rational Z –Transforms, Poles & Zeros of Signals & Systems, Pole Location and Time Domain behavior for Causal Signals; Applications of Z-Transform: System Function of an LTI System, Causality & Stability of LTI Systems, Pole Zero Cancellation.

Unit 4(10 Lectures)

State Variable Technique: State Space Representation of Continuous –Time LTI Systems with multi-input, multi-output; Solution of state equation for Continuous –Time Systems.

State Space Representation of Discrete –Time LTI Systems: single input single output and multiple input multiple output systems, Solution of State Equation for Discrete-time LTI Systems, Determining System function H(z).

Text Books:

1. A. V. Oppenheim, A. S. Willsky, with S. Nawab "Signals & Systems", 2nd Edition, Pearson Education, 2015.
2. S. Salivahanan, C. Gnanapriya, " Digital Signal Processing", Second Edition, McGraw Hill Education.
3. J. G. Proakis, D. G. Manolakis, "Digital Signal Processing, Principles, Algorithms, & Applications", 4th Edition, Pearson Education.
4.

Reference Books:

1. Smarajit Ghosh,"Signal & Systems",Pearson Education.
2. Nagrath & R. Ranjan, "Signals & Systems", TMH.
3. Schaum Series, "Signals & Systems",Sue & Ranjan.
4. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th Edition, Pearson Educatio.
5. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.
6. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill International Edition
7. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", TMH, 2003.

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

1. Understand and classify different types of signals and systems as per their properties.
2. Represent continuous and discrete time signals and systems in time and frequency domain using different transforms. Understanding frequency concepts for analog and digital signals.
3. Get familiarized with the characteristics and applications of Linear Time Invariant Systems for practical applications.
4. Analyze LTI systems using Laplace/Z-Transform. Use of LTI systems as filters for various applications.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE207C Network Theory

B.Tech. 2nd YEAR (SEMESTER –III)
Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Fundamentals of Network Analysis: Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactances, source transformation and duality**.**
Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

Unit 2 (14 Lectures)

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& Laplace Transform: Fourier transform and continuous spectra, three phase unbalancedcircuit and power calculation.
Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis.

Unit 3 (11 Lectures)

A.C Analysis: Analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions, Behaviors of series and parallel resonant circuits.
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.

Unit 4 (7 Lectures)

Two port network and interconnections: Characteristics and parameters of two port networks**,** Network Configurations**,** short-circuit Admittance parameters, open-circuit impedance parameters, Transmission parameters, hybrid parameters, condition for reciprocity & symmetry, Inter-relationships between parameters of two-port network sets, Inter-connection of two port networks.
Topology: Principles of network topology, graph matrices, network analysis using graph theory
Filter Analysis: Introduction to band pass, low pass, high pass and band reject filters, Analysis & design of prototype high-pass, prototype low-pass, prototype band-pass, and prototype band-reject filter.

Text Books:

1. Van, Valkenburg.; "Network analysis" ; Prentice hall of India, 2000
2. Sudhakar A. Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

Reference Books:

1. Network Theory by U.A Bakshi, V.A Bakshi, Technical Publications
2. "Fundamentals of Electric Circuit" by C.K Alexander and Sadiku.
3. A.V. Oppenheim, A.S. Willsky, with S. Nawaab "Signals & Systems",Prentice –Hall India

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. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

MC203C Constitution of India

B.Tech. 2nd YEAR (SEMESTER –III)
Common for all branches

L	T	P	Credits		
3	-	-	-	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Philosophy of Indian Constitution: Ideological Basis and Salient Features of Indian Constitution, Fundamental Rights & Duties of the Citizens**,** Directive Principles of State Policy

Unit 2 (12 Lectures)

Nature and Dynamics of Indian Federalism: Federalism: Theory and Practice in India, Federal Features of the Indian Constitution**,**Legislative, Administrative and Financial Relations between the Union and the States.

Unit 3 (12 Lectures)

Union and State Legislature: Parliament: Composition, Functions and Working of the Parliamentary system **,**State Legislature: Composition and Functions of Vidhan Sabha/ Vidhan Parishad

Unit 4 (11 Lectures)

Centre and State: Executive and Judiciary: President, Prime Minister and Council of Ministers **,**Governor, Chief Minister and Council of Ministers**,**Judiciary: Supreme Court; High Court

Text Books:

1. Austin G., *The Indian Constitution: Corner Stone of a Nation*, New Delhi: Oxford University Press, 196
2. Basu D.D., *An Introduction to the Constitution of India*, New Delhi: Prentice Hall, 1994
3. Kothari R., *Politics in India*, New Delhi: Orient Language, 1970
4. Siwach J.R., *Dynamics of Indian Government and Politics*, New Delhi: Sterling Publishers, 1985
5. Bhambhri C.P., *The Indian State--Fifty Years*, New Delhi: Shipra, 1997
6. Ghai U.R., *Indian Political System*, Jalandhar: New Academic Publishing Company, 2010

Course Outcomes: Upon successful completion of this course,students will be able:

1. To understand basic features of the constitution and rights and duties of Indian citizens
2. To understand the basic structure of Centre and State Government
3. To get acquainted with the nature of parliamentary form of Government
4. To have knowledge of the executive and judiciary powers in Indian democratic set-up

Scheme of End Semester Examinations (Major Test):

1. The duration of examinations will be three hours.
2. Nine questions of 15 marks each will be set out of which the students will have to attempt five questions in all.
3. First question of 15 marks will be compulsory. It will cover all the four units of the syllabus. The nature of the questions in each unit will depend upon the nature of content therein. The questions may have sub-parts with marks assigned against each.
4. Question No 02 to 09 of 15 marks each will be set from the four units of the syllabus --- two from each unit.
5. In addition to first compulsory question the students will have to attempt four more questions, selecting one from each unit.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

MGT201C Engineering Economics

B.Tech. 2nd YEAR (SEMESTER –III)
Electronics & Communication Engineering

(Common with 3rd Semester Mech, CSE and 4th Semester Civil & Chemical Engg.)

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100

Duration of Exam : 3 Hours

Unit 1 (10 Lectures)

Concept of Economics- various definitions, nature of Economic problem, Micro and macro economics- their features and scope, production possibility curve, Relationship between Science, Engineering Technology and Economics. Utility: Concept and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its importance and practical applications**.**

Unit 2 (12 Lectures)

Demand: Concept, Individual and Market demand schedule, Law of demand, shape of demand curve. Elasticity of demand: Concept, measurement of elasticity of demand, factors affecting elasticity of demand, practical application of elasticity of demand. Various concepts of cost-Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

Unit 3 (12 Lectures)

Meaning of production and factors of production; Law of variable proportions, Law of Return to Scale, Internet and External economics and diseconomies of scale. Meaning of Market, Type of Marker– perfect Competition, Monopoly, Oligopoly, Monopolistic competition (Main features of these markers).

Unit 4 (11 Lectures)

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on price. Nature and characteristics of Indian economy, privatization – meaning, merits and demerits. Globalisation of Indian economy – meaning, merits and demerits.

Text Books:

1. Ahuja H.L"Micro Ecomomic Theory" S. Chand Publication, New Delhi
2. Dewett K.K "Modern Ecomomic Theory" S. Chand Publication, New Delhi
3. Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi
4. Dr. R.K. Agarwal & Rashmi Agarwal, " Principles and Applications of Economic", Pragati Prakashan.

Suggested Books:

1. Jhingan 1. Jhingan M.L"Micro Ecomomic Theory" S.Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
3. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai.
4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.

Course Outcomes: Upon successful completion of this course:

1. Students will acquire the skills to apply the basics of economics and cost analysis to engineering and take economically sound decision.
2. Acquaint the student with the basic economic concepts and their operational significance.
3. Stimulate the student to think systematically and objectively about cotemporary economic problems.
4. In Decision making with the availability of limited resources in the organization these concepts will act as a guiding tool.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

CSE201C Data Structures & Algorithms

B.Tech. 2nd YEAR (SEMESTER –III)
Electronics & Communication Engineering
(Common with 3rd Semester CSE)

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (8 Lectures)

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure operations: insertion, deletion, traversal etc. Analysis of an Algorithm, Asymptotic Notations , Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis

Unit 2 (11 Lectures)

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3 (10 Lectures)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching,Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Unit 4 (12 Lectures)

Sorting and Hashing:Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Reference Books:

1. " Fundamentals of Data Structures" , Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
2. "Algorithms, Data Structures, and Problem Solving with C++" , Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.
3 . "How to Solve it by Computer" , 2nd Impression by R. G. Dromey, Pearson Education.

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

1. Analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. Implement search problem (Linear Search and Binary Search) .
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort,Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity and will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

CSE203C Computer Organization and Architecture

B.Tech. 2nd YEAR (SEMESTER –III)

Electronics & Communication Engineering

(Common with 3rd Semester CSE)

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (8 Lectures)

Functional blocks of a computer : CPU, Memory, input/output subsystems, control unit , Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language , RTL Computer Buses (basic design using multiplexers), Bus width, Bus clocking(synchronous , asynchronous), bus arbitration, Bus examples(ISA bus, PCI bus, Universal serial bus) .

Data representation: signed number representation, fixed and floating point representations, character representation . computer arithmetic –integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier

Unit 2 (11 Lectures)

CPU Organization: Instruction set architecture of a CPU , interpretation of instructions, Instruction set based classification of processors (RISC, CISC, and their comparison), CPU Architecture types (accumulator, register, stack, memory/ register) Instruction cycle (Fetch-Decode-Execute)

Addressing modes(register, immediate, direct, indirect, indexed); Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid) Pipelining (basic concepts, throughput and speedup, hazards)

Unit 3 (10 Lectures)

Input /Output & Control Unit: Input Output Interface , Asynchronous data transfer (Strobe control, handshaking , serial transfer); Serial Vs parallel data transmission;Modes of data transfer, (Programmed I/O, Interrupt driven, Direct Memory access (DMA).
Control Unit design:- Control unit design methods (hardwired & microprogrammed) Control Memory, Address Sequencing, Micro instructions.

Unit 4 (12 Lectures)

Memory Organization: Memory device characteristics(access/ cycle time, cost per bit, volatility , storage density) ;Memory hierarchy ;Main memory Design (Semiconductor RAM & ROM organization, memory expansion,Static & dynamic memory types , their comparison); Associative memory Design ,Match logic ,Locality of reference principle(Temporal & Spatial)

Cache mapping(Direct , associative , set associative); Cache writing policies (Copy-Back , Write-through); Virtual Memory (Address space , memory space , Address mapping using pages , Page replacement)

Reference Books:

1. Computer System Architecture by M. Mano, Prentice-Hall.
2. Structured Computer Organisation by A.S. Tanenbaum, 6th edition, Prentice-Hall of India, Eastern Economic Edition.
3. Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, SafwatZaky.
4. Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
5. Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH
6. Computer Organisation& Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.

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

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution pipelining, parallelism and microprogramming
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE202C Communication Systems

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (8 Lectures)

Introduction to Communication System: Modulation, Demodulation, Radio Frequency Spectrum, Signals & their classification, Limitations & Advantages of a Communication System, Comparison of Analog & Digital Communication Systems, Historical Perspective, Modes & Medias of Communication.

Noise: Sources of Noise, External & Internal Noise, Noise Calculations, Noise Figure, Noise Figure Calculation, Noise Temperature, Noise in Communication Systems, Band Pass Noise Model, Cascaded States & its Noise Figure Calculation, Signal in presence of Noise, Pre-Emphasis & De-Emphasis, Noise Quieting Effect, Capture Effect, Noise in Modulation Systems.

Unit 2 (11 Lectures)

Linear Modulation:(AM) Basic definition & derivation for Modulation & Modulation Index, Modulation & Demodulation of AM, Suppressed Carrier Modulation, Quadrature Amplitude Modulation, SSB-SC, DSB-SC, VSB Modulation & Demodulation, Comparison of various AM Systems, Generation of AM waves.

Angle Modulation:

Basic definition & derivation for Modulation & Modulation Index, Generation of FM waves, Comparison between PM & FM, Frequency Spectrum of FM, B.W. & required spectra, Types of FM, vector representation of FM, Universal Curve, Multiple FM, Demodulation of FM waves, Demodulation of PM waves, Comparison between AM & FM.

Unit 3 (10 Lectures)

Transmitters & Receivers: Classification of Radio Transmitters, Basic Block Diagram of Radio Transmitter, Effect of Feedback on operation of Transmitter, Radio Telephone Transmitters, Privacy Device in Radio Telephony, FM Transmitter using Reactance Modulator, Armstrong FM Transmitter, Radio Receivers, Classification, TRF Receiver, Super Heterodyne Receiver, Image Rejection & Double Spotting, Choice of IF, Tracking & Alignment of Receivers, AGC.

Pulse Analog Modulation: Sampling theory, TDM, FDM, PAM, PWM, PPM, Modulation & Demodulation techniques of above all.

Unit 41 (12 Lectures)

Pulse Digital Modulation: Elements of Pulse Code Modulation, Noise in PCM Systems, Bandwidth of PCM Systems, Measure of Information, Channel Capacity, Channel Capacity of PCM System, Differential Pulse Code Modulation (DPCM). Delta Modulation (DM)

Digital Carrier Modulation And Demodulation Techniques: Digital Modulation Formats, Coherent Binary Modulation & Demodulation: ASK, BPSK, BFSK, Coherent Quadrature Modulation & Demodulation Techniques: QPSK, MSK.

Non Coherent BFSK, Differential PSK, M-Ary Modulation & Demodulation Techniques: M-Ary PSK, M-Ary QAM, M-Ary FSK, Synchronization: Carrier & Symbol Synchronization.

Reference Books:

1. Communication Systems — By Manoj Duhan – I. K. International
2. Electronic Communication Systems — By Kennedy – TMH
3. Communication Systems — By Singh & Sapre – TMH
4. Communication System Engineering — By John G. Proakis and Masoud Salehi, Pearson Education, 2015.
5. Analog Communication — By P. Chakarbarti – DR & Co.
6. Communication Systems — By Simon Haykins – Wiley

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

1. Familiarize with basic concepts like AM, FM, PM and digital modulation.
2. Differentiate between the working of transmitter and receiver of various analog and digital modulation techniques.
3. Design and rectify various communication gadgets and remove/reduce effects of noise on their working.
4. Suggest up gradation in the existing communication systems with lesser radiation output and better signal quality for the betterment of human kind.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE282C Communication Systems Lab

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits
0	0	2	1

Class Work	: 25
Examination	: 75
Total	: 100
Duration of Exam	: 3 Hours

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. 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.
14. To study delta modulation.
15. To deliver a seminar by each student on Advance Communication System.

Reference Books:

1. Communication Systems — By Manoj Duhan – I. K. International
2. Electronic Communication Systems — By Kennedy – TMH
3. Communication Systems — By Singh & Sapre – TMH

Course Outcomes:

1. Students will get hands on practical exposure to concepts of AM, FM and PM
2. Students will be able to understand the basics of PAM, PPM and PWM.
3. Students will be able to analyze various digital carrier modulation and demodulation techniques
4. They can analyze noise and disturbance in modulated signals.

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.

ECE204C Analog Circuits

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (11 Lectures)

High Frequency Analysis of BJT and Multistage Amplifier: Hybrid Pi Model, CE Short Circuit Gain, Frequency Response, Alpha Cut off Frequency, Gain Bandwidth Product, Emitter Follower at High Frequencies. RC Coupled Transistor Amplifier, Lower & Upper Cut off Frequency, Frequency Response curve & Bandwidth, Transformer Coupled Amplifier, Direct Coupled Amplifier, Cascade Amplifier, Darlington Pair Amplifier, Distortion In Amplifiers.

Feedback Amplifiers: Feedback concept , Transfer Gain with Feedback, General Characteristics of Negative Feedback, Advantages & disadvantages, Input And Output Resistance, Voltage Series Feedback topology, Voltage Shunt, Current Series & Current Shunt topology ,Equivalent circuit for each topology, Effects of Negative Feedback.

Unit 2 (11 Lectures)

Oscillators: Introduction, Barkhausen Criterion, Oscillator with RC Feedback circuit (RC Phase Shift, Wien Bridge), Tuned Collector, Tuned Base Oscillator, LC Feedback circuits (Hartley, Colpitts), Condition for Sustained Oscillations & Frequency of Oscillations, Crystal Oscillator.

Power Amplifier: Definition, Application & Types of Power Amplifiers, Amplifier Classes of Efficiency (Class - A, B, AB, C), Push Pull Amplifiers, Distortion in Simple & Push Pull Amplifier, Complementary Push Pull Amplifier, Integrated Circuit Power Amplifier , Introduction to MOSFET & CLASS D Power Amplifier.

Unit 3 (10 Lectures)

Voltage Regulators: Voltage Regulation, Basic Series Regulators, Basic Shunt Regulators, Power Supply Parameters, Basic Switching Regulators, Step up Configuration, Step down Configuration, IC Voltage Regulator, SMPS.

Integrated Circuit Fabrication Process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapour deposition, sputtering, twin-tub CMOS process.

Unit 4 (10 Lectures)

Operational Amplifier Fundamentals: Block Diagram Representation, Ideal OP-AMP, OP-AMP Equivalent Circuit, Ideal Voltage Transfer Curve, Input Offset Voltage, Input Bias Current, Input Offset Current, Output Offset Voltage, Thermal Drift, Effect of Variation in Power Supply Voltages on Offset Voltage, Common Mode Configuration and CMRR, Frequency Response of OP-AMP: Open Loop Response, Close Loop Response, Input and Output Impedances, Effect of Finite Gain Bandwidth Product, Slew Rate.

Operational Amplifier Applications: Linear and non-linear applications-ADC and DAC, Multivibrators, Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, 555 Timer, Monostable & Astable Operation with 555 Timer.

Text/Reference Books:

1. Electronics Device &Circuit By David.A. Bell - Oxford University Press.
2. Electronics Device & Circuit By Theodore F. Bogart, Jeffrey.S.Bealey,Guilermo Rico – 6th Edition, Pearson Education.
3. Electronics Device & Circuit By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education, 2015.
4. Electronics Device By Floyd , 9th Edition, Pearson Education, 2015.
5. Integrated Electronics By Millman Halkias - TMH.
6. Electronic Devices & Circuits By B.P Singh and Rekha Singh, 2nd Edition, Pearson Education.
7. Electronics Device & Circuit By Sanjeev Gupta.
8. Electronics Device & Circuit By I. J. Nagrath - PHI
9. Electronic Principles By Albert Malvino.

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

1. Apply knowledge of electronic devices to construct electronic circuits with better applications for our real time causes.
2. Handle higher power capacity devices which will enhance the existing power handling capacity of electronic circuits.
3. Design various power supplies for different circuit requirements in turn help in reducing size of batteries.
4. Design same electronic circuits with another very important device i.e. operational amplifier with higher gain and easy design facilities.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE284C Analog Circuits Lab

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

LIST OF EXPERIMENTS:

1. To analyze and study frequency response of RC coupled amplifier.
2. To analyze and study different types of feedback topology.
3. To analyze and study RC phase shift oscillator.
4. To analyze and study wein bridge oscillator.
5. To analyze and study three terminal IC voltage regulator.
6. To draw characteristics of a transistor.
7. To analyze and study CE amplifier and calculate its gain.
8. To analyze and study 555 timer as a square wave generator.
9. To analyze and study SMPS power supply.
10. To analyze and study working of Push-Pull amplifier.

Text/Reference Books:

1. Electronics Device &Circuit By David.A. Bell - Oxford University Press.
2. Electronics Device & Circuit By Theodore F. Bogart, Jeffrey.S.Bealey,Guilermo Rico – 6th Edition, Pearson Education.
3. Electronics Device & Circuit By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education, 2015.
4. Electronics Device By Floyd , 9th Edition, Pearson Education, 2015.
5. Integrated Electronics By Millman Halkias - TMH.

Course Outcomes:

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

1. Apply knowledge of electronic devices to construct electronic circuits with better applications for our real time causes.
2. Handle higher power capacity devices which will enhance the existing power handling capacity of electronic circuits.
3. Design various power supplies for different circuit requirements in turn help in reducing size of batteries.
4. Design same electronic circuits with another very important device i.e. operational amplifier with higher gain and easy design facilities.

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.

ECE206C Microprocessor & Interfacing

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, Architecture & Instruction set of microprocessors (8086).

Unit 2 (12 Lectures)

Concepts of virtual memory, Cache memory, Architecture & Instructions set of X86 family Microprocessors (80186, 80286, 80386, 80486).

Unit 3 (10 Lectures)

Enhanced features of Pentium, Pentium Pro, Pentium-II, Pentium-III, Pentium-IV, Multi-core Technology, Mobile Processor.

Unit 4 (13 Lectures)

Interfacing with peripherals - Serial I/O, parallel I/O, A/D & D/A converters, PPI chip, DMA controller, Programmable Interrupt Controller, Programmable interval timer chips.

Text / Reference Books:

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

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

1. Understand the architecture & Instruction set of 8086 microprocessor and will be able to do assembly language programming
2. Understand the architecture & Instruction set of X86 family microprocessors and will be able to do assembly language programming
3. Understand the features of advance Microprocessors
4. Be able to do interfacing design of peripherals.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

ECE286C Microprocessor & Interfacing Lab

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

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.

Reference Books:

1. D. V. Hall, Microprocessors and interfacing, Tata McGraw-Hill, 2nd Edition, 2006.
2. Ray A. K. and Burchandi, Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002.
3. Brey, The Intel Microprocessors 8086- Pentium Processor, 8th Edition, Pearson Education.
4. M. A. Mazidi, J. P. Maizidi and Danny Causey, The X86 PC: Assembly Language, Design and interfacing, 5th Edition, Pearson Education, 2017.
5. B. Ram, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Publications, 5th edition, 2008.

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

1. Do basic assembly language programming of 8086.
2. Do advance assembly language programming of 8086.
3. Do basic assembly language programming of 8086 for interfacing of peripherals.
4. Do advance assembly language programming of 8086 for interfacing of peripherals.

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.

MC201C Environmental Studies

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	-	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

The Multidisciplinary Nature of Environmental Studies.Introduction to Environment: Definition, Scope, and importance of environmental studies; need for public awareness.Environmental Pollution: Definition, Cause and effects of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Role of an individual in prevention of pollution, Pollution case studies

Unit 2 (10 Lectures)

Natural Resources: Water resources: over-utilization, floods, drought, dams-benefits and problems; Mineral resources: Use and exploitation, environmental effects; Food resources : changes caused by modern agriculture, fertilizer-pesticide problems, water logging, Energy resources : Growing energy needs, renewable and non renewable energy sources; Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Unit 3 (10 Lectures)

Ecosystems and Biodiversity: Concept of an ecosystem, Structure and function, Energy flow, Ecological succession, ecological pyramids. Concept of Biodiversity, definition and types, Hot-spots of biodiversity; Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity.

Unit 4 (10 Lectures)

Social Issues and Environment: Water conservation, rain water harvesting, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, Public awareness. Population growth, variation among nations, Family Welfare Programme. Human Population and the Environment - Population growth, Population explosion, Women and Child Welfare.

Reference Books:-

1. A Textbook of Environmental Studies by Asthana D.K. and Asthana Meera
2. Fundamental Concepts in Environmental Studies by Mishra D.D.
3. Environmental Studies by S.C Sharma M.P Poonia
4. Textbook of Environmental Studies for Undergraduate by Erach Bharucha
5. Environmental Studies: Third Edition by R. Rajagopalan

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

1. Develop concepts of basic environmental factors.
2. Introduce to the students the basic understanding of ecosystem and its structural and functional aspects and vast biodiversity
3. Outline aspects of environmental issues.
4. Understand the knowledge of energy resources and their environmental implications

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

CSE214C Object Oriented Programming

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (8 Lectures)

C++ Standard Library, Preprocessor Directives, illustrative Simple C++ Programs. Header Files and Namespaces, library files.Concept of objects, Object Oriented Analysis & Object Modeling techniques.

Object Oriented Concepts: Introduction to Objects and Object Oriented Programming, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private, package), Other Modifiers, Polymorphism: Overloading, Inheritance, Overriding, Abstract Classes, Reusability

Classes and Data Abstraction: Introduction, Structure Definitions, Accessing Members of Structures, Class Scope and Accessing Class Members, Controlling Access Function And Utility Functions, Initializing Class Objects: Constructors.

Unit 2 (11 Lectures)

Using Destructors, Classes: Const(Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Static Class Members, Container Classes and Iiterators, Function overloading.

Operator Overloading: Introduction, Fundamentals of Operator Overloading, Restrictions On Operators Overloading, Operator Functions as Class Members vs. as Friend Functions, Overloading, «, »

Unit 3 (10 Lectures)

Inheritance: Introduction, Inheritance: Base Classes And Derived Classes, Protected Members, Casting Base Class Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base -Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Implicit Derived -Class Object To Base- Class Object Conversion, Composition Vs. Inheritance.

Introduction to Virtual Functions, Abstract ,Base Classes And Concrete Classes, Polymorphism, New Classes And Dynamic Binding, Virtual Destructors, Polymorphism, Dynamic Binding.

Unit 4 (12 Lectures)

Files and I/O Streams and various operation on files. Stream Input/Output Classes and Objects, Stream Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, StreamFormatStates, StreamErrorStates.
Templates & Exception Handling: Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends.

Templates and Static Members: Introduction, Basics of C++ Exception Handling: Try Throw, Catch, Throwing an Exception;- Catching an Exception, Re-throwing an Exception, Exception specifications, Processing Unexpected Exceptions, Constructors, Destructors and Exception Handling, Exceptions and Inheritance.

Reference Books:

1. Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.
2. Programming with C++ By D Ravichandran, 2003, T.M.H
3. Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill
4. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
5. Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
6. The Complete Reference in C++ By Herbert Schildt, 2002, TMH.
7. C++ Programming Fundamentals by Chuck Easttom, Firewall Media.

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

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

CSE284C Object Oriented Programming Lab

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

LIST OF EXPERIMENTS:

1 Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value Use a default argument of 2 for p. so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.

2 A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinate.

Write a program that uses a structure called point to model a point Define three points, and have the user input values to two of them Then set the third point equal to the sum of the other two. and display the value of the new point Interaction with the program might look like this:

Enter coordinates for PI : 3 4

Enter coordinates for P2: 5 7

Coordinates of PI + P2 are: 8 11

3 Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding. subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result.

When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this.

Enter first number. Operator, second number: 10/3

Answer = 3.333333

Do another (YI N)? Y

Enter first number. Operator, second number 12 + 100

Answer = 112

Do another (Y I N)? N

4 Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB.

Use a friend function to carry out the addition operation. The object that stores the results maybe DM object or DB object. depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on object on display.

5 Create a class rational which represents a numerical value by two double values- NUMERATOR & DENOMINATOR Include the following public member Functions:

- constructor with no arguments (default).
- constructor with two arguments.

- void reduce( ) that reduces the rational number by eliminating the highest common factor between the numerator and denominator.
- Overload + operator to add two rational number
- Overload » operator to enable input through cin
- Overload « operator to enable output through cou1.
- Write a main ( ) to test all the functions in the class.

6 Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

7 A hospital wants to create a database regarding its indoor patients. The information to store include

- Name of the patient
- Date of admission
- Disease
- Date of discharge

Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age or the patients List the information about all the to store the age of the patients. List the information about an the pediatric patients (less than twelve years in age).

8 Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department, of type string. Supply a method to toString that prints the manager's name, department and salary. Make a class Executive inherit from Manager Supply a method to String that prints the string Executive followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.

9 Imagine a tollbooth with a class called toll Booth. The two data items of a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ). increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals.

Text/Reference Books:

1. Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.
2. Programming with C++ By D Ravichandran, 2003, T.M.H
3. Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill
4. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
5. Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
6. The Complete Reference in C++ By Herbert Schildt, 2002, TMH.
7. C++ Programming Fundamentals by Chuck Easttom, Firewall Media.

Course Outcomes:

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

1. Use the characteristics of an object-oriented programming language in a program.
2. Use the basic object-oriented design principles in computer problem solving.
3. Use the basic principles of software engineering in managing complex software project.
4. Program with advanced features of the C++ programming language.

Note:-

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

MATH311C Numerical Methods

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (12 Lectures)

Solution of Polynomial and Transcendental Equations, Bisection Method, Newton-Raphson Method and Regula-Falsi. Finite differences, Relation between operators, Interpolation using Newton's, forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Unit 2 (12 Lectures)

Simultaneous Linear Equations: Elimination Method, Gauss and Gauss-Jordan Method, Jacobi's Method, Gauss-Seidal Method, Relaxation Method.

Numerical Differentiation and Integration: Derivatives from difference tables, Higher order derivatives, Extrapolation Techniques, Newton-Cotes integration formula, Trapezoidal rule, Simpson's rule, Boole's rule , Weddle's rule, Romberg's integration

Unit 3 (12 Lectures)

Ordinary differential equations: Taylor's series, Euler's methods, Methods Runge-Kutta Method of Fourth Order for solving first and second order equations. Milne's and Adam's Predicator-Corrector Methods. Power Method for Eigen values by Interations.

Unit 4 (12 Lectures)

Partial Differential Equations: Finite difference solution two dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bendre-Schmidt and Crank-Nicholson Methods), Finite difference explicit Method for Wave Equation, Dufort and Frankel Method.

Text/Reference Books:

1. P. Kandasamy,. K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Co. 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of Numerical Analysis, PHI, 4th Edition, 2005
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th, Edition, 2010.

Course Outcomes: At the end of the course:

1. The students will understand to find the solutions of various kinds of first order ordinary Differential equations.
2. The student will understand second order differential equations and to find their solutions along with variable coefficients, power series, Legendre's and Bessel's equations. .
3. The students will learn to solve polynomial, algebraic and Transcendental equations by various Methods, interpolations, Numerical Differentiation and numerical Integration.
4. The students will be able to find numerical solutions of Ordinary Differential Equations of first and second order and of Partial Differential Equations by various methods.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

MATH313C Numerical Methods Lab

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

LIST OF EXPERIMENTS:

Write down and execute the following programs using c/c++/matlab

1. To find the roots of non-linear equations using Bisection method
2. To find roots of non-linear equation using Newton's method
3. Curve fitting by least square approximations
4. To solve system of linear equations using Gauss-Elimination method
5. To solve system of linear equations using Gauss-Seidal iteration method
6. To solve system of linear equation using Gauss-Jordan method
7. To integrate numerically using Trapezodal rule
8. T integrate numerically using Simpsons's rule
9. To find largest Eigen value of a matrix by power-method
10. To find numerical solution of ordinary differential equations by Euler's method
11. To find numerical solution of ordinary differential equations by Runge-Kutta method
12. To find numerical solution of ordinary differential equations by Milne's method
13. To find numerical solution of Laplace equation
14. To find numerical solution of wave equation
15. To find numerical solution of heat equation

Text/Reference Books:

1. Applied Numerical Analysis by Curtis F. Gerald and Patrick G. Wheatley-Pearson, Edu. Ltd.
2. Numerical Methods: E.Balaguruswamy T.M.H

Course Outcomes: At the end of the course:

1. The students will understand to find the solutions of various kinds of first order ordinary Differential equations.
2. The student will understand second order differential equations and to find their solutions along with variable coefficients, power series, Legendre's and Bessel's equations. .
3. The students will learn to solve polynomial, algebraic and Transcendental equations by various Methods, interpolations, Numerical Differentiation and numerical Integration.
4. The students will be able to find numerical solutions of Ordinary Differential Equations of first and second order and of Partial Differential Equations by various methods.

Note:-

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

CSE303C Database Management Systems

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering
(Common with 5th Semester CSE)

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (12 Lectures)

Basics of Database system: Architecture of DBMS, Applications of DBMS, Advantages and Disadvantages of DBMS. Categorization of DBMS, Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: introduction to network model, Hierarchical model, Relational Model and object oriented data model. Key components of E-R Model. Specifying different constraints on E-R Models. Specialization and generalization.

Unit 2 (12 Lectures)

Relational Model: formal definition of relational model, Relational model Design.

Query Language: introduction to Tuple and domain relational calculus, operations of Relational algebra, Introduction to SQL , Implementation of relational algebra operations in SQL. Introduction to Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Unit 3 (12 Lectures)

Refinement of Database Design: Domain and data dependency, types of functional dependencies. Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Unit 4 (12 Lectures)

Transaction processing: Concurrency control, ACID property, Serializability of schedules, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery

Advance Topics in DBMS : Distributed databases, Data warehousing and data mining, Object oriented and object relational databases.

Text/Reference Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.
5. An introduction to **Database Systems**. Author : C J Date. Publisher : Wesley

Course Outcomes: At the end of the course:

1. Write relational algebra expressions for the query and optimize the developed expressions and design the databases using ER method and normalization for a given specification of the requirement
2. Construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2 for a given specification
3. Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system,
4. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

CSE383C Database Management Systems Lab

B.Tech. 2nd YEAR (SEMESTER –IV)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

LIST OF EXPERIMENTS:

1. Study of oracle 11g interface, with different types of installations, Accounts and privileges in Oracle 11g.
2. Study of various Data Types and Data Objects in SQL
3. Implementation of Data Definition Language (DDL) Commands in SQL
4. Implementation of Data Manipulation Language (DML) Commands in SQL.
5. Implementation of various aggregate functions in SQL with group by and Having Clause.
6. Implementation of various String functions in SQL.
7. Implementation of various Date Functions in SQL.
8. Implementation of Data Control Language (DCL) Commands in SQL
9. Implantation of Data Integrity Constraints in SQL
10. Implementation of Different types of Views in SQL.
11. Implementation Nested Queries (Simple and Correlated) in SQL.
12. Implementation of JOINS (Natural, Equi, Theta, Inner, Outer) in SQL.
13. Implementation of SET Operations (UNION,INTER-SECTION, SET DIFFERENCE) in SQL
14. Implementation of SQL Commands related to Database recovery and Concurrency Control in DBMS.
15. Implementation different types of Index in SQL.

Text/Reference Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

Course Outcomes: At the end of the course:

1. Student will be able to know basics of SQL.
2. Student will be able to construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2 for a given specification.
3. Student will be able to implement SET Operations in SQL.
4. Student will be able to implement different types of Index in SQL.

Note:-

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

ECE101C Practical Training (In-house)

B.Tech. 2nd YEAR (SEMESTER –IV)
Electronics & Communication Engineering

L	T	P	Credits		
0	0	0	1	Class Work	: 100
				Examination	: -
				Total	: 100
				Duration of course	: 50 hrs.

Unit 1 (3 Days or 12-15 Hrs.)

Learning of Measuring Instruments:

(a) Study of electronics components and measuring instruments.
(b) Components testing using measuring instruments.
(c) Inter conversion of measuring instruments.

Unit 2 (3 Days or 12-15 Hrs.)

PCB Designing:

(a) Study of soldering methods.
(b) Study of steps involved in PCB making.
(c) Design and construct a simple PCB circuit.
(d) Component mounting on PCB.

Unit 3 (2 Days or 8-12 Hrs.)

Computer Skill Development:

(a) M/S word
(b) M/S excel
(c) M/S power point

Unit 4 (2 Days or 8-12 Hrs.)

MATLAB:

(a) Basic introduction to MATLAB.
(b) Introduction to various commands of MATLAB and introduction to simple programme writing.

Course Outcomes: At the end of the course:

1. Students will be beforehand ready for the upcoming challenges in their advance syllabus.
2. With the practical exposure, students will be handling real world problems with more ease.
3. Being equipped with computer skills, will provide them with an additional edge.
4. Students will be aware of basics of MATLAB for future use.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
Department of Electronics & Communication Engineering
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. IIIrd YEAR (SEMESTER –V)
Choice Based Credit Scheme w.e.f. 2020-21

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ECE301C	Microwave Theory and Techniques	3	0	0	25	75	-	100	3	3
2	ECE381C	Microwave Theory and Techniques Lab	0	0	2	25	-	75	100	1	3
3	ECE303C	Antennas and Wave Propagation	3	0	0	25	75	-	100	3	3
4	ECE305C	Probability Theory and Stochastic Processes for Communication Engineering	3	0	0	25	75	-	100	3	3
5	ECE307C	Digital Signal Processing	3	0	0	25	75	-	100	3	3
6	ECE387C	Digital Signal Processing Lab	0	0	2	25	-	75	100	1	3
7	ECE309C	Linear Integrated Circuit & Applications	3	0	0	25	75	-	100	3	3
8	ECE391C **or** ECE393C **or** ECE395C **or** ECE397C	Electronic Measurement Lab Digital System Design with VHDL Lab Microcontroller & Interfacing Lab Consumer Electronics Lab	0	0	2	25	-	75	100	1	3
9		Program Elective -1	3	0	0	25	75	-	100	3	3
10	ECE399C	Professional Training (Level-2)	0	0	2	100	-	-	100	2	-
11	HUM301C	Essence of Indian Traditional Knowledge	3	0	0	25	75	-	100	-	3
Total			**21**	**0**	**8**	**350**	**525**	**225**	**1100**	**23**	

Note:

1. Assessment of Professional Training (Level-2)(ECE399C), undergone at the end of semester-IV, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry / institute / research lab / training centre etc.
2. Students will be permitted to opt for any one elective from the list of **Program Elective-1** as given below. The minimum strength of the students should be 20 to run an elective course. The student opting for program elective ECE321C/ECE323C/ ECE325C/ECE327C has to opt for its respective lab that is, ECE391C/ ECE393C/ ECE395C/ ECE397C.

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ECE321C	Electronics Measurement	3	0	0	25	75	-	100	3	3
2	ECE323C	Digital System Design with VHDL	3	0	0	25	75	-	100	3	3
3	ECE325C	Microcontroller & Interfacing	3	0	0	25	75	-	100	3	3
4	ECE327C	Consumer Electronics	3	0	0	25	75	-	100	3	3

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
Department of Electronics & Communication Engineering
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. IIIrd YEAR (SEMESTER –VI)
Choice Based Credit Scheme w.e.f. 2020-21

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ECE302C	Control Systems	3	0	0	25	75	-	100	3	3
2	ECE304C	VLSI Design	3	0	0	25	75	-	100	3	3
3	ECE384C	VLSI Design Lab	0	0	2	25	-	75	100	1	3
4	ECE306C	Verilog Based Digital System Design	3	0	0	25	75	-	100	3	3
5	ECE386C	Verilog Based Digital System Design Lab	0	0	2	25	-	75	100	1	3
6	ECE308C	Wireless Communication System	3	0	0	25	75	-	100	3	3
7		Program Elective -2	3	0	0	25	75	-	100	3	3
8		Open Elective-I	3	0	0	25	75	-	100	3	3
Total			**18**	**0**	**4**	**200**	**450**	**150**	**800**	**20**	

Note:

1. At the end of semester-VI each student has to undergo Professional Training (level-3) of atleast four weeks from industry, institute, research lab, training centre during summer vacation and its evaluations shall be carried out in the semester-VII.
2. Students will be permitted to opt for any one elective from the list of **Program Elective-2** given below. The minimum strength of the students should be 20 to run an elective course.

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ECE322C	Speech and Audio Processing	3	0	0	25	75	-	100	3	3
2	ECE324C	Introduction to MEMS	3	0	0	25	75	-	100	3	3
3	ECE326C	Scientific Computing	3	0	0	25	75	-	100	3	3
4	ECE328C	Optimization Techniques	3	0	0	25	75	-	100	3	3

3. Students will be permitted to opt for any one **Open Elective-I** course run by other department, from group of subjects given in table below. However, the department shall offer those elective for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	HUM350C	Communication Skills for Professionals (Except BME & BTE)	3	0	0	25	75	-	100	3	3
2	HUM352C	Soft Skills And Interpersonal Communication	3	0	0	25	75	-	100	3	3
3	MGT402C	Human Values, Ethics And IPR	3	0	0	25	75	-	100	3	3
4	MGT404C	Human Resource Management	3	0	0	25	75	-	100	3	3
5	HUM354C	Introduction To French Language	3	0	0	25	75	-	100	3	3
6	HUM356C	Introduction To German Language	3	0	0	25	75	-	100	3	3

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

SCHEME OF STUDIES & EXAMINATIONS OF B. TECH. (HONS./MINOR DEGREE) WITH SPECIALIZATION (W.E.F. 2020-21)

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (Hons. Degree for students of ECE & CSE, Minor Degree for other students)

S. No.	Semester	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
				L	T	P		Theory	Practical			
1	5	SPEC301C	Statistics and Predictive Analytics	4	0	0	25	75	-	100	4	3
2	6	SPEC302C	Python Programming	4	0	0	25	75	-	100	4	3
3	6	SPEC304C	Machine Learning	4	0	0	25	75	-	100	4	3
4	6	SPEC384C	Machine Learning Lab	0	0	2	25	-	75	100	1	3
5	7	SPEC401C	Artificial Intelligence	4	0	0	25	75	-	100	4	3
6	7	SPEC481C	Artificial Intelligence Lab	0	0	2	25	-	75	100	1	3
Total				**16**	**0**	**4**	**150**	**300**	**150**	**600**	**18**	

INTERNET OF THINGS (Hons. Degree for students of ECE & CSE, Minor Degree for other students)

S. No.	Semester	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
				L	T	P		Theory	Practical			
1	5	SPEC303C	IoT and Applications	4	0	0	25	75	-	100	4	3
2	5	SPEC383C	IoT Lab	0	0	2	25	-	75	100	1	3
3	6	SPEC302C	Python Programming	4	0	0	25	75	-	100	4	3
4	6	SPEC306C	Embedded IoT	4	0	0	25	75	-	100	4	3
5	6	SPEC386C	Embedded IoT Lab	0	0	2	25	-	75	100	1	3
6	7	SPEC403C	Cloud Computing	4	0	0	25	75	-	100	4	3
Total				**16**	**0**	**4**	**150**	**300**	**150**	**600**	**18**	

ROBOTICS (Jointly offered with ME Department. Hons. Degree for students of ECE & ME, Minor Degree for other students)

S. No.	Semester	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
				L	T	P		Theory	Practical			
1	5	SPME301C	Robotics and Applications	4	0	0	25	75	-	100	4	3
2	5	SPEC381C	Robotics Lab	0	0	2	25	-	75	100	1	3
3	6	SPEC302C	Python Programming	4	0	0	25	75	-	100	4	3
4	6	SPEC308C	Embedded Robotics	4	0	0	25	75	-	100	4	3
5	6	SPEC388C	Embedded Robotics Lab	0	0	2	25	-	75	100	1	3
6	7	SPME401C	Mechanics and Control in Robotics	4	0	0	25	75	-	100	4	3
Total				**16**	**0**	**4**	**150**	**300**	**150**	**600**	**18**	

Note:

1. **The ordinance of B. Tech. Programme of the University shall be applicable to this scheme as well.**
2. **Student can undertake 20% of the courses of this scheme (Hons./Minor Degree with Specialization in the above listed emerging areas) through online platforms SWAYAM/MOOCS/NPTEL etc. with due permission of the chairperson.**
3. **Any students of the B. Tech. of the University can opt for this scheme (Hons./Minor Degree with Specialization in the above listed emerging areas), however, minimum 10 students are required for running a particular specialization.**
4. **The choice of the students shall be sought through the respective chairpersons at the end of the 4th Semester.**
5. **If any of the course in the any of the above scheme opted by a student exist in the list of the electives of the normal B. Tech. Scheme of the stream of that student as well then the student has to opt for some other elective.**

ECE301C Microwave Theory and Techniques

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Introduction to Microwaves: History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical etc. Microwave Systems- Radar, Terrestrial and Satellite Communication, RFID, GPS. Planar Transmission Lines, basics of waveguides, Concept of transmission modes in waveguides, Features of TEM, TE and TM Modes in Rectangular waveguide & Circular waveguide.

Unit 2 (12 Lectures)

Microwave Network Analysis: Scattering Parameters and S-matrix. Passive Microwave Devices- Directional Coupler, Power Divider, Magic Tee, Attenuator, Resonator, Hybrid Ring, Directional Couplers, Phase shifter, Cavity resonators, Isolators, Circulators.

Unit 3 (12 Lectures)

Microwave active components: Microwave Tubes: Klystron amplifiers, reflex klystron, TWT, BWO, Magnetron, CFA. Microwave Semiconductor Devices: Varactor diode, Tunnel diode, Schottky Barrier diodes, PIN diodes, Gunn Diodes, IMPATT, TRAPATT, BARITT diodes, parametric amplifiers, MASER.

Unit 4 (9 Lectures)

Microwave Measurements: VSWR, Power, Frequency and impedance measurement at microwave Frequency. Network Analyzer, Spectrum Analyzer. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Monolithic Microwave ICs.

Text/Reference Books:

1. R.E. Collins, Microwave Circuits, McGraw Hill
2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house
3. Samuel Liao, Microwave Devices and Circuits, 3rd Edition, Pearson Education
4. R.Chatterjee, Elements of Microwave Engineering,EWP
5. SushrutDas,MicrowaveEngineering,Oxford University Press.

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

5. Understand and apply knowledge for designing various microwave communication systems using planar transmission line technology that can be applied in various fields of communication.
6. Analyze various microwave circuits for verifying their properties and bringing up new designs for obtaining better performances which in turn will be used for betterment of human kind.
7. Inspect various microwave power generation sources and will be able to design circuits with improved power handling capacities.
8. Measure various parameters related to microwave systems and will be able to work towards improving those parameters to make such systems more suitable and efficient for everyday life of human kind.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE381C Microwave Theory and Techniques Lab

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

16 To study various waveguide components.

17 To analyze generation of microwave power & basic set-up of waveguide bench.

18 To generate and analyze the characteristics of reflex klystron.

19 To measure the frequency of microwave source and demonstrate relationship among frequency, free space wavelength and guide wave length.

20 To measure VSWR of an unknown load.

21 To measure standing wave ratio of an unmatched load.

22 To match impedance for maximum power transfer using slide screw tuner.

23 To measure VSWR, insertion loss and attenuation of a fixed and variable attenuator.

24 To measure coupling factor and directivity of directional coupler.

25 To determine the insertion loss, isolation of three port circulator.

26 To determine the insertion loss, isolation of an isolator.

27 To generate and analyze the characteristics of a Gunn Diode.

Text/Reference Books:

3. R.E.Collin, Foundations for Microwave Engineering,MGH.
4. Samuel Liao, Microwave Devices and Circuits, 3rd Edition, Pearson Education.
5. R.Chatterjee, Elements of Microwave Engineering,EWP

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

5. Understand the operational mechanism of various microwave devices which inturn can be used for designing of various microwave based devices that can be used for betterment of human life.
6. Measure various parameters related to microwave devices, hence verifying their characteristics and modifying them to develop more power efficient devices.
7. To plot various voltage and power characteristic curves required for better understanding of the device and enhancing its voltage and power characteristics.
8. Design and handle high power devices which inturn will improve safety of human body.

Note:

4. Each laboratory class/section shall not be more than about 20 students.
5. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
6. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

ECE303C Antennas and Wave Propagation

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(12 Lectures)

Introduction To EM Waves: Introduction, Electromagnetic Wave Equations, Poynting Theorem & Electromagnetic Power, Short Electric Dipoles, Retarded Vector Potential, Radiation from a Small Current Element.

Current Element Characteristics: Power Radiated by a Current Element and Its Radiation Resistance, Radiation from a Half Wave Dipole, Radiation Patterns, Radiation Power Density, Radiation Intensity.

Unit 2(10Lectures)

Antenna Pattern: Antenna Pattern, Antenna Parameters: Front To Back Ratio, Gain, Directivity, Radiation Resistance, Efficiency, Aperture Area, Impedence, Effective Length and Beam width, Reciprocity Theorem for Antenna and Its Applications.

Antenna Parameters: Impedance Measurements, Radiation Pattern Measurement, Beam width Measurement, Phase And Current, Radiation Resistance, Directivity and Polarization Measurement.

Unit 3(12 Lectures)

Types Of Antennas: Introduction,Isotropic,Yagi-Uda,Biconical,Helical,Horn,Slot,Parabolic Feeds, Conical, Log Periodic, Microwave and Patch Antenna.

Antenna Arrays: Types of Antenna Array: Broadside Array, End Fire Array, Collinear Array and Parasitic Array, array of point sources, pattern multiplication, Linear Array, Phased Array, Tapering of Arrays, Binomials Arrays, Continuous Arrays and Superdirective Array, effect of ground on antennas.

Unit 4(12 Lectures)

Transmission Parameters: Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-line analogy, poynting theorem, interpretation of E x H, power loss in a plane conductor.

Radio Wave Propagation: Introduction, Ground Wave, Sky Wave, Space Waves and Tropospheric Abnormalities, Multi-Hop Propagation, Effect of Earth, Skip Distance, Ionospheric Abnormalities, Mechanism of Ionospheric propogation, critical frequency,MUF , Duct Propagation.

Text Books :

1. Antennas by J.D.Kraus, TMH.
2. Antenna & Wave Propagation by G.S.N Raju, Pearson Education.
3. Antenna & Wave Propagation by K.D Prasad.

Reference Books:

1. Antenna & Radiowave Propogation by Collin,TMH
2. Antenna Theory Analysis & Design by Balanis, Wiley.
3. Electromagnetic Waves & Radiating Systems by Jordan & Balmain, Pearson Education,2015.

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

1. Understand & analyse various antenna parameters using antenna theory & concepts that in turn will enhance antenna efficiency and provide better communication facilities for human convenience.
2. Modify & enhance various antenna patterns to achieve better directivity & gain and understand various methods of measurements for antenna parameters for needful corrections, hence upgrading its impact on society.
3. Analyse various types of antennas & modify their parameters to deign more efficient antennas for improving communication capabilities in turn reduce impact of radiation.
4. Understand basic theories of antenna & wave propagation and implement them in designing better antennas in terms of size and power requirement.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE305C Probability Theory and Stochastic Processes for Communication Engineering

B.Tech. 3rd YEAR (SEMESTER –V)
Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(10 Lectures)

Spectral Analysis: Fourier Transform & its Properties, Convolution & Correlation, Autocorrelation & Cross Correlation, Orthogonal Representation of Signal, Signal Transmission through a Linear system, Signal Distortion over a Communication Channel, Energy spectral density, Power spectral density.

Unit 2(12 Lectures)

Distribution Functions And Random Processes-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; Joint Distributions, Functions of One and Two Random Variables, Moments Of Random Variables; Conditional Distribution, Densities and Moments

Unit 3(12 Lectures)

Distribution Functions And Random Processes-II: Characteristic Functions of a Random Variable; Markov, Chebyshev and Chernoff Bounds; 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 System.

Unit 4(11 Lectures)

Base Band Shaping For Data Transmission: Discrete PAM Signal, Power Spectra for Digital PAM Signal, Inter Symbol Interference, Nyquist Criterion for Distortionless Baseband Binary Transmission, Correlation Coding, Eye Pattern, Base Band M-Ary PAM System, Adaptive Equalization for Data Transmission.

Spread Spectrum Modulation:PN Sequences, A Notion of Spread Spectrum, Direct Sequence Spread Spectrum, Frequency Hopping Spread Spectrum, Application.

Reference Books:

1.	Digital Communication	By Simon Haykins – Wile
2.	Probability, Random Variables and Stochastic Processes	By A.Papoulis and S. Unnikrishnan Pillai- McGraw Hill
3.	Probability, Statistics and Random Processes	By Kousalya, Pearson Education, 2013
4.	Digital Communication	By Sklar & Ray- Pearson Education, 2nd Edition.
5.	Principle of Communication Systems	By Taub & Schilling – TMH
6.	Electronics Communication Systems	By Tomasi -5th Edition, Pearson Education.
7.	Communication System	By Haykin & Moher- Wiley
8.	Digital Communication	By J. G. Proakis
9.	Digital Communication	By B. P. Lathi
10.	Communication Systems	By Manoj Duhan – I. K. International

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

1 Understand Fourier transform, its properties and utility in communication engineering.
2 Understand representation of random signals and investigate characteristics of random processes
3 Apply theorems related to random signals in communication engineering and get acquainted with the propagation of random signals in LTI systems
4 Understand base band shaping for data transmission and spread spectrum techniques.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE307C Digital Signal Processing

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Introduction: Review of Signals and Systems, Analog Signal Processing (ASP), Digital Signal Processing (DSP), Comparison of ASP & DSP, Discrete –Time Processing of Continuous –Time Signals, Basic Sampling & Reconstruction Theorem, Effect of Under sampling, Aliasing.

Discrete Fourier Transform, Fast Fourier Transform, Relationship of the DFT to Z- transform, Properties of DFT, Radix-2 Fast Fourier Transform Algorithm: Decimation -In -Time, Decimation –in-Frequency, Applications of FFT Algorithms: Efficient Computation of the DFT of Two Real Sequences, Efficient Computation of the DFT of a 2N –Point Real Sequence, Computing Inverse DFT using Direct DFT.

Unit 2 (10 Lectures)

Realization of Digital Linear Systems: Realization Block Diagram and Signal –Flow Graph, Structures for IIR Systems: Direct Form I, Direct Form II, Cascade and Parallel Realization, Transposed Direct Form I and II.

Structures for FIR Structures: Direct –Form Structures, Cascade –Form Structures, Comparison of Different structures, single and multistage lattice filters.

Unit 3 (12 Lectures)

Frequency Domain Analysis of LTI Systems: Response to Complex Exponential & Sinusoidal Signals, Steady –state and Transient response with Input as a sinusoidal signal, Steady state response to periodic input signals, response to Aperiodic Input Signals, magnitude and phase response, measuring the impulse response of an unknown system by correlation.

LTI Systems as Frequency Selective Filters: Ideal Filter Characteristics, lowpass, Highpass, Bandpass; pole –zero pattern for lowpass and highpass filters, lowpass to highpass filter transformation, Invertibility of systems & Deconvolution: LTI systems invertibility, maximum, minimum phase, and mixed phase systems.

Unit 4 (12 Lectures)

Testing the Frequency response for practical realization: Paley –Wiener Theorem, characteristics of Practical Frequency –selective filters, FIR and IIR filters comparison, Design of FIR filters: importance of Linear Phase response, Zero locations for a linear phase FIR filter, Design of linear phase FIR filters using Windows, Desirable Window function properties for FIR filter design.

Design steps for IIR Filter design, Design of IIR lowpass analog filters: Butterworth, Chebyshew, Elliptic; Conversion of analog system to digital system by: Approximation of Derivatives, Impulse Invariance, Bilinear Transformation, Analog Domain Frequency Transformations, Digital Domain Frequency Transformations.

Text Books :

1. J. G. Proakis, D. G. Manolakis, "Digital Signal Processing, Principles, Algorithms, & Applications", 4th Edition, Pearson Education.
2. S. Salivahanan, C.Gnanapriya, " Digital Signal Processing", Second Edition, McGraw Hill Education.

Reference Books:

1. L. R. Rabiner& B. Gold, "Theory and Application of Digital Signal Processing", Pearson Education, 2015.
2. A. V. Oppenheim, R. W. Schafer, J. R. Buck, "Discrete –Time Signal Processing",3rd Edition, Pearson Education, 2014
3. A. V. Oppenheim, R. W. Schafer, "Digital Signal Processing", Pearson Education, 2015.
4. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH.

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

1. Compute DFT, FFT and using these in various applications.
2. Utilize the design techniques for digital IIR and FIR filters.
3. Analyze signals mathematically in time and frequency domain and obtain the response of an LTI system to different signals.
4. Design of different types of digital filters for various applications.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE387C Digital Signal Processing Lab

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. To study basics of MATLAB and to practice different kind of loop and conditional statements.
2. To represent basic signals (Unit step, unit impulse, ramp).
3. To represent basic signals (exponential, sine and cosine).
4. To develop program for discrete convolution & discrete correlation.
5. To understand stability test.
6. To develop program for computing FFT & IDFT.
7. To design analog filter (low-pass, high pass).
8. To design analog filter (band-pass, band-stop).
9. To design digital IIR filters (low-pass, high pass).
10. To design digital IIR filters(band-pass, band-stop).
11. To design FIR filters using windows technique.
12. To design a program to compare direct realization values of IIR digital filter
13. To develop a program for computing parallel realization values of IIR digital filter.
14. To develop a program for computing cascade realization values of IIR digital filter
15. To develop a program for computing inverse Z-transform of a rational transfer function.
16. To design equiripple FIR filter for given specifications and plot its magnitude & Phase Response.
17. To plot pole zero diagram for given FIR system.
18. To plot pole zero diagram for given IIR system.

Text/Reference Books:

1. S. Salivahanan, C.Gnanapriya, " Digital Signal Processing", Second Edition, McGraw Hill Education.
2. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH.

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

1. Plot and analyze signals using MATLAB.
2. Compute, visualize and analyze DFT, FFT of signals to use information in frequency domain for different applications.
3. Realize various types of structures using MATLAB for various applications.
4. Design and visualize FIR and IIR filters as Low-pass, high-pass, band-pass, band-stop.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.
4. Any open source tool can be used to perform the experiments.

ECE309C Linear Integrated Circuit & Applications

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (11 Lectures)

Differential Amplifier Fundamentals: Differential Amplifier, Differential Amplifier Circuit Configuration: DC and AC Analysis of all Four Types of Configurations, FET Differential Amplifiers, Differential Amplifier with Swamping Resistor, Constant Current Bias, Current Mirror, Cascaded Differential Amplifier, Cascode Configurations.

Operational Amplifier Fundamentals: Amplifier Fundamentals, the Operational Amplifier, Block Diagram Representation, Ideal OP-AMP, OP-AMP Equivalent Circuit, Ideal Voltage Transfer Curve, Open Loop OP-AMP Configurations, OP-AMP with Negative Feedback: voltage series & voltage shunt feedback amplifiers, Current feedback Amplifiers.

Unit 2 (12 Lectures)

Characteristics Of Op-Amp: Input Offset Voltage, Input Bias Current, Input Offset Current, Output Offset Voltage, Thermal Drift, Effect of Variation in Power Supply Voltages on Offset Voltage, Common Mode Configuration and CMRR, Frequency Response of OP-AMP: Open Loop Response, Close Loop Response, Input and Output Impedances, Effect of Finite Gain Bandwidth Product, Slow Rate.

Linear Applications: DC and AC Amplifier, Peaking Amplifier, Summing, Scaling And Averaging Amplifiers, Instrumentation Amplifier, Voltage to Current Converter, Current to Voltage Converter, Difference Amplifier, Integrator, Differentiator, very high input impedance circuit.

Unit 3 (12 Lectures)

Noise and Stability: Noise Properties, Sources of Noise, OP-AMP Noise, Stability Problems, Stability in Constant GBP OP-AMP Circuits, Internal Frequency Compensation, External Frequency Compensation, Stability In CFA Circuits.

Active Filters and Oscillators: Transfer Function, Active Filters, First Order LP & HP Butterworth Filters, Second Order LP & HP Butterworth Filters, Higher Order Filters, Band Pass Filters, Band Rejection Filters, Oscillators: Phase Shift , Wein Bridge Oscillator, quadrature oscillator, Square Wave Generator, Triangular Wave Generator, saw tooth wave generator, Voltage Controlled Oscillator.

.

Unit 4 (12 Lectures)

Non Linear Circuits: Voltage Comparator, Zero Crossing Defector, Schmitt Trigger, Peak Detector, Sample and Hold Circuit, Voltage To Frequency and Frequency To Voltage Converter, ADC and DAC, clippers and clampers, absolute value output circuit.

Specialized IC Application: Switched Capacitor Filter, 555 Timer: As Monostable Multivibrator, Astable Multivibrator. Phase-Locked Loops, Voltage Regulators: Fixed and Adjustable Voltage Regulator, power amplifiers, Switching Regulators.

Text/Reference Books:

1. OPAMPS and Linear Integrated Circuit — By Ramakant A Gayakwad –4th Edition, Pearson Education, 2015.
2. Design with Operational Amplifiers and Analog Integrated Circuits — By Sergio Franco -- MGH
3. Integrated Circuits — By K .R. Botker –Khanna pub.
4. Linear Integrated Circuits — By D.Roy Choudhary & S.Jain.

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

1. Understand various basic parameters related to differential operation of an amplifier which can be used for designing low power devices.
2. Understand various applications of OP-AMP and will be to make its judicious use in other user defined applications.
3. Understand and design low noise active filters that will improve signal quality.
4. Design various linear and non-linear applications using OP-AMP.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE321C Electronics Measurement

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (12 Lectures)

Introduction to Oscilloscope and Electronics Instruments:- Block Diagram of Oscilloscope and study of its various stages, High Frequency CRO, Sampling and Storage CRO, Lissajous Pattern, DC and AC Voltage and Current measurements, Ohmmeter, Multimeter, Calorimeter, Bolometer.

Unit 2 (08 Lectures)

Display and Recording Devices:- Nixie Tubes, LEDs, LCDs, Discharging Devices, Strip Charts Recorder, Single Point Recorder, Magnetic Tape Recorder.

Unit 3 (10 Lectures)

Generation and Analysis of Waveforms, Signal Conditioning:- Pulse Generator, Signal Generator, Wave Analyzer, Distortion analyzer, Spectrum Analyzer, Harmonic Analyzer, Power Analyzer, DC and AC Signal Conditioning Systems, Data Acquisition and Conversion System, Characteristics of Modern Digital Data Acquisition System.

Unit 4 (12 Lectures)

Transducers and Measurements of Time and Frequency:- Classification of Transducers, Transducers of types: Resistive, Capacitive and Inductive, Basic Schemes for the measurements of Displacement, Velocity, Acceleration, Strain, Pressure, Liquid Level and Temperature Photocells, Study of Decade Counting Assembly, Frequency Measurements, Period Measurements, Universal Counters, Introduction to Digital Meters.

Text/Reference Books:

1. A Course in Electrical and Electronics Measurements and Instrumentation by A.K.Sawhney, Dhanpat Rai & Sons.
2. Electronics Measurements and Instrumentation Techniques by Helfrick & Cooper, Pearson Education, 2015.
3. Textbook of Measurements and Instrumentation by J S Saini, New Age International Publishers.
4. Electronics Instrumentation by Kalsi, TMH
5. Electronic Measurement and Instrumentation by K.Lal Kishore, Pearson Education.

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

1. Measure various electrical signal parameters with accuracy, precision, resolution with help of electronics measuring instruments will help in predicting natural disasters etc.
2. Test and troubleshoot electronic circuit and equipment using various measuring instruments.
3. Hands on experience of various measuring instruments as per industry requirements like CRO, Bolometer, Power meter, Multimeter etc. which helps them in getting direct placements in industries.
4. The knowledge of transducers and signal conditioning techniques leads to new innovations and productive applications and indirectly improve the quality of sensing devices and will reduce the health threats.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE391C Electronic Measurement Lab

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. To measure Displacement using LVDT.
2. To determine Distance using LDR.
3. To measure Temperature using R.T.D.
4. To find Temperature using Thermocouple.
5. To measure Pressure using Strain Gauge.
6. To measure Pressure using Piezo-electric pick up.
7. To calculate Distance using Capactive pick up.
8. To determine Distance using Inductive pick up.
9. To measure Speed of DC motor using Magnetic pick up.
10. To measure Speed of DC motor using Photoelectric pick up.

Text/Reference Books:

1. A Course in Electrical and Electronics Measurements and Instrumentation by A.K.Sawhney, Dhanpat Rai & Sons.
2. Electronics Measurements and Instrumentation Techniques by Helfrick & Cooper, Pearson Education, 2015.
3. Textbook of Measurements and Instrumentation by J S Saini, New Age International Publishers.

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

1. Students get hands on training on various transducers used in various industrial applications.
2. They will understand apt use of all the principles of a transducer for proper design and improvement in various transducers applications.
3. They learn to explore the various aspects of measurement and applications of CRO.
4. The students will become creative and will channelize and mobilize their skills for underdeveloped instrumentation sectors like rural areas.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

ECE323C Digital System Design with VHDL

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (12 Lectures)

Introduction to VHDL: Concepts of Digital System Design Process, Design automation, Hardware Description Language, HDL based Digital Design, VHSIC Hardware Description Language: Program structure. Types, Constants and Arrays. Functions and Procedures. Structural design elements. Dataflow design elements. Behavioral design elements.

Unit 2 (11 Lectures)

Combinational Logic Design Practices: VHDL for combinational circuits: Assignment statements, Signal assignments, Generate statements, Concurrent and sequential assignment statements, Process statements, Case statements and VHDL operators. VHDL description of Decoders, Encoders, Multiplexers, Comparators and arithmetic circuits.

Unit 3 (11 Lectures)

Sequential Logic Design Practices: VHDL models of sequential logic blocks: Latches, Flip-flops, Registers, Shift registers, Counters and Memory. Synchronous sequential circuit design with VHDL: Basic design steps, State assignment problems, VHDL models for Moore and Mealy type FSMs. State minimization. State Machine design examples.

Unit 4 (11 Lectures)

Asynchronous Sequential Circuits: Asynchronous behavior, Analysis of Asynchronous sequential circuits, Synthesis of Asynchronous sequential circuits, Hazards, Design examples using VHDL.

VHDL simulation and synthesis: Event driven simulation, Simulation of VHDL models, RTL synthesis, Constraints, Behavioral synthesis. Fault models for testing of logic circuits.

Text/Reference Books:

1. Brown S. and Vranesic Z., *Fundamentals of Digital Logic with VHDL Design*,TMH.
2. Wakerly J. F., *Digital Design – Principles and Practices*,Pearson Education.
3. Mark Zwolinski, *Digital System Design with VHDL*, 2/e, Pearson Education.
4. J.Bhasker, V*HDL Primer*, 3/e, Pearson Education, India.
5. Roth C. H., *Digital System Design Using VHDL*, Cengage Learning,2008.
6. Perry D. L., *VHDL Programming by Example*, **4/e**, TMH,2008. 3.
7. Pedroni V. A., *Circuit design with VHDL*, PHI,2008.

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

1. Understand digital system design process and apply knowledge for designing the digital circuits using different style of modeling in VHDL.
2. Analyze, design and implement combinational logic circuits using hardware description language.
3. Analyze and design VHDL models for sequential logic blocks and Moore/ Mealy-type finite state machines.
4. Simulate and synthesize the VHDL models of logic circuits and test these circuits using fault models.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE393C Digital System Design with VHDL Lab

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. To design and simulate VHDL code to realize any Boolean function.
2. To design and simulate VHDL code for realizing logic gates.
3. To write VHDL codes for realizing adder and subtractor circuits using different modeling styles.
4. To write VHDL programs for realizing multiplexer & demultiplexer circuits.
5. To design and simulate VHDL code for code converters.
6. To design and simulate VHDL codes for encoder and decoder circuits.
7. To write a VHDL program for a comparator and check the wave forms.
8. To write a VHDL program for carry look ahead adder.
9. To write VHDL programs for S-R, J-K, D and T Flip-flops.
10. To write a VHDL program for synchronous counter and asynchronous counter.
11. To write VHDL program for designing universal shift register.
12. To write a VHDL code for designing sequence detector.
13. To design and implement finite state machine on FPGA kit.

Text/Reference Books:

1. Brown S. and Vranesic Z., *Fundamentals of Digital Logic with VHDL Design*,TMH.
2. Wakerly J. F., *Digital Design – Principles and Practices*,Pearson Education.
3. Mark Zwolinski, *Digital System Design with VHDL*, 2/e, Pearson Education.
4. J.Bhasker, V*HDL Primer*, 3/e, Pearson Education, India.
5. Perry D. L., *VHDL Programming by Example*, **4/e**, TMH,2008. 3.

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

1. Simulate and synthesize digital systems using VHDL.
2. Design digital systems using various modeling styles.
3. Implement combinational and sequential circuits on FPGA devices.
4. Design finite state machines using VHDL and implement on FPGA.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

ECE325C Microcontroller & Interfacing

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (12 Lectures)

Microcontrollers, 8051 microcontroller: pin diagram explanation, internal diagram 8051, Instruction Set, Addressing mode, data transfer instruction, logical, arithmetic instruction, bit instruction, branching instruction.Timer: Control Word, mode of timers, Serial interface: Introduction, Control Word, mode of serial interface, Interrupts: Introduction, Control word.

Unit 2 (10 Lectures)

Applications based on 8051 microcontroller: Interfacing of memory, intelligent LCD, 8255, ADC, DAC, LED display, Memory Card, Bio-metric system.

Unit 3 (12 Lectures)

PIC microcontrollers: Introduction, features of PIC family microcontrollers, architecture and pipelining, program memory considerations, addressing modes, CPU registers, Instruction set, Timer: Control Word, mode of timers, Watch-dog timer, Serial interface: Introduction, Control Word, mode of serial interface, Interrupts: Introduction, Control.

Unit 4 (12 Lectures)

Applications based on PIC microcontroller: Interfacing of Graphical Display, Memory Card, Bio-metric system Music box, Applications like Mouse wheel turning, PWM motor control, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor, Magnetic Field Sensor.

Text / Reference Books:

1. Scott Mackenizie, 8051, PHI, Englewood Cliffs, New Jersey.
2. Myke Predko Programnming & Customizing the 8051 Microcontroller, Tata McGraw-Hill Pub. Co. Ltd., New Delhi.
3. K. J. Ayala, 8051 Architecture Programming & Applications, Penram International Publishers, India.
4. Myke Predko, Programnming & Customizing the PIC Microcontroller, Tata McGraw-Hill Pub. Co. Ltd., New Delhi.
5. Subrata Ghoshal, 8051 Microprocessors: Internals, Instructions, Programming & Interfacing, 2nd Edition, Pearson Education 2014.

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

1. Understand the basics of 8051 microcontroller.
2. Do interfacing design of peripherals with 8051 microcontroller.
3. Understand the basics of PIC microcontroller.
4. Do interfacing design of peripherals with PIC microcontroller.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE395C Microcontroller and Interfacing Lab

B.Tech. 3rd YEAR (SEMESTER –V)
Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	:3Hours

List of Experiments:

1 To study architecture of 8051 Microcontroller.
2 To write an assembly language program to add eight 8-bit numbers.
3 To write an assembly language program for 8-bit subtraction using Arithmetic Operation of 8051 Microcontroller.
4 To interface LED and switch with microcontroller 8051.
5 To interface LCD and switch with microcontroller 8051.
6 To interface stepper motor with microcontroller 8051.
7 To write program to generate delay using serial port and on-Chip timer /Counter.
8 To interface ADC with microcontroller 8051 for measurement of temperature.
9 To interface DC motor with microcontroller 8051and speed control using PWM.
10 To write a program for Code conversion: BCD – ASCII; ASCII – Decimal; Decimal - ASCII.
11 To write a program for Elevator interface to 8051.
12 To interface Alphanumeric LCD panel and Hex keypad input interface to 8051.

Course Outcomes:

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

1. Familiarize with the assembly level and embedded C programming using 8051.
2. Familiarize with the assembly level programming using low powered MSP430.
3. Familiarize with the Keil µVision-3/4 and IAR Embedded Workbench tools.
4. Design circuits for various applications using microcontrollers.

Text/Reference Books:

1. Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems.
2. **Kenneth Ayala,** 8051 Microcontroller.
3. Mazidi, Microcontroller : Architecture, Programming and Applications.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

ECE327C Consumer Electronics

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(12 Lectures)

Monochrome TV (Introduction): Elements of a TV System,Picture transmission,Sound transmission,Picture reception,Sound reception,Synchronization,Receiver control,Image continuity, Scanning Process, Aspect Ratio, Flicker, Composite Video Signal, Picture Elements,Kell factor, Vertical Resolution,Horizontal Resolution,Video bandwidth,Interlacing, 625 Line System,Bandwidths for TV Transmission,Vertical and horizontal synch detail,Vestigial Side Band transmission(Advantages and Disadvantages)

Monochrome TV (Picture and Camera Tubes): Monochrome picture tube,beam reflection,Beam focussing,Screen Phosphor,Face plate,Picture tube characteristics,picture tube circuit controls,Monochrome Camera Tubes:Basic principle,Image Orthicon, Vidicon,Plumbicon

Unit 2(12 Lectures)

Colour TV Essentials: Compatibility , Colour perception,Three Colour theory,Luminance,Hue and Saturation, Dispersion and Recombination of light,Primary and secondary colours,luminance signal,Chrominance Signal, Colour picture tube,colour TV Camera,Colout TV display Tubes,colour Signal Transmission,Bandwidth for colour signal transmission,Colour TV controls. Cable TV,Block Diagram and principle of working of cable TV.

Plasma and LCD: Introduction,liquid crystals,types of LCD's,TN,STN,TFT,Power requirements,LCD working,Principle of operation of TN display,Construction of TN display,Behaviour of TN liquid crystals,Viewing angle,colour balance, colour TN display, limitatons, advantages, disadvantages, applications.

Unit 3(10 Lectures)

LED and DMD : Introduction to LED Television , comparison with LCD and Plasma TV's, schematic of DMD, introduction to Digital MicroMirror device, Diagram of DMD, principle of working, emerging applications of DMD.

Microwave Ovens and Air Conditioners: Microwaves,Transit Time,Magnetron,Waveguides,Microwave Oven,Microwave Cooking. Air conditioning,Components of air conditioning systems,all water Air conditioning systems,all air air conditioning Systems,Split air conditioner.

Unit 4(11 Lectures)

Microphones: Introduction, characteristics of microphones,types of microphone:carbon,moving coil,wireless,crystal,introduction to tape recorder.

Loudspeaker: Introduction to ideal and basic loudspeaker,loudspeaker construction types of loudspeaker: Dynamic and permanent magnet,woofers,tweeters, brief introduction to baffles,equalisers.

Text Books :

1. Consumer Electronics by S. P. Bali, Pearson Education.
2. Complete Satellite and Cable T.V by R.R Gulati, New Age International Publishers

Reference Books:

1. Monochrome and Colour Television by R. R. Gulati, New Age International Publishers

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

1. Identify and explain basic working of electronics products like TV, Microphone, loudspeaker, AC, Microwave ovens.
2. Learn various components of composite video signal and differentiate between line, brightness, saturation and to design the lower power consumption device, the primary challenge is how to minimize overall cost.
3. Acquire ability to design different display screen so as effect of radiations on eyes will be reduced.
4. Understand the general importance of product safety to consumers & producers will reduce the various adverse impacts of these devices on common man.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE397C Consumer Electronics Lab

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1 To plot frequency response of different types of loudspeaker.
2 To identify and realize different sections of Monochrome Television.
3 To find out different sections of Colour Television and study their working.
4 To learn principal of working of a colour television camera.
5 To identify functional block diagram & front panel control of Microwave Oven.
6 To find out the working of display devices like Plasma,LCD,LED,DMD.
7 Demonstration of the working of all type of air conditioner like water air conditioning, split air conditioners etc.
8 Demonstration of the working of domestic refrigerators.
9 To plot the frequency response of microphone.
10 To study the block diagram of Transmitter & Receiver.

Text/Reference Books:

1. Monochrome and Colour Television by R. R. Gulati, New Age International Publishers
2. Consumer Electronics by S. P. Bali, Pearson Education

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

1. The students will have a better understanding of mechanisms that actually operates the respective consumer products.
2. The students will be able to generate frequency response for loudspeakers as well as microphone.
3. The students will have more knowledge about digital display devices.
4. The students will understand the general importance of product safety to consumers as well as producers.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

ECE399C Professional Training (Level-2)

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	2	Class Work	: 100
				Total	: 100
				Duration of Exam	: 3 Hours

At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the 5th Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.

COURSE OUTCOMES:

1. After the course is completed the student will have additional knowledge about professional attributes.
2. The students will develop a more professional outlook.
3. The students will know how to deal with time bound tasks in a more effective way.
4. The students will have more efficient attribute of multi-tasking.

HUM301C Essence of Indian Traditional Knowledge

Mandatory Course

(Common for All Branches)

B.Tech. 3rd YEAR (SEMESTER –V)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	-	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(10 Lectures)

Indian Knowledge Traditions and Processes: An Overview
Vedic Tradition, Epical Tradition, Sutra Tradition, Scholastic Tradition

Unit 2(10 Lectures)

Vedic and Upnishadic Traditions
Vedic Mantras: Hymn of Creation, To Vāk
UpnishadicNarraatives: The Story of Nachiketa

Unit 3(10 Lectures)

Epical Insights
Gyanmarg(The Yoga of Wisdom)

Unit 4(10 Lectures)

Folk Wisdom

(A) Folk Tales as knowledge: "The Blind Man and an Elephant"#
"The Goat who saved the Priest", " Buried Treasure" , " Little Prince, No Father", " Demons in the Desert"##

"The Story of Meddlesome Monkey" , " The Story of the Lion and the Rabbit" "The Story of Three Fishes""The Story of DharmabudhiamndPapabuddhi"###

(B) Haryanvi Ragini as Moral lesson: Raja Harishchandra

Note: Different signs such as # etc. indicate source of the primary texts enlisted in the 'RECOMMENDED READING

Text /Reference Books:

1. Mitchell, Stephen. *The Bhagavad Gita*. Harmony Books, 2007(Ch.4 for UNIT III).
2. Radhakrishnan, S. & Charles A. Moore. eds. *A Source Book in Indian Philosophy*. Princeton UP, 1957 ("General Introduction:History of Indian Thought" for UNIT I, Ch.1-2 for UNIT II))
3. ###Sharma, Vishnu.*Panchatantra*. Translated by RohiniChowdhury. Puffin Books.
4. Sharma, Puran Chand. *Pundit Lakhmi Chand Granthavali*. Haryana SahityaAkademi, 2010.
5. # https://www.peacecorps.gov/educators/resources/story-blind-men-and-elephant/
6. ##www. buddhanet.net

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

1. Understand, appreciate and explain Indian traditional knowledge systems.
2. Relate life and learning with traditional knowledge in present times.

Pedagogy:

Through lectures, self study, group discussion, Projects and seminar

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE302C Control Systems

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(10 Lectures)

Input / Output Relationship: System / Plant model, illustrative examples of plants & their inputs and outputs, open loop & closed loop control system & their illustrative examples, Mathematical modeling and representation of physical systems, Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs: Mason's gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems.

Unit 2(12 Lectures)

Time Domain Analysis: Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, time domain specifications, steady state error and error constants, concept of stability, pole-zero configuration and stability, necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion and relative stability. Root locus concept, development of root loci for various systems, stability considerations.

Unit 3(11 Lectures)

Frequency Domain Analysis: Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

Unit 4(10 Lectures)

Compensation: Necessity of compensation, compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers.

Control Components: Synchros, servomotors, stepper motors, magnetic amplifier.

Text book:

1. Control System Engineering: I.J. Nagrath& M. Gopal; New Age Publishers.

Reference books:

1. Automatic Control Systems: B.C. Kuo, PHI. Publishers.
2. Modern Control Engg: K. Ogata; PHI. Publishers.
3. Control Systems - Principles & Design: Madan Gopal; Tata Mc Graw Hill. Publishers.
4. Modern Control Engineering, R.C. Dorf & Bishop; Addison-Wesley Publishers.

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

1. Understand the important aspect of classical control system which will provide the opportunity to control machine & industrial process for benefit of society.
2. In order to efficiently ensure a certain level of security, ant organization with valuable assets should have an automated key control system with the help of this student will be able to gain the knowledge regarding automated control system.
3. It will help to understand how to mange command direct or regulate the behavior of devices or system using control loop. It is the most important aspect of any industry which will help the student to perform this duty properly.
4. Practically all system requires stability and control thereby ensure that stability is achieved.It will help to understand the control system of single home heating controller using a thermostat controlling and also the large industrial control system which are used for controlling processes or machine.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE304C VLSI Design

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (9 Lectures)

Introduction to MOSFET: Structure and cross-sectional view of a MOSFET, Enhancement and Depletion mode MOSFETs, Operation of Enhancement and Depletion mode MOSFETs.

Device Modelling: DC MOSFET Model, Small Signal MOSFET Model, High Frequency MOSFET Model, Measurement of MOSFET Model Parameters.

Unit 2 (10 Lectures)

Basic Integrated Circuit Building Blocks: Introduction, Switches, Active Resistors, Current Sources and Sinks.

Digital Circuits: Introduction, Characteristics of Digital Circuits: Logic Level Standards, Inverter Pair Characteristics, Logic Fan-Out Characteristics, Digital Logic Analysis.

Unit 3 (10 Lectures)

MOS/CMOS Inverters: Basic Single Channel Inverters, Inverter Device Sizing, Enhancement Load versus Depletion Load Inverter, A Basic CMOS Inverter, CMOS Inverter Logic Levels, Device Sizing.

NMOS/ CMOS NOR and NAND Logic Gates: Basic NMOS NOR Logic Circuits, Basic NMOS NAND Logic Circuits, Multi-Input NMOSNOR and NAND Logic Gates, NMOS Pass Transistor, CMOS NOR Logic Circuits, CMOS NAND Logic Circuits, Multi-Input CMOS NOR and NAND Logic Gates, CMOS Transmission Gates.

Unit 4 (12 Lectures)

Signal Propagation Delays and Power Dissipation: Ratio-Logic Models, Process Characteristics Time Constant, Inverter-Pair Delay, Super buffers, NMOS NAND and NOR Delays, Enhancement versus Depletion Loads, CMOS Logic Delays, Interconnection Characteristics, NMOS Power Dissipation, CMOS Power Dissipation, Clocked CMOS Logic: C2MOS, Precharge-Evaluate Logic, Domino CMOS.

Semiconductor Memories: Memory Organization, Erasable Programmable Read-Only Memory, Electrically Erasable Programmable Read-Only Memory, Static RAM Memories, Dynamic RAM Memory.

Text/ Reference Books:

1. Basic VLSI: Design: Douglas A. Pucknell, Kamran Eshragian.
2. CMOS VLSI: Design: Neil H.E.Weste, David Money Harris.
3. VLSI: Design: K.Lal Kishore, V.S.V. Prabhakar.
4. Digital Integrated Circuits: Rabaey, Chandrakasn, Nikolic.

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

1. Understand the basic concepts and operations of different types of MOSFETs and the device modelling related to MOSFEs in different types of signal Levels.
2. Understand the properties of various digital circuits used in all spheres of life and the basic building blocks to realize these digital circuits.
3. Understand the designing of the various digital gates, to calculate their sizes in the Integrated circuits and the performance in single channel and CMOS circuits.
4. Measure various performance parameters related to digital circuits realized in the Integrated Circuits and the circuits used in the realization Semiconductor Memories.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE384C VLSI Design Lab

B.Tech. 3rd YEAR (SEMESTER –VI)
Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. Design a CMOS inverter in schematic and simulate for Transient Characteristics.
2. Design a CMOS two input NAND gate, Two input NOR gate, Two input AND gate and Two input OR gate in schematic and simulate for Transient Characteristics.
3. Design the layout of a CMOS Inverter and simulate for DC (Transfer) and Transient characteristics.
4. Design the layout for two inputs NAND gate, two input OR gate, two input AND gate and two input NOR gate and simulate for DC (Transfer) and Transient characteristics.
5. Realized a two input EXOR gate in schematic, draw its layout and simulate for DC (Transfer) and Transient characteristics.
6. To realize a 1 bit full adder in CMOS schematic, design its layout using tool option and simulate for Transient Characteristics.
7. To realize a Boolean expression Y=Not ((A+B)C) in schematic, draw its layout and simulate for Transient Characteristics..
8. To realize a 4 X 1 MUX using transmission gates in schematic and simulate for Transient Characteristics.
9. To Realize JK FLIPFLOP in CMOS schematic, design its layout and simulate for Transient Characteristics.
10. To Realize D FLIPFLOP and T FLIPFLOP in CMOS schematic, design its layout and simulate for Transient Characteristics.

Text/Reference Books:

1. Basic VLSI: Design: Douglas A. Pucknell, Kamran Eshragian.
2. CMOS VLSI: Design: Neil H.E.Weste, David Money Harris.

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

1. Understand the basic of digital VLSI Design.
2. Understand the schematic designing of Digital circuits and analysis these for AC ,DC, and Transient.
3. Design a gate of any given arbitrary logic function at the transistor-level.
4. Design the Layout a Basics gates in CMOS VLSI technology.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

ECE306C Verilog Based Digital System Design

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (9 Lectures)

Basic Digital Systems: Introduction to Digital Design, Introduction to Verilog HDL: ASIC / FPGA design flow, Advantages of HDL, Overview of digital design with Verilog HDL. Hierarchical modeling: Basic concepts – Modules and ports. Overview of different levels of abstractions: Gate level modeling, Dataflow modeling, Behavioral modeling, Switch level modeling.

Unit 2 (10 Lectures)

Combinational Logic Design: Modeling at Data Flow Level, Continuous Assignment Structures, Delays and Continuous Assisgnments, Assignment to Vectors, Operators, Verilog HDL for combinational Circuits, Design of Adder, Subtractor, Decoders, Encoders, Multiplexer, code Converter.

Unit 3 (12 Lectures)

Sequential Logic Design: Behavioral Modeling: Operator and Assignments, Functional Bifurcation, Initial & Always Construct, Assignments with Delays, wait construct, Multiple always blocks, If and if-else, assign-deassign, repeat Construct, Loop Construct: for, while & forever, Parallel blocks, force-release construct, event, Design of Flip flop, Shift register and Counters using Verlilog HDL.

Unit 4 (12 Lectures)

Modeling Techniques: Functions, Tasks, user defined primitives, Pipeline principle, State Machine: Moore and mealay state model, Verilog HDL code for moore-type FSM, Specification of Mealy FSM using Verilog HDL, Mealy-type and Moore-type FSM for Serial Adder.

Text/Reference Books:

1. J. F. Wakerly, Digital Design: Principles and Practices, Prentice Hall.
2. M.G.Arnold, Verilog Digital – Computer Design, Prentice Hall (PTR), 1999.
3. S. Palnitkar , Verilog HDL – A Guide to Digital Design and Synthesis, Pearson , 2003.
4. M.D. Ciletti, Modeling, Synthesis and Rapid Prototyping with the Verilog HDL, Prentice Hall, 1999.
5. W.Wolf, FPGA- based System Design, Pearson, 2004
6. PLD, FPGA data sheets.

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

1. Describe Verilog hardware description languages (HDL).
2. Design Digital Circuits.
3. Write behavioral models of digital circuits.
4. Write Register Transfer Level (RTL) models of digital circuits.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE386C Verilog Based Digital System Design Lab

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. Write a Verilog code to realize all the logic gates.
2. Design a Verilog code to implement Half Adders, Full adders and Subtracters using Gates.
3. Write a Verilog code to describe the function of Multiplexer and Demultiplexer using different modelling styles.
4. Design a Verilog code to realize D Flip-Flop and D Latch.
5. Write a Verilog code to implement 2:1 Mux and D Latch using Switches.
6. Write a Verilog code to implement Encoders and Decoders Using if-else Statement and case Statement.
7. Design a Verilog code to implement SR Flip Flop using UDP (User Defined Program).
8. Write the Verilog code for a JK Flip-flop, and its test bench. Use all possible combinations of inputs to test its working.
9. Design the hardware description of a 8-bit register with parallel load, shift left and shift right modes of operation and test its operation.
10. Write a Verilog code to realize Up/Down Counter and Divide by 4.5 Counter.
11. Design a Verilog code to describe the function of Synchronous FIFO.
12. Write a Verilog code using FSM to realize a sequence detector (101101).
13. Design any one Digital System using Verilog.

Text/Reference Books:

1. Verilog HDL:A Guide to Digital Design and Synthesis by Samir Palnitkar ,PHT .
2. HDL Programming Fundamentals:VHDL and Verilog by Nazeih Botros,Dream Tech Press.

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

1. Design any basic building blocks and simulate all digital function in Verilog HDL.
2. Simulate and synthesis digital system using Verilog HDL.
3. Test the functionality of combinational and sequential logic design with the help of Verilog HDL.
4. Design and simulate finite state machine in Verilog HDL.

Note:-

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either be done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.
4. Any open source tool can be used to perform the experiments.

ECE308C Wireless Communication System

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(12 Lectures)

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications : Introduction, First Generation (1G), Second Generation (2G), Generation (2.5G) , Third Generation (3G), Evolution from 2G To 3G, Fourth Generation (4G), Examples of Wireless Communication Systems , Difference Between Fixed Telephone Network and Wireless Telephone Network, Wireless Local Loop [WLL], Wireless Local Area Networks (WLAN) , Personal Area Network(PAN), Bluetooth, GSM and CDMA System.

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Hand-Off Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems.

Unit 2(12 Lectures)

Large Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Practical Link Budget Design Using Path Loss Models, Outdoor Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings.

Small Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small Scale Multipath Measurements, Parameters of Mobile Multipath Channels ,Types of Small Scale Fading, Rayleigh and Ricean Distributions.

Unit 3(10 Lectures)

Equalization and Diversity : Fundamentals of Equalization, Equalizer in a Communication Receiver, Linear Equalizer, Non Linear Equalization, Diversity Techniques, Rake Receiver, Interleaving

Multiple Access Techniques for Wireless Communication : Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access (SDMA), Capacity of Cellular System.

Unit 4(10Lectures)

Wireless Networking : Introduction to Wireless Networks, Development of Wireless Networks, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling, Integrated Services Digital Network (ISDN), Signalling System No.7(SS 7),Personal Communication Services/Networks.(PCS/PCN)

Advance Intelligent Networks: Introduction, Intelligent Networks and its architecture, Advanced Intelligent Networks and its application.

Text/Reference Books:

1. V.K.Garg, J.E.Wilkes, "Principle and Application of GSM", Pearson Education, 5th edition, 2008.
2. Rajeshwar Dass, "Wireless Communication Systems," I.K International Pvt. Ltd
3. Mobile Communication: Jochen Schiller Pearson Education.
4. V.K.Garg, "IS-95 CDMA & CDMA 2000", Pearson Education, 4th edition, 2009.
5. T.S.Rappaport, "Wireless Communications Principles and Practice", 2nd edition, PHI,2002.
6. William C.Y.Lee, "Mobile Cellular Telecommunications Analog and Digital Systems", 2nd edition, TMH, 1995.
7. Asha Mehrotra, "A GSM system Engineering" Artech House Publishers Bosten, London,1997.

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

1. Understand basics of wireless communication and propagation mechanism in cellular networks.
2. Understand various propagation and fading models prevalent in wireless networks.
3. Identify various diversity techniques and multiple access techniques available in wireless networks.
4. Understand various standards or services available in wireless communication systems .

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE322C Speech and Audio Processing

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(10 Lectures)

Speech signal and signal processing, Digital signal processing, Digital speech processing: Digital transmission and storage of speech, speech synthesis systems, speaker verification and identification, speech recognition systems, aids-to-the handicapped, enhancement of signal quality.

Fundamentals of digital speech processing: Discrete –time signals and systems, representation of signals and systems using Z-transform, Fourier Transform, and discrete Fourier Transform; Fundamentals of FIR and IIR Digital filters; sampling of signals, Decimation and Interpolation of sampled waveforms.

Unit 2(10 Lectures)

Digital Models for the Speech Signal: Process of speech production, mechanism of speech production, Acoustic phonetics; Acoustic theory of speech production-sound propagation, example of uniform lossless tube, Effects of losses in the vocal tract, Effects of radiation at the lips, vocal tract transfer functions for vowels, Effect of Nasal Coupling, Models based on Acoustic theory.

Lossless tube models:Wave propagation in concatenated lossless tubes, boundary conditions, relationship to digital filters, Transfer function of the Lossless tube model; Digital models for speech signals-Vocal tract, Radiation, Excitation, complete model.

Unit 3(12 Lectures)

Digital Representations of the speech waveform: Sampling speech signals, statistical model for speech, instantaneous Quantization-uniform quantization, instantaneous companding, Quantization for optimum SNR, Adaptive quantization- feed forward adaptation, feedback adaptation; Differential PCM (DPCM)-DPCM with adaptive quantization and prediction.
CD-Quality audio, Synthesized audio.

Short –Time Fourier Analysis: Fourier Transform interpretation, Linear filtering interpretation, sampling rates of $X_n(e^{j\omega})$ in time and frequency, Filter bank summation method of short-time synthesis, overlap addition method for short time synthesis, summary of basic model for short-time analysis and synthesis of speech.

Unit 4(12 Lectures)

Design of digital filter banks: practical considerations, Filter bank design using IIR and FIR filters, Implementation of the filter bank summation method using Fast Fourier Transform-analysis techniques, synthesis techniques, Pitch Detection, Analysis by synthesis-pitch synchronous spectrum analysis, Pole-zero analysis.

Analysis synthesis systems:Digital coding of the time dependent Fourier transform, phase vocoder, Channel vocoder.

Text/Reference Books:

1. "Digital processing of speech signals" by L. R. Rabinar and R. W. Schafer, Pearson Education.
2. "Digital Speech" by A.M.Kondoz, Second Edition (Wiley Students_ *Edition), 2004.*
3. "Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", W.C.Chu, Wiley Inter science, 2003.
4. "Multimedia Communication, applications, Networks, Protocols and Standards", Fred Halsall, Pearson Education.

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

1. Use concepts of signal processing in speech processing, and relate parameters to get desired quality of audio.
2. Mathematically model the speech signal to synthesize in applications.
3. Analyze the quality and properties of speech signal.
4. Modify and enhance the speech and audio signals for applications in speech and audio Processing applications.

Note:

Paper setter will set two questions (each with 2-3 sub-parts) from each of the four units, & a ninth compulsory 1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE324C Introduction to MEMS

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(10 Lectures)

MEMS Introduction: Overview of CMOS process in IC fabrication, Microfabrication Evolution, Microsystems miniaturi zation, Materials for MEMS and Microsystems , Microsystem Applications in health care industry, aerospace industry, telecommunications, automobile industry, multidisciplinary aspect of MEMS.

Unit 2 (12 Lectures)

Microsensors and Microactuation: Microsensors: overview,:pressure sensor and its application like accelerometer, gyroscope, acoustic wave sensors, biomedical sensors, thermal sensors,. Microactuation: overview, microactuation using thermal forces, electrostatic forces, shaped memory alloys, examples of microactuators like Microgrippers, Micromotors, Microvalves, Micropumps.

Unit 3 (8Lectures)

Scaling laws in MEMS: Scaling in electrostatic forces, electromagnetic forces, Scaling in electricity, fluid mechanics and heat transfer.

Unit 4 (12 Lectures)

Micromanufacturing and Micropackaging: Micromanufacturing: Bulk Micromanufacturing, Surface Micromachining, LIGA Process.Micropackaging: Microsystem Packaging, Packaging Technologies, Three dimensional packaging, Selection of Packaging Materials.

Text/Reference Books:

1. Tai-Ran Hsu,"Mems &microsystems design and manufacture"Mc Graw Hill,2002.
2. Nadim Maluf, An Introduction to Microelectromechanical Systems Engineering, Artech House, 2000.
1. M.H. Bao, Micro Mechanical Transducers, Volume 8, Handbook of Sensors and Actuators, Elsevier, 2000.
2. H. J. De Los Santos, Introduction to Microelectromechanical (MEM) Microwave Systems, Artech, 1999.

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

1. Apply and analyze the concepts of advanced Microsystem fabrication technologies in order to design devices that are more power efficient.
2. Design different techniques and processes for microsensor & microactuators that will ease the work for human kind.
3. Understand various scaling laws that governs the designing of MEMS devices and inturn will be able to design improved versions of existing devices.
4. Understand and design different packaging techniques for MEMS devices using variety of materials available for providing more rugged structures for human use.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE326C Scientific computing

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Introduction: Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy.

Nonlinear equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method, Interpolation: Purpose for Interpolation, Choice of Interpolating, Function, Polynomial Interpolation, Piecewise Polynomial Interpolation

Unit 2 (11 Lectures)

System of liner equations: Linear Systems, Solving Linear Systems, Gaussian elimination,Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for Linear Systems.

Linear least squares: Data Fitting, Linear Least Squares, Normal Equations Method, Orthogonalization Methods, QR factorization, Gram-Schmidt Orthogonalization, Rank Deficiency, and Column Pivoting, Nonlinear Least Squares.

Unit 3 (13 Lectures)

Eigen values and singular values: Eigen values and Eigenvectors, Methods for Computing All Eigen values, Jacobi Method, Methods for Computing Selected Eigen values, Singular Values Decomposition, Application of SVD.

Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization.

Numerical Integration and Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation.

Partial Differential Equations: Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, Iterative Methods.

Unit 4 (8 Lectures)

Initial Value Problems for ODES: Euler's Method, Taylor Series Method, Runga-Kutta Method, Extrapolation Methods.

Boundary Value Problems for ODES: Finite Difference Methods, Finite Element Method, Eigenvalue Problems.

Fast Fourier Transform: FFT Algorithm, Limitations, DFT, Fast polynomial Multiplication,Wavelets, Random Numbers and Simulation, Stochastic Simulation, Random Number Generators, Quasi-Random Sequences.

Text Books:

1. Heath Michael T., "Scientific Computing: An Introductory Survey", McGraw-Hill, 2nd Ed., 2002
2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery,"Numerical Recipes: The Art of Scientific Computing", Cambridge University Press,3rd Ed., 2007
3. Xin-she Yang (Ed.). "Introduction to Computational Mathematics", World Scientific Publishing Co., 2nd Ed.

Reference Books:

1. Kiryanov D. and Kiryanova E., "Computational Science", Infinity Science Press, 1stEd., 2006
2. Quarteroni, Alfio, Saleri, Fausto, Gervasio and Paola, "Scientific Computing With MATLAB and Octave", Springer, 3rd Ed., 2010

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

1. Students will understand different types of errors and several necessary functions of scientific computing.
2. Students will have a clear understanding of system of linear equations.
3. Understand the significance of computing methods, their strengths and application areas.
4. Perform the computations on various data using appropriate computation tools.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

ECE328C Optimization Techniques

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Introduction to Operation Research: Introduction to models and modeling techniques, general methods for Operation Research models, methodology and advantages of Operation Research.

Linear Programming (LP): Introduction to LP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming, Integer linear programming.

Unit 2 (12 Lectures)

Transportation & Assignment Problems: Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems.

Unit 3 (10 Lectures)

Network Analysis: Network definition and Network diagram, probability in PERT analysis, CPM, project time cost trade off, introduction to resource smoothing and allocation.

Sequencing: Introduction, processing N jobs through two machines, processing N jobs through three machines, processing N jobs through m machines.

Unit 4 (10 Lectures)

Inventory Model: Introduction to inventory control, deterministic inventory model, EOQ model with quantity discount.

Queuing Models: Concepts relating to queuing systems, basic elements of queuing model, role of Poisson & exponential distribution, concepts of birth and death process.

Text/ Reference Books:

1. J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd.
2. N D Vohra, Quantitative Techniques in management, Tata McGraw Hill.
3. Handy A Taha, Operations Research – An Introduction, Prentice Hall of India, New Delhi.
4. Wagner H M, Principles of Operations Research: With Applications to Management Decisions, Prentice-Hall of India, New Delhi.
5. Hillier F S and Lieberman G J, Operations Research, Holden Day Inc., San Francisco.
6. Payne T A, Quantitative Techniques for Management: A Practical Approach, Reston Publishing Co. Inc., Virginia.
7. Wilkes F M, Baum P and Smith G D, Management Science: An introduction, John Wiley and Sons, Santa Barbara.

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

1. Understand importance of optimization of industrial process management
2. Apply basic concepts of mathematics to formulate an optimization problem
3. Analyse and appreciate variety of performance measures for various optimization problems
4. Evaluate the solutions from different perspective, which are given in the absence of input of optimization.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

HUM350C Communication Skills for Professionals (Except BME & BTE)

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (8 Lectures)

Mechanics of Report Writing: Objectives of Report Writing; Types of Reports on the basis of forms and content. Introduction to Formats of Reports; Structure of Reports:Front Matter, Main Body, Back Matter.

Unit 2 (10 Lectures)

Writing Business and Technical Report: Preliminary Strategies for Report Writing: Data Collection, Report Planning,Use of Illustrations, Point Formation, Preparing Notes/Drafts. Using Appropriate Formats: Memo Format, Letter Format,Manuscript Format, Printed Forms

Unit 3 (10 Lectures)

Oral Communication and Soft Skills : Group Discussions; Interviews for jobs: preparation and facing them.Professional Presentations: Power Point Presentation, Oral Presentation. Role of Kinesics (Body Language) in Communication.General Etiquettes in Office areas, corporate lunch and dinner. Handling Telephone calls.

Unit 4 (8 Lectures)

Resumes and Job application: Writing of Resume--Chronological Resume and Functional Resume.Request for Reference/Recommendation .Writing Application Letters for Job; Writing Covering letter.

Text/ Reference Books:

1. Sharma,Sangeeta, and Binod Mishra. *Communication Skills for Engineers and Scientists.* PHI,2009.
2. Tyagi,Kavita, and Padma Mishra. *Advanced Technical Communication.* PHI, 2011.
3. Rizvi, M. Ashraf. *Effective Technical Communication*. McGraw Hill Education, 2014.
4. Kumar, Sanjay, and PushpLata. *Communication Skills*. OUP, 2011.
5. Raman, Meenakshi and SangeetaSharma.*Communication* Skills. OUP,2011.
6. *Bhatnagar, Nitin, and MamtaBhatnagar. *Communicative English for Engineers and Professionals*. Pearson Education, 2013. (The soft copy of the book is available in the university library)
7. Mitra,Barun K. *Personality Development and Soft Skills*. OUP,2011.
8. Kaul, Asha. *Business Communication*. PHI, 2nd Edition.
9. Namee, Patrick Mc. *Success in Interviews: How to Succeed in any Job Interview*, Ist Edition.
10. Argenti, Paul. *Corporate Communication*.6th Edition. McGraw Hill Education, 2012.

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

1. Get acquainted with multiple forms and formats of various technical and business reports
2. Develop competence for report writing with a focus on its complex writing techniques and procedures.
3. Develop their speaking skills with professional proficiency.
4. Equip themselves for Letter Writing Skills.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

HUM352C Soft Skills And Interpersonal Communication

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (8 Lectures)

Soft Skills: Introduction to Soft Skills & their classification.Importance of Soft Skills: Writing Resume/CV, Engaging in Group discussion, Appearing for Job interviews.

Unit 2 (10 Lectures)

Interpersonal Skills, Behaviour, Relationships and Communication: Development and Role of Effective Interpersonal Skills.Development of Effective Speaking and Listening Skills.

Unit 3 (10 Lectures)

Non-Verbal Elements in Interpersonal Communication : Role of Body Language, Paralinguistic Features, Proxemics/Space Distance and Haptics in Interpersonal Communication.

Unit 4 (8 Lectures)

Personality Development for Personal and Professional Growth: Desirable Personality Attributes, Personality Types, Analysis of Personality Development (Freudian and Swami Vivekananda's Concept), Grooming Personality for Personal and Professional Life.

Text/ Reference Books:

1. Mitra, Barun K. *Personality Development and Soft Skills*. Delhi: OUP, 2nd Edition, 2016.
2. Butterfield, Jeff.*Soft Skills for Everyone.* Cengage Learning, 2017.
3. Raman, Meenakshi and Sangeeta Sharma. *Communication Skills.* OUP, 2011.
4. Ramesh, Gopalaswamy and Mahadevan Ramesh. *The ACE of Soft Skills,* Pearson India,2010.
5. Ribbons, Geoff and Richard Thompson.*Body Language*.Hodder& Stoughton, 2007.
6. Sharma, Sangeeta and Binod Mishra.*Communication Skills for Engineers and Scientists.* PHI, 2017.

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

1. Know now how soft skills complement hard skills for career growth.
2. Enhance communicative competence for professional enhancement.
3. Learn desirable body language and other non-verbal elements in interpersonal communication.
4. Groom personality for handling effectively various situations of personal and professional life.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

MGT402C Human Values, Ethics And IPR

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Human Values: Understanding the need, basic guidelines, Self Exploration - its content and process; 'Natural Acceptance' and Experiential Validation, Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly.

Unit 2 (12 Lectures)

Different kinds of value: Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Unit 3 (10 Lectures)

Modern approach to the study of values: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman).

Unit 4 (10 Lectures)

Professional Ethics & IPR: Values in Work-life, Professional Ethics and Ethos, Code of conduct, Whistle Blowing, Corporate Social Responsibility.IPR: meaning, nature, scope and relevance of IPR. Kinds of IPR: Copyright, Patents, Trademark, Geographical Indication, Industrial design, Plant Variety. Benefits, Emerging dimensions and Rational for protection of IPR.

Suggested Readings:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi
2. A.N. Tripathy, 2003, Human Values, New Age International Publishers.
3. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
4. M Govindrajan, S Natrajan& V. S Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
5. S. B. Gogate, Human Values & Professional Ethics, Vikas Publishing House Pvt. Ltd., Noida.

Reference Books:

1. A Nagraj, 1998 JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
2. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
3. Prof. A.R.Aryasri, DharanikotaSuyodhana, Professional Ethics and Moral, Maruthi Publications.
4. A. Alavudeen, R.Kalil Rahman and M. Jayakumaran, Professional Ethics and Human Values, University Science Press.
5. Prof.D.R.Kiran, 2013, Professional Ethics and Human Values, Tata McGraw-Hill
6. Jayshree Suresh and B. S. Raghavan, Human Values And Professional Ethics, S.Chand Publications

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

1. Students will be able to understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Understand and can distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. Students will be aware of the significance of Intellectual Property as a very important driver of growth and development in today's world and to be able to statutorily acquire and use different types of intellectual property in their professional life.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

MGT404C Human Resource Management

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Introduction: Nature and scope of human resource management, HRM objectives and functions, HRM policies, HRM in globally competitive environment; strategic human resource management.

Unit 2 (12 Lectures)

Acquiring human resources: Man power planning, Job evaluation, job analysis and job design. Recruitment: Sources, Methods, constraints & challenges, selection: objectives and process, placement and induction.

Unit 3 (10 Lectures)

Developing human resources: Training: types, methods, training vs. development and evaluation of a training programme and training need assessment, career planning and development.

Unit 4 (10 Lectures)

Performance appraisal: Methods, process and challenges of performance appraisal, performance appraisal vs. potential appraisal, Compensation: wages & salaries administration and factors influencing compensation levels.

Suggested Readings:

1. Jyothi, Human Resource Management, Oxford University Press
2. Bohlander George and Scott Snell, Management Human Resources, Cengage, Mumbai
3. Bhattacharyya, Dipak Kumar, Human Resource Management, Excel Books, NewDelhi
4. Cascio Wayne F., Managing Human Resources, TMH, New Delhi
5. DeCenzo, David A, and Stephan P. Robbins, Fundamentals of Human Resource Management, Wiley India, New Delhi
6. Denisi, Angelo S, and Ricky W Griffin, Human Resource Management, Biztantra, New Delhi

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

1. To have an understanding of the basic concepts, functions and processes of human resource management
2. To be aware of the role, functions and functioning of human resource department of the organizations.
3. To Design and formulate various HRM processes such as Recruitment, Selection, Training, Development, Performance appraisals and Reward Systems, Compensation Plans and Ethical Behavior.
4. Develop ways in which human resources management might diagnose a business strategy and then facilitate the internal change necessary to accomplish the strategy.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

HUM354C Introduction To French Language

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

VOCABULAIRE

Les Salutations

Les jours de la semaine, Les moins de l'année, Les couleurs, Les professions

Les nombrescardinaux

Les lieux de la ville, Les nationalites

Personnesetobjetscaractéristiques d'un pays

Civilisation: France,de la sociétéfrancaise, les monuments, les fêtes

Unit 2 (10 Lectures)

GRAMMAIRE

Conjugation des verbeetre, avoir, aller; Conjugation des verbe –er, -ir, -re

Masculin/feminine,Singulier/ pluriel

Accord des nomset des adjectives

Articles indéfinisetdéfines

Négation simple

Interrogation

Futurproche

On= Nous

Articles partitifsetcontractes

La date etl'heure

Unit 3 (8 Lectures)

ECRITURE (comprehension des écrits, Production écrite)

Presentez- vous, Mon meuillierami, Ma famille

Carteset messages d'invitation, d'acceptationou de refus

Ecrives des scenes

Unit 4 (8 Lectures)

COMPREHENSION (écouter, production orale)

Se presenter à ungroupe

Parlez/ écoutezdevotreville

Parlez/écoutezdesesactivités de loisirs

Parlez /écoutez de vosgo*ûts*

Demander/ donnerun explication

Identifier unepersonneouun objet

Demander/dire cequ'ona fait

Text/ Reference Books:

1. Echo – A1 Methode de Francais, CLE International (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi).
2. Connexions, niveau 1, Yves Loiseau and R_gineM_rieux(Goyal Publishers).
3. Alter Ego-1, Hachette (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi).
4. Forum- Methode de Francais 1, Hachette (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi).
5. 450 Exercises de Grammaire, CLE International (Distributed in India by W. R. Goyal Publishers & Distributors, Delhi).
6. Audio- Video study material.
7. Supplementary handouts

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

1. Familiarize with the basics of French language.

2. Understand and express vocabulary and grammar through writing.
3. Demonstrate understanding through simple dialogues in French.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

HUM356C Introduction To German Language

B.Tech. 3rd YEAR (SEMESTER –VI)

Electronics & Communication Engineering

L	T	P	Credits		
3	0	0	3	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (10 Lectures)

Introduction to German alphabets
Numbers 0- 100 (basic algebraic expressions)
Vocabulary of days and months
Adverbs of time
Ordinal numbers in German
Phonetics and pronunciation

Unit 2 (10 Lectures)

Introduction to the simple possessive pronouns
Sentence: statement, question, (question for completion and decision) command
Coordination of clauses
Placing of the verb in the sentence: first, second and last place
Word order in main clause
Details of time, manner and place (casual)

Unit 3 (8 Lectures)

Verb: infinitive, imperative, indicative – Präsens, Perfekt, Präteritum of auxiliary and modal verbs, modal verbs (meaning, indicative Präsens&Präteritum, möchten)
Verbs with prefixes – separable and inseparable
Nouns: Gender, plural, Nominative, Accusative, Dative
Articles: Definite and Indefinite
Adjectives: predicative use

Unit 4 (8 Lectures)

Day-to-day conversation in German: Introducing oneself and other, greeting and taking leave, Meeting people, Time and date, months and weekdays
Inquire and name the country of origin, languages
Introduce family members and friends

Text/ Reference Books:

1. Tangram AktuellNiveau A1, Max HeuberVertag, Ismaning, 2005 (Published and distributed in India by German Book Depot, Delhi).
2. Netzwerk A1, KlettVerlag, Muenchen, 2013 (Published and distributed in India by German Book Centre, Delhi 2015).
3. *Sprachkurs Deutsch I &2*. Diesterweg (Moritz) Verlag, Frankfurt am Main, 1989, (Published and distributed in India by Goyal Saab Publishers & Distributors, New Delhi).
4. *Schuelerduden Grammatik*, BibliographischesInstitutand F.ABrockhaus, 2000.
5. *ThemenAktuell 1, Kursbuch*, Max HeuberVerlag, Ismaning, Deutschland, 2003 (Published and distributed in India by German Book Centre, Delhi,2010).
6. Audio-video Study Material.
7. Supplementary Handouts.

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

1. Familiarize with the basics of German language.
2. Understand and express vocabulary and grammar through writing.
3. Demonstrate understanding through simple dialogues in German.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC301C Statistics and Predictive Analytics

B. Tech. (Hons./Minor degree) with Specialization in Artificial Intelligence & Machine Learning
3rd YEAR (SEMESTER –V)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1(15 lectures)

Descriptive Statistics: Data exploration (histograms, bar chart, box plot, line graph, scatter plot),Qualitative and Quantitative Data, Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation), Anscombe's quartet, Other Measures: Quartile and Percentile, Interquartile Range.

Statistical Analysis: Relationship between attributes: Covariance, Correlation Coefficient, Chi Square, Measure of Distribution (Skewness and Kurtosis), Box and Whisker Plot (Box Plot and its parts, Using Box Plots to compare distribution) and other statistical graphs, Probability (Joint, marginal and conditional probabilities), Probability distributions (Continuous and Discrete), Density Functions and Cumulative functions.

Unit 2 (15 lectures)

Sampling and Estimation: Sample versus population, Sample techniques (simple, stratified, clustered, random), Sampling Distributions, Parameter Estimation, Unbalanced data treatment.

Inferential Statistics: Develop an intuition how to understand the data, attributes, distributions, Procedure for statistical testing, Test of Hypothesis (Concept of Hypothesis testing, Null Hypothesis and Alternative Hypothesis), Cross Tabulations (Contingency table and their use, Chi-Square test, Fisher's exact test), One Sample t test (Concept, Assumptions, Hypothesis, Verification of assumptions, Performing the test and interpretation of results), Independent Samples t test , Paired Samples t test, One way ANOVA (Post hoc tests: Fisher's LSD, Tukey's HSD), z-test and F-test.

Unit 3 (15 lectures)

Linear Regression: Regression basics: Relationship between attributes using Covariance and Correlation, Relationship between multiple variables: Regression (Linear, Multivariate) in prediction, Residual Analysis, Identifying significant features, feature reduction using AIC, multi-collinearity, Non-normality and Heteroscedasticity, Hypothesis testing of Regression Model, Confidence intervals of Slope R-square and goodness of fit, Influential Observations – Leverage.

Multiple Linear Regression: Polynomial Regression, Regularization methods, Lasso, Ridge and Elastic nets, Categorical Variables in Regression.

Unit 4 (15 lectures)

Non-Linear Regression: Logit function and interpretation, Types of error measures (ROCR), Logistic Regression in classification.

Forecasting models: Trend analysis, Cyclical and Seasonal analysis, Smoothing, Moving averages, Box-Jenkins, Holt-winters, Auto-correlation; ARIMA.

Text/ Reference Books:

1. Sheldon M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Academic Press, 2014.
2. C. R. Kothari, "Research Methodology Methods and Techniques", 2nd Edition, New Age International Publishers, 2004.
3. Trevor Hastie, Robert Tibshirani and Jerome Friedman, "The Elements of Statistical Learning-Data Mining, Inference and Prediction", 2nd Edition, Springer Verlag, 2009.
4. Thomas W. Miller, "Modelling Techniques in Predictive Analytics", 1st Edition, Pearson, 2018.
5. J. S. Milton and J.C. Arnold, "Introduction to Probability and Statistics", 4th Edition, Tata McGraw Hill, 2007.
6. R. A. Johnson and C. B. Gupta, "Miller and Freund's Probability and Statistics for Engineers", 7th Edition, Asia, Pearson Education, 2007.
7. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", 7th Edition, John Wiley & Sons, 2018.

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

1. Analyze the data based on large and small sample sizes. Understand the fundamental knowledge of the concepts of probability, measures of central tendency, correlation, regression and their properties.
2. Acquire the knowledge of standard distributions which can describe real life phenomenon. Have the notion of sampling distributions and statistical techniques used in engineering problem
3. Recognize statistical methods of studying data samples, hypothesis testing, statistical quality control and their properties. Use statistical methodology and tools in the engineering problem-solving process.
4. Compute and interpret descriptive statistics using numerical and graphical techniques. Extract information from data and use it to predict trends and behavior pattern.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC302C Python Programming

B. Tech. (Hons./Minor degree) with Specialization in Artificial Intelligence & Machine Learning/Internet of Things/Robotics

3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (15 Lectures)

Introduction and Overview: Introduction to Python, Origin, Comparison, Comments, Operators, Variables and Assignment, Numbers, Strings, Lists and Tuples, Dictionaries, if Statement, while Loop, for Loop and the range(), Built-in Function, Files, Errors and Exceptions, Functions, Classes, Modules Syntax and Style Statements and Syntax, Variable Assignment, Identifiers, Memory Management, Python Applications.

Unit 2 (15 Lectures)

Numbers and Strings: Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions. Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings.

Lists and Dictionaries: Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples, Introduction to Dictionaries, Operators, Built-in Functions, Built-in Methods, Dictionary Keys.

Unit 3 (15 Lectures)

Functions: Functions, Calling Functions, Creating Functions, Formal Arguments, Positional Arguments, Default Arguments, Default Function Object Argument Example, Variable-length Arguments, Non-keyword Variable Arguments (Tuple), Keyword Variable Arguments (Dictionary).

Classes: Problems in Procedure Oriented Approach, Features of Object Oriented Programming System (OOPS), Classes and objects, Encapsulation, Abstraction, Inheritance, Polymorphism.

Unit 4 (15 Lectures)

Files and Input/output: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Using context managers with files.

Errors and Exceptions : Introduction to Exceptions, Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Regular Expressions, Special Symbols and Characters for Regular expressions.

Text/Reference Books:

1. Wesley J. Chun, "Core Python Programming", 2nd Edition, Pearson, 2007 (Reprint 2010).
2. Paul Barry, "Head First Python", 2nd Edition, O Rielly, 2010.
3. Mark Lutz, "Learning Python", 4th Edition, O Rielly, 2009.

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

1. Explain the various concept of Python Programming.
2. Apply the basic concepts of Python Programming for writing simpler programs in Python.
3. Apply the advance concepts of Python Programming for writing advance programs in Python.
4. Develop applications in Python.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC304C Machine Learning

B. Tech. (Hons./Minor degree) with Specialization in Artificial Intelligence & Machine Learning
3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (15 Lectures)

Foundations for ML: ML Techniques overview; Validation Techniques (Cross-Validations); Feature Reduction/Dimensionality reduction, Decision tree: Introduction, classification and algorithms; Principal components analysis (Eigen values, Eigen vectors, Orthogonality).

Unit 2 (15 Lectures)

Clustering: Different clustering methods (Distance, Density, Hierarchical), Iterative distance-based clustering; Dealing with continuous, categorical values in K-Means, Constructing a hierarchical cluster, K-Medoids, k-Mode and density-based clustering, Measures of quality of clustering.

Unit 3 (15 Lectures)

Classification : Naïve Bayes Classifier: Model Assumptions, Probability estimation, Required data processing, M-estimates, Feature selection: Mutual information. K-Nearest Neighbors: Computational geometry, Voronoi Diagrams, Delaunay Triangulations, K-Nearest Neighbor algorithm, Wilson editing and triangulations, Aspects to consider while designing K-Nearest Neighbor.

Support Vector Machines: Linear learning machines and Kernel space, Making Kernels and working in feature space, SVM for classification and regression problems.

Unit 4 (15 Lectures)

Ensemble methods: Bagging & boosting and its impact on bias and variance, C5.0 boosting, Random forest, Gradient Boosting Machines and XGBoost.

Data Mining: Techniques and Applications.

Text/ Reference Books:

1. Ethem Alpaydin, " Introduction to Machine Learning", 2nd Edition, MIT Press Ltd, 2010.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", 2nd Edition, CRC Press, 2014.
3. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer Science+Business Media, LLC, New York, 2006.
4. Tom M. Mitchell, "Machine Learning", McGraw Hill, 1997.
5. Luis Pedro Coelho and Willi Richert, "Building Machine Learning Systems with Python", 2nd Edition, PACKT, 2013.
6 Jake VanderPlas, "Python Data Science Handbook Essential tools for working with data", O'Reilly, USA, 2017.
7 Allen B. Downey, "Think Stats Exploratory data analysis in Python", Green Tea Press, Massachusetts, 2014.

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

1. Identify potential applications of machine learning in practice and select the appropriate machine learning task.
2. Describe the core differences in Analyzes enabled by regression, classification, and clustering.
3. Apply regression, classification and clustering techniques.
4. Apply the algorithms to a real-world problem and optimize the models learned.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC384C Machine Learning Lab

B. Tech. (Hons./Minor degree) with Specialization in Artificial Intelligence & Machine Learning
3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Text/ Reference Books:

1. A. C. Muller and S. Guido, “Introduction to Machine Learning with Python”, O’Reilly, 2016.
2. Jake VanderPlas, “Python Data Science Handbook Essential tools for working with data”, O’Reilly, USA, 2017.
3. Allen B. Downey, “Think Stats Exploratory data analysis in Python”, Green Tea Press, Massachusetts, 2014.
4. Ethem Alpaydin, “ Introduction to Machine Learning”, 2nd Edition, MIT Press Ltd, 2010.

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

1. Understand the basic concepts of training and testing the machine.
2. Practically understand the working of various algorithms applied in machine learning.
3. Implement and evaluate performance of various classification and clustering algorithms.
4. Apply the machine learning concepts to solve real world problems.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

SPEC401C Artificial Intelligence

B. Tech. (Hons./Minor degree) with Specialization in Artificial Intelligence & Machine Learning
4th YEAR (SEMESTER –VII)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (15 lectures)

Foundations of Artificial Intelligence (AI): Introduction, AI techniques, AI Basics (Divide and Conquer, Greedy, Branch and Bound, Gradient Descent), Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods, Neural Network (NN) basics (Perceptron and MLP, FFN, Back propagation).

Unit 2 (15 lectures)

Convolution Neural Networks: Image classification, Text classification, Image classification and hyper-parameter tuning, Emerging NN architectures.

Unit 3 (15 lectures)

Recurrent Neural Networks: Building recurrent NN, Long Short-Term Memory, Time Series Forecasting.

Unit 4 (15 lectures)

Deep Learning and Natural Language Processing: Auto-encoders and unsupervised learning, Stacked auto-encoders and semi-supervised learning Regularization - Dropout and Batch normalization, Introduction to natural language processing.

Text/ Reference Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson Education, 2010.
2. Ian Goodfellow and Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016.
3. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, McGraw-Hill, 2018.
4. Eugene Charniak and D. McDermott, "Introduction to Artificial Intelligence", Pearson Education, 1985.
5. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India, 1990.
6. Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmann Publications, 2000.

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

1. Create different neural networks of various architectures. Perform the training and testing of neural networks using various learning rules. Analyze these networks for various applications.
2. Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques.
3. Participate in the design of systems that act intelligently and learn from experience.
4. Understand the basic concepts of natural language processing.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC481C Artificial Intelligence Lab

B. Tech. (Hons./Minor degree) with Specialization in Artificial Intelligence & Machine Learning
4th YEAR (SEMESTER –VII)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. To classify linear separable data with a perceptron.
2. To design and train a perceptron for basic logic gate.
3. To design and train a perceptron for universal gate.
4. To design and train a perceptron for identifying ODD and EVEN number.
5. To solve XOR problem with different AI techniques.
6. To classify a 4-class problem with (i) a perceptron (ii) a multilayer perceptron.
7. To construct an ADALINE for adaptive prediction of time series based on past time series data.
8. Write a python program to generate Calendar for given month and year.
9. Write a python program to implement simple calculator.
10. Write a python program to implement Library Management System.
11. Write a program to implement simple chatbot.
12. Write a python program to implement breadth first/ depth first search traversal.
13. Write a python program to solve traveling salesman problem.
14. Write a python program to implement Hangman/ Tic-tac-teo or similar games.

Text/Reference Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson Education, 2010.
2. Ian Goodfellow and Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016.
3. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, McGraw-Hill, 2018.
4. Eugene Charniak and D. McDermott, "Introduction to Artificial Intelligence", Pearson Education, 1985.
5. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India, 1990.
6. Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmann Publications, 2000.

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

1. Identify the type of an AI problem i.e. search, inference, decision making under uncertainty, game theory, etc).
2. Formulate the problem as a particular type.
3. Compare the difficulty of different versions of AI problems, in terms of computational complexity and the efficiency of existing algorithms.
4. Implement, evaluate, and compare the performance of various AI algorithms, including both empirical demonstration and theoretical proofs.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

SPEC303C IoT and Applications

B. Tech. (Hons./Minor degree) with Specialization in Internet of Things

3rd YEAR (SEMESTER –V)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (16 Lectures)

Introduction to Internet of Things (IoT): Definition of the Internet of Things (IoT), The Importance of the Internet of Things (IoT) in Society IoT Architecture, History of IoT, M2M Machine to Machine, Web of Things, The Layering concepts, IoT Communication Pattern.

IoT protocol: Wireless communication protocols: Wifi, IPV4/IPV6, 6LOWPAN, ZigBee, Bluetooth Low Energy (BLE), Application layer protocols: MQTT/MQTTS, CoAP, REST/HTTP, XMPP, SCADA Authentication Protocols.

Unit 2 (14 Lectures)

Operating System used for IoT: Linux Operating System introduction,Working with the command line and the Shell, Managing directories and files, Managing user access and security, Setting up a Linux file system, Understanding system initialization, Connecting a system to the network, Installing and Configuring Linux.

Shell Scripting Programming for IoT: Introduction, Creating Shell Scripts, Flow control in the Shell, Advanced Shell features Programming Language used in IoT, C Programming.

Unit 3 (14 Lectures)

Hardware Interfacing for IoT: Overview of IoT Hardware platforms, Sensors interfacing, Actuators interfacing**.**

Communication Protocol for IoT: UART Communication, RS485 Communication, I2C Protocol device interfacing, SPI Protocol device interfacing, Ethernet configuration, Zigbee interfacing, Wi-Fi AP and Router interfacing.

Unit 4 (16 Lectures)

IoT Applications: IoT in Agriculture, IoT in Home Automation, IoT in Security Solutions, IoT in Healthcare, IoT in Robotics, Internet of Vehicles (IoV), Internet of Everything (IoE).

Text/ Reference Books:

1. Shriram K Vasudevan, Abhishaek S Nagarajan and RMD Sundaram, “Internet of Things”, 1st Edition, Wiley, 2019.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos and David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
3. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
4. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
5. Rajkumar Buyya and Amir Vahid Dastjerdi, “Internet of Things: Principles and paradigms”, Elsevier, 2016.

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

1. Explain the various concepts of IoT.
2. Use Devices and Software needed in IoT.
3. Design state-of the-art architecture of IoT related to the domain the problem.
4. Develop IoT based Application.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines “AICTE Examination Reforms”. Students shall be informed about these reforms.

SPEC383C IoT Lab

B. Tech. (Hons./Minor degree) with Specialization in Internet of Things
3rd YEAR (SEMESTER –V)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. Study and working of IOT Builder Platform.
2. Implementation of different Linux OS Commands.
3. Basics programming of Raspberry Pi.
4. Interfacing Sensors with Raspberry Pi.
5. Interfacing LCD display with Raspberry Pi.
6. Health monitoring using Raspberry pi.
7. Facial Recognition Door using android and Raspberry pi.
8. Temperature transmission using Raspberry Pi.
9. House monitoring using Raspberry Pi.
10. Study the Temperature sensor and Write Program for monitoring temperature using Raspberry Pi.
11. Write a Program to upload temperature and humidity data on cloud.

Text/ Reference Books:

1. Shriram K Vasudevan, Abhishaek S Nagarajan and RMD Sundaram, “Internet of Things”, 1st Edition, Wiley, 2019.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos and David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
3. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
4. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
5. Rajkumar Buyya and Amir Vahid Dastjerdi, “Internet of Things: Principles and paradigms”, Elsevier, 2016.

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

1. Write program in C on Raspberry Pi platform.
2. Write program in Python on Raspberry Pi platform.
3. Design interfacing program using Raspberry Pi.
4. Develop applications using Raspberry Pi.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.
4. Pre-experimental & post experimental quiz / questions may be offered for each lab experiment to reinforce & aid comprehension of the experiment.

SPEC306C Embedded IoT

B. Tech. (Hons./Minor degree) with Specialization in Internet of Things
3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (14 Lectures)

Introduction to Embedded IoT: Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller.

Unit 2 (16 Hours)

IoT Controllers: Introduction to IoT controllers, features of IoT controllers, different types of IoT microcontroller, architecture, memory access and instruction execution, pipelining, program memory considerations, addressing modes, CPU registers, Instruction set, and simple operations, Embedded C Programming of IoT controllers.

Unit 3 (16 Hours)

Arduino: Architecture, Setup the IDE, Writing Arduino Software, Arduino Libraries, Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensor with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino.

Unit 4 (14 Hours)

Cloud for IoT: Need of Cloud for IoT applications, Cloud Architecture for IoT applications, challenges in IoT with Cloud, Various Cloud Service Providers for IoT: ThingSpeak, Blynk etc., Embedded C programming for posting sensors data to web server.

Text/ Reference Books:

1. Shriram K Vasudevan, Abhishaek S Nagarajan and RMD Sundaram, "Internet of Things", 1st Edition, Wiley, 2019.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos and David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
3. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
5. Rajkumar Buyya and Amir Vahid Dastjerdi, "Internet of Things: Principles and paradigms", Elsevier, 2016.

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

1. Understand about various types of Robots & Controls used in the Robotics.
2. Know the Sensors and Actuators in Robotics.
3. Work on various Robotic Platforms.
4. Develop applications based on these platforms.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC386C Embedded IoT Lab

B. Tech. (Hons./Minor degree) with Specialization in Internet of Things
3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. To interface Arduino with Bluetooth.
2. To interface Arduino with ESP8266.
3. To interface Arduino 16 x 2 LCD Display.
4. To interface Arduino with Ultrasonic Sensor.
5. To interface Arduino with keypad.
6. Implement a C program to interface GPIOs.
7. Implement a C program to interface DC Motor.
8. Implement a C program to interface Graphical LCD.
9. Implement a Python program to interface GPIOs.
10. Implement a Python program to interface DC Motor.
11. Implement a Python program to interface Graphical LCD.

Text/ Reference Books:

1. Shriram K Vasudevan, Abhishaek S Nagarajan and RMD Sundaram, “Internet of Things”, 1st Edition, Wiley, 2019.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos and David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
3. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
4. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
5. Rajkumar Buyya and Amir Vahid Dastjerdi, “Internet of Things: Principles and paradigms”, Elsevier, 2016.

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

1. Write program in C on Arduino platform.
2. Write program in C on Arduino platform.
3. Write interfacing programs using Arduino platform.
4. Develop applications using Arduino platform.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

SPEC403C Cloud Computing

B. Tech. (Hons./Minor degree) with Specialization in Internet of Things
4th YEAR (SEMESTER –VII)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (14 Lectures)

Introduction: Cloud computing history, architecture and essential characteristics, cloud service models, Cloud Deployment models, advantages of cloud computing, cloud v/s grid computing.

Unit 2 (15 Lectures)

Virtualization: Virtualization techniques, Benefits and drawbacks of virtualization, VMmigration with its types, hypervisors, types of hypervisors, distributed management of virtual infrastructures, scheduling techniques for advance reservation of capacity, Service-orientedarchitectures, SOA implementation, SOAP v/s REST, web 2.0.

Unit 3 (15 Lectures)

PaaS: Introduction, advantages and disadvantages of PaaS, introduction to google app engine,GAE cost structure, Apache Hadoop: MapReduce, HDFS, Hive, Map reduce programming model, Hadoop as a service.

Unit 4 (16 Lectures)

Migrating into the cloud: Introduction, challenges in the cloud, legal issues in cloud computing, Cloud Economics and Capacity Management: Restricted Choices, Capacity Planning, Queuing and Response Time, Evidence Based Decision Making, Instrumentation (Measuring Resource Consumption), Bottlenecks, Key Volume Indicators. Security in clouds, protocols, algorithms, Security as a service, Multi-cloud.

Text/ Reference Books:

1. Rajkumar Buyya, James Broberg and Andrzej Goscinski, " Cloud Computing Principles and Paradigms" , Wiley & Sons, 2011.
2. Christian Baun, Marcel Kunze, Jens Nimis and Stefan Tai, " Cloud Computing Web-Based dynamic IT services", Springer-Verlag Berlin Heidelberg, 1st Edition, 2011.
3. David E.Y. Sarna, "Implementing and Developing Cloud Computing Applications", CRC Press, 2011.

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

1. Explain the basic concepts along with evolution and features of cloud computing.
2. Demonstrate the concept of existing cloud paradigms and platforms.
3. Explore the issues of cloud computing in addition with various cloud models.
4. Attain the knowledge of virtualization through virtualization technologies.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPME301C Robotics and Applications

B. Tech. (Hons./Minor degree) with Specialization in Robotics

3rd YEAR (SEMESTER –V)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (14 Lectures)

Introduction to Robotics: History, evolution of Robots and Robotics, Laws of Robotics, Progressive advancement in Robots-first, second, third and fourth generations; Robot autonomy-links, joints notations scheme, degrees of freedom in a manipulator, arm configuration, wrist configuration, End-effector.

Human arm characteristics, Components of Robotics-mechanics, trajectory generation and motion planning, control system, Sensors and vision, AI in robotics, Robot programming -teach method, off-line programming, Robot programming languages; future prospects-bio robotics and humanoid Robotics.

Unit 2 (15 Lectures)

Robotic Sensors: Human sensing, problem of Robot sensing; Sensors in Robots-status sensors, environmental sensors, quality control sensors, safety sensors, workcell control sensors, classification of Robotic sensors.

Types of sensors used in Robotics: Optical, pneumatic sensors; tactile, acoustic, force, torque; Optical encoders, selecting right sensor.

Unit 3 (15 Lectures)

Robotic Vision: Introduction, industrial application of vision-controlled Robotic systems - presence, object location, pick and place, object identification, visual inspection, visual guidance;

Image acquiring and processing: Processing of imaging, architecture of Robotic vision system, Image acquisition, description of components of vision system, image representation, introduction to image processing.

Unit 4 (16 Lectures)

Robot applications: Industrial applications, Material handling- material transfer, loading and unloading; Processing applications- arc welding, spray painting; Assembly applications- assembly task, peg-in-hole assembly, steps in assembly, providing compliance; Inspection application: sensors and vision based inspection and testing.

Principles for Robot application and application planning, quantitative and qualitative justification of Robots, Robot safety, Non-industrial applications;

Text/ Reference Books:

1. R.K. Mittal and I. J. Nagrath, " Robotics and control", McGraw Hill,2003.
2. K. R. Guruprasad, " Robotics: Mechanics and control", PHI, 2019.
3. John J. Craig, " Introduction to Robotics: Mechanics and control",3rd Edition, Pearson, 2005.
4. Ashitava Ghosal, " Robotics: fundamental concepts and analysis", Oxford Pub, 2006.
5. Saeed B. Niku, " Introduction to Robotics: Analysis, control, applications", 2nd Edition, Wiley, 2010.
6. King-Sun Fu, C.S. George Lee and Ralph Gonzalez, "Robotics: control, sensing, vision and intelligence", 3rd Edition, McGraw Hill, 2004.

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

1. Explain the characteristics, architecture and applications of Robotic systems.
2. Identify and describe different types of end effectors and sensors required for specific applications.
3. Apply the basic concepts of robotic vision and image processing for robotic systems.
4. Analyze the applications of robots in various industrial applications and select a robotic system for given pplication.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC381C Robotics Lab

B. Tech. (Hons./Minor degree) with Specialization in Robotics
3rd YEAR (SEMESTER –V)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

1. Study of Robotic Arm.
2. Write a Programming to demonstrate working of Robotic Arm.
3. Study of Fire bird –V Robotic Platform.
4. Write a Programming to demonstrate working of Fire bird-V Robotic Platform.
5. Study of Hexpod Robotic Platform.
6. Write a Programming to demonstrate working of Hexpod Robotic Platform.
7. Study and working of Quad-copter.
8. Study and working of Scorbot-ER4u (A five degrees of freedom) robot along with its on hardware & software:
   a) Construction (Sketch) & its specifications.
   b) Components & their functions.
   c) Operating instructions.
   d) Safety instructions.
   e) Teach Pendant.
9. Programming of Scorbot-ER4u for loading and unloading a job along with its simulation.
10. Make a program for Scorbot-ER4u to weld (spot and seam welding) a job and simulate the code.

Text/ Reference Books:

1. R.K. Mittal and I. J. Nagrath, " Robotics and control", McGraw Hill,2003.
2. K. R. Guruprasad, " Robotics: Mechanics and control", PHI, 2019.
3. John J. Craig, " Introduction to Robotics: Mechanics and control",3rd Edition, Pearson, 2005.
4. Ashitava Ghosal, " Robotics: fundamental concepts and analysis", Oxford Pub, 2006.
5. Saeed B. Niku, " Introduction to Robotics: Analysis, control, applications", 2nd Edition, Wiley, 2010.
6. King-Sun Fu, C.S. George Lee and Ralph Gonzalez, "Robotics: control, sensing, vision and intelligence", 3rd Edition, McGraw Hill, 2004.

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

1. Analyze various Robotic Platforms.
2. Work on various Robotic Platforms.
3. Write basic programs for running various Robotic Platforms.
4. Perform small jobs with various Robotic Platforms.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.
4. Pre-experimental & post experimental quiz / questions may be offered for each lab experiment to reinforce & aid comprehension of the experiment.

SPEC308C Embedded Robotics

B. Tech. (Hons./Minor degree) with Specialization in Robotics
3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (14 Lectures)

Introduction to Embedded Robotics: Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller.

Unit 2 (16 Lectures)

AVR Microcontroller: Introduction to AVR microcontroller, features of AVR family microcontrollers, different types of AVR microcontroller, architecture, memory access and instruction execution, pipelining, program memory considerations, addressing modes, CPU registers, Instruction set, and simple operations.

Unit 3 (14 Lectures)

Features & Programming of AVR Microcontroller: Timer: Control Word, mode of timers, simple programming, generation of square wave, Interrupts: Introduction, Control word Simple Programming, generation of waveforms using interrupt, Serial interface using interrupt, Watch-dog timer, Power-down modes of AVR microcontroller, UART, SRAM, Programming of AVR microcontroller.

Unit 4 (16 Lectures)

Robotic Platforms & Applications: Introduction to Robotic Platforms such as Robotic Arm, Fire-fird, Hexpod, Quad-copter etc., Robotic Applications such as Motion Control, Line follower, Serial Communication, Zig-bee Communication, Automatic Cruise Control, Drone etc.

Text/ Reference Books:

1. S.K. Saha, "Introduction to Robotics", 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.
2. Ashitava Ghosal, "Robotics- Fundamental Concepts and Analysis", Oxford, New Delhi, 2006.
3. Dhananjay V. Gadre, " Programming and customizing the AVR Microcontroller", McGraw-Hill, 2011.
4. Thomas Grace , " Programming and Interfacing Atmel AVR Microcontrollers", Cengage Learning PTR,2015.

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

1. Analyze basics concepts of embedded Robotics.
2. Write Program using AVR Microcontroller.
3. Work on various Robotic Platforms.
4. Develop applications based on these platforms.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

SPEC388C Embedded Robotics Lab

B. Tech. (Hons./Minor degree) with Specialization in Robotics
3rd YEAR (SEMESTER –VI)

L	T	P	Credits		
0	0	2	1	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

List of Experiments:

11. To study the Robotic Platforms (Fire Bird V).
12. Write a Program to demonstrate operation of Buzzer Beep using Fire Bird V Robotics Platform.
13. Design a Program to demonstrate I/O interfacing using Fire Bird V Robotics Platform.
14. Write a Program to demonstrate motion control using Fire Bird V Robotics Platform.
15. Write a Program to demonstrate position control using Fire Bird V Robotics Platform.
16. Design a Program to demonstrate velocity control using Fire Bird V Robotics Platform.
17. Write a Program to LCD interfacing using Fire Bird V Robotics Platform.
18. Write a Program to Serial Communication using Fire Bird V Robotics Platform.
19. Design a Program to demonstrate operation of white line follower using Fire Bird V Robotics Platform.
20. Write a Program to demonstrate operation of Adaptive Cruise control using Fire Bird V Robotics Platform.
21. Write a Program to Serial Communication via Zig Bee using Fire Bird V Robotics Platform.
22. Design a Program to demonstrate operation of Robotic Arm.
23. Write a Program to demonstrate operation of Hexapod.

Text/ Reference Books:

1. S.K. Saha, “Introduction to Robotics”, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.
2. Ashitava Ghosal, “Robotics- Fundamental Concepts and Analysis”, Oxford, New Delhi, 2006.
3. Dhananjay V. Gadre, “ Programming and customizing the AVR Microcontroller”, McGraw-Hill, 2011.
4. Thomas Grace, “ Programming and Interfacing Atmel AVR Microcontrollers”, Cengage Learning PTR,2015.

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

1. Write Program using AVR microcontroller.
2. Write interfacing programs using AVR microcontroller.
3. Develop robotics applications using AVR microcontroller.
4. Develop robotics applications using Robotic Platforms.

Note:

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may be either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

SPME401C Mechanics and Control in Robotics

B. Tech. (Hons./Minor degree) with Specialization in Robotics
4th YEAR (SEMESTER –VII)

L	T	P	Credits		
4	0	0	4	Class Work	: 25
				Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Unit 1 (16 Lectures)

Introduction to Robotics, Coordinate frames, mapping and Transforms – coordinate frames, description of objects in space, transformation of vectors, inverting a homogeneous transform, fundamental rotation matrices, exercises.
Forward kinematics: mechanical structure and notations, description of links and joints, kinematic modelling of manipulator, Denavit-Hartenberg notation, kinematic relationship between adjacent links, manipulator transformation matrix.

Unit 2 (15 Lectures)

Inverse kinematics: Manipulator workspace, solvability of inverse kinematic model, solution techniques, closed form solution.
Manipulator differential motion and statics: relationship between transformation matrix and angular velocity, mapping velocity vector, velocity propagation along links, Manipulator Jacobian and its inverse, Jacobian singularities, exercises.

Unit 3 (15 Lectures)

Robot Dynamics: Lagrange mechanics, dynamic model of two degree of freedom manipulator, Lagrange-Euler formulation, Newton-Euler formulation; Inverse dynamics.
Trajectory planning: definition and planning tasks, steps in trajectory planning, joint space technique, Cartesian space techniques.

Unit 4 (14 Lectures)

Control of manipulators: Open and closed loop control, manipulator control problem, linear control schemes, characteristics of second-order linear system.
Joint Actuators – model of a DC motor; Partitioned PD control scheme, PID control scheme.

Text/ Reference Books:

1. R.K. Mittal and I. J. Nagrath, " Robotics and control", McGraw Hill,2003.
2. K. R. Guruprasad, " Robotics: Mechanics and control", PHI, 2019.
3. John J. Craig, " Introduction to Robotics: Mechanics and control",3rd Edition, Pearson, 2005.
4. Ashitava Ghosal, "Robotics- Fundamental Concepts and Analysis", Oxford, New Delhi, 2006.
5. Saeed B. Niku, " Introduction to Robotics: Analysis, control, applications", 2nd Edition, Wiley, 2010.
6. King-Sun Fu, C.S. George Lee and Ralph Gonzalez, "Robotics: control, sensing, vision and intelligence", 3rd Edition, McGraw Hill, 2004.

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

a. Analyze a manipulator through evaluation of forward kinematics, inverse kinematics and Jacobian singularities.
b. Formulate and evaluate the dynamics of robot.
c. Describe the trajectory planning techniques for robotic manipulators.
d. Analyze the control problems and apply the control schemes for manipulators and actuators.

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.

3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.