M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH (Electronics and Communication Engineering)

Common with

B.Tech (Electronics and Tele Communication)

SEMESTER 3rd & 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definitios
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses

PT	Practical Training
S	Seminar

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

SCHEME OF STUDIES & EXAMINATIONS

B.TECH (Electronics and Communication Engineering)

Common with

B.Tech (Electronics and Tele Communication)

SEMESTER –3rd 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	PCC-ECE201G	Electronic Devices	3	0	-	25	75	-	100	3	3	3
2	LC-ECE203G	Electronic Devices lab	0	0	2	25	-	25	50	1	3	2
3	PCC-ECE206G	Analog Circuits	3	0	-	25	75	-	100	3	3	3
4	LC-ECE208G	Analog Circuits lab	0	0	2	25	-	25	50	1	3	2
5	PCC-ECE209G	Signals and Systems	3	0	-	25	75	-	100	3	3	3
6	PCC-ECE211G	Network Theory	3	1	-	25	75	-	100	3	3	3
7	LC-ECE-212G	Network Theory Lab	0	0	2	25	-	25	50	1	3	2
8	LC-ECE-213G	PCB & ELECTRONIC WORKSHOP LAB	0	0	2	25	-	25	50	1	3	2
9	HSMC-01G	Economics for Engineers (Common with CSE)	3	0	0	25	75	-	100	3	3	3
10	*MC-106G	Environmental Science	3	0	1	25	75	-	-	-	3	4
Total									**700**	**19**		27

*__MC-106G__ is a mandatory non –credit course in which the students will be required passing marks in theory.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

SCHEME OF STUDIES & EXAMINATIONS
B.TECH (Electronics and Communication Engineering)
Common with
B.Tech (Electronics and Tele Communication)
SEMESTER –4th 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	PCC-ECE202G	Communication System	3	0	-	25	75	-	100	3	3	3
2	LC-ECE204G	Communication System lab	0	0	2	25	-	25	50	1	3	2
3	PCC-ECE205G	Digital Electronics	3	1	-	25	75	-	100	3	3	4
4	LC-ECE207G	Digital Electronics lab	0	0	2	25	-	25	50	1	3	2
5	PCC-ECE210G	Microcontrollers	3	1	-	25	75	-	100	3	3	4
6	LC-ECE-214G	Microcontrollers Lab	0	0	2	25	-	25	50	1	3	2
7	HSMC-02G	Organizational Behavior	3	0	0	25	75	-	100	3	3	3
8	BSC-MATH-202G	Mathematics-III (Partial differential equations and Numerical methods)	3	1	-	25	75	-	100	4	3	4
9	PCC-CSE-221G	Data Structures	3	0	0	25	75	-	100	3	3	3
Total									**750**	**22**		27

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

PCC-ECE201G **Electronic Devices**

L	T	P	Credits	Sessional Marks:	25
3	0	-	03	Theory Marks :	75
				Duration of Exams: 3 Hours	

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

1. To provide explanation about the operation of all the important electronic devices
2. To study and understand the I/O behavior of various electronics devices to variable inputs
3. To demonstrate how electronic devices are used to design efficient electronic applications

Unit 1

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

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

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

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 operation of all the important electronic devices
2. Understand the I/O behavior of various electronics devices to variable inputs
3. Understand the design of efficient electronic applications

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE203G Electronic Devices Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

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

1. To introduce students to the characteristics of diodes, transistors, JFETs, and op-amps .
2. To provide understanding about the operation and characteristics of different configurations of BJT.
3. To provide understanding about the operation and characteristics of different special semiconductor devices.

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.

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.

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.

3 At least 5 experiments have to be simulated and results to be validated with experimental results.

PCC-ECE206G **Analog Circuits**

L	T	P	Credits	Sessional Marks: 25
3	0	-	03	Theory Marks: 75
				Duration of Exams: 3 Hours

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

1. To understand the characteristics of diodes and transistors
2. To design and analyze various rectifier and amplifier circuits
3. To design sinusoidal and non-sinusoidal oscillators
4. To understand the functioning of OP-AMP and design OP-AMP based circuits
5. To design ADC and DAC

Unit 1

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, Cascode 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

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

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

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. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators
4. Understand the functioning of OP-AMP and design OP-AMP based circuits
5. Design ADC and DAC

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE208G **Analog Circuits Lab**

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

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

- To understand the characteristics and AC analysis of RC coupled amplifier.
- To understand the operation and characteristics of different oscillators, regulators and timers.
- To understand the operation of power supply.

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.

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

1. Understand the characteristics and AC analysis of RC coupled amplifier.
2. Understand the operation and characteristics of different oscillators, regulators and timers.
3. Understand the operation of power supply.

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.

3 At least 5 experiments have to be simulated and results to be validated with experimental results.

PCC-ECE209G **Signals and Systems**

L	T	P	Credits		
3	0	-	3	Sessional Marks:	25
				Theory Marks `:	75
				Duration of Exams: 3 Hours	

COURSE OBJECTIVES: To bring the Continuous-time and Discrete-time concepts, types of signals and systems.

- To impart knowledge about representation, properties and applications of systems and signals.
- To impart knowledge about transforms and their applications to signals and systems.

Unit 1

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

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

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

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.

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:

- Analyze different types of signals and systems.
- Represent continuous and discrete time signals and systems in time and frequency domain using different transforms.
- Get familiarized with the characteristics and applications of Linear Time Invariant System.
- Analyze LTI systems using Laplace/Z-Transform.

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

PCC-ECE211G **Network Theory**

L	T	P	Credits	Class Work : 25 Marks
3	1	0	3	Theory : 75 Marks
				Total : 100 Marks
				Duration of Exam: 3 Hrs.

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

1. To prepare the students to have a basic knowledge in the analysis of Electric Networks
2 To solve the given circuit with various theorems and methods.
3 To analyze the various three phase circuits star and delta connections.
4 To distinguish between tie set and cut set methods for solving various circuits.
5 To design various types of filters.
6 To relate various two port parameters and transform them.

Unit I

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

Fourier Series: 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

A.C Analysis: Analysis of RC, RL, and RLC networks with and without initial conditions with Laplacetransforms 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

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", 3rd Edition, Pearson Education, 2015.
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
4. S.K Bhattacharya & Manpreet Singh, Network Analysis and Synthesis, Pearson Education, 2015.

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"2nd Edition, Pearson Education, 2015.

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.
5. Appreciate the frequency domain techniques.

Note:

Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE-212G **NETWORK THEORY LAB**

L	T	P	Credits- 1	Class Work marks : 25
0	0	2		Theory marks : 25
				Total marks : 50

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

1. To impart practical knowledge to the students about the basic theory concepts of network theory and familiarize them with various kits, filters and parameters used in the circuits.
2. To enable students to design and analyze various circuits using the network components (Resistor, capacitor and inductor).
3. To make students practically capable of designing various types of filters implement such filters for various high level applications and systems.

LIST OF EXPERIMENTS:

A: Simulation based

1. Introduction of circuit creation & simulation software like TINAPRO, P-Spice, Dr.-Spice/other relevant Software

2. Transient response of RC, RL circuit on any of above software.

3. To find the resonance frequency, Band width of RLC series circuit using any of above software.

4. To plot the frequency response of low pass filter and determine half-power frequency.

5. To plot the frequency response of high pass filter and determine the half-power frequency.

6. To plot the frequency response of band-pass filter and determine the band-width.

B: Hardware Based

7. To calculate and verify "Z" & “Y” parameters of a two port network.

8. To determine equivalent parameter of parallel connections of two port network and study loading effect.

9. To calculate and verify "ABCD" parameters of a two port network.

10. To synthesize a network of a given network function and verify its response.

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

1. Implement the basic network theory concepts practically and will be able to verify filter results derived in theory.
2. Design and analyze various network and filter circuits for various practical problems.
3. Understand all the concepts and parameters of network theory.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

LC-ECE-213G **PCB & ELECTRONIC WORKSHOP LAB**

L	T	P	credits	Class Work marks : 25
0	0	2	1	Theory marks : 25
				Total marks : 50

Objective: To create interest in Hardware Technology.

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

2. Soldering shop: Fabrication of DC regulated power supply

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

(b) Etching & drilling of PCB.

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

5. Testing of regulated power supply fabricated.

Experiment to be performed

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

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

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

4. Design a circuit for a fixed power supply.

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

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

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

8. Etching of the above PCB.

9. UV exposure & Drilling of PCB.

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

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

12. Testing of above circuit.

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

1. Understand the characteristics of diodes and filter circuits.
2. Understand the operation and characteristics of different types of rectifiers.
3. Understand the operation and characteristics of power supply.

Course Name	**:**	**ECONOMICS FOR ENGINEERS**	
Course Code	**:**	**HSMC-01G**	**External marks: 75**
Credits	**:**	**2**	**Internal marks: 25**
L-T-P	**:**	**2-0-0**	**Total marks: 100**
Course Objectives:			

1. Acquaint the students to basic concepts of economics and their operational significance.

2. To stimulate the students to think systematically and objectively about contemporary economic problems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics, nature of economic problem, Production Possibility Curve, Economic laws and their nature, Relationship between Science, Engineering, Technology and Economic Development. **Demand-** Meaning of Demand, Law of Demand, **Elasticity of Demand**- meaning, factors effecting it, its practical application and importance.

UNIT-2

Production- Meaning of Production and factors of production, Law of variable proportions, Returns to scale, Internal and external economies and diseconomies of scale. **Various concepts of cost of production-** Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost, Opportunity cost. Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-3

Market- Meaning of Market, Types of Market- Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly (main features). **Supply-** Supply and law of supply, Role of demand & supply in price determination and effect of changes in demand and supply on prices.

UNIT 4

Indian Economy- Nature and characteristics of Indian economy as under developed,developing and mixed economy (brief and elementary introduction), **Privatization -** meaning, merits and demerits. **Globalization of Indian economy -** merits and demerits. **Banking-** Concept of a Bank, Commercial Bank- functions, Central Bank- functions, Difference between Commercial & Central Bank.

Course Outcomes: By the end of this course the student will be able to:

1. The students will able to understand the basic concept of economics.
2. The student will able to understand the concept of production and cost.
3. The student will able to understand the concept of market.
4. The student will able to understand the concept of privatization, globalization and banks.

Suggested Books:

1. Chopra P. N., Principle of Economics, Kalyani Publishers.
2. Dewett K. K., Modern economic theory, S. Chand.
3. H. L. Ahuja., Modern economic theory, S. Chand.
4. Dutt Rudar & Sundhram K. P. M., Indian Economy.
5. Mishra S. K., Modern Micro Economics, Pragati Publications.
6. Singh Jaswinder, Managerial Economics, dreamtech press.
7. A Text Book of Economic Theory Stonier and Hague (Longman's Landon).
8. Micro Economic Theory – M.L. Jhingan (S.Chand).
9. Micro Economic Theory - H.L. Ahuja (S.Chand).
10. Modern Micro Economics : S.K. Mishra (Pragati Publications).
11. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co).
12. Jain T.R., Economics for Engineers, VK Publication.

ENVIRONMENTAL SCIENCE
MC-106G

L	T	P	Credits	
3	0	1	-	Class Work : 25 Marks Theory : 75 Marks Duration of Exam: 3 Hrs.

Unit-1

The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2

Natural Resources:

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.

* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3

Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.
b. Grassland ecosystem.
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). (6 lectures)

Unit-4

Biodiversity and its conservation :

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5

Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution

c) Soil pollution

d) Marine pollution

e) Noise pollution

f) Thermal pollution

g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6

Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.

* Issues involved in enforcement of environmental legislation.
* Public awareness.

(7 lectures)

Unit-7

Human population and the Environment :

Population growth, variation among nations. Population explosion- Family Welfare Programme. Environment and human health.
Human Rights. Value Education. HIV/AIDS.
Woman and Child Welfare

Role of Information Technology in Environment and human health.
Case Studies. (6 lectures)

Unit-8

Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc.
(Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd., Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment &

Security Stockholm Env. Institute, Oxford Univ. Press, 473p.

9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).

10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.

11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.

12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.

13. Mhaskar A.K., Mayyer Hazardous, Tekchno-S cience Publications (TB).

14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).

15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.

16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.

17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.

18. Survey of the Environment, The Hindu (M).

19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).

20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).

21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.

23. A text book environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks.
The structure of the question paper will be :

Part- A : Short Answer Pattern	:	15 marks
Part- B : Essay Type with inbuilt choice	:	60 marks

Part-C : Field Work (Practical) : 25 marks

Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.
Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

PCC-ECE202G Communication System

L	T	P	Credits	Class Work : 25 Marks
3	0	0	3	Theory : 75 Marks Total : 100 Marks Duration of Exam: 3 Hrs.

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

- To introduce the students to the basics of different types of modulation techniques
- To aim at a comprehensive coverage of design of radio transmitter and receiver

Unit 1

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

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

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 4

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:

- Student will be familiar with concept of modulation and various modulation techniques
- Ability to model noise in communication systems
- Familiarity with design of radio transmitter and receiver

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE204G Communication System Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

COURSE OBJECTIVES:

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

LIST OF EXPERIMENTS:

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

COURSE OUTCOMES:

- Students are able to analyze digital communication signals.

- Students understand the basics of PAM, QAM, PSK, FSK, and MSK.
- 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.

PCC-ECE205G **Digital Electronics**

L	T	P	Credits			
3	1	-	3	Sessional Marks	:	25
				Theory Marks	:	75
				Duration of Exams	:	3 Hours

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

1. To provide a comprehensive introduction to digital logic design leading to the ability to understand binary codes, binary arithmetic and Boolean algebra and its relevance to digital logic design.
2. To design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder etc.
3. To design & analyze synchronous sequential logic circuits.
4. To familiarize students with basics of digital logic families.
5. To Analyze and design simple systems composed of PLDs.

Unit 1

Logic Simplification: Review of Boolean Algebra and DeMorgan's Theorem, SOP & POS forms, Canonical forms comlements of a numbers ,addition and subtractions of a comlements numbers, Realization Using Gates. Karnaugh maps up to 6 variables , Q M & VEM technique,

Unit 2

Combinational & Sequential Logic Design: Binary codes, error detection and correction code ,Code Conversion. Numericals

Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display,Half andFull Adders, Subtractors , Parallel Adders, Adder with Look Ahead Carry ,BCD Adder.

Unit 3

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, conversions of FF, Ripple and Synchronous counters, Ring and Johnson counter, UP & DOWN counter, Sequence Generator,Shift registers.

Unit 4

PLDs and Finite state machines: Concept of Programmable logic devices like PAL,PLA ,ROM ,CPLD and FPGA. Logic implementation using Programmable Devices

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.

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 Verilogn 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. Design digital logic circuits depicting their ability to understand binary codes, binary arithmetic and Boolean algebra, its axioms and theorems.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
3. Design & analyze synchronous sequential logic circuits
4. Understand and design various digital circuits using different digital logic families.
5. Analyze and design simple systems composed of PLDs.

Note:

1. The paper setter will set two questions (with or without parts) from each of four units , & a ninth compulsory question comprising of 5 to 10 sub-parts , covering the entire syllabus . The examinee will attempt 5 questions in all, alongwith the compulsory question (with all its sub-parts), selecting one question from each unit.

The use of programmable devices such as programmable calculators, phones etc. and sharing of materials during the examination are not allowed

Note:

Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE207G **Digital Electronics Lab**

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

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

4. To impart practical knowledge to the students about the basic theory concepts of digital electronics and familiarize them with various kits and I.C's used for digitally designing the circuits.
5. To enable students to design and analyze various combinational and sequential circuits using logic gates as well as medium scale integrated (MSI) components.
6. To make students practically capable of designing various types of counters and implement such counters for various high level applications and systems.

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 ckt to detect a Count Sequence.

12 Conversion of state diagram to the state table and implement it using logical ckt.

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

4. Implement the basic digital theory concepts practically and will be able to verify various results derived in theory.
5. Design and analyze various combinational and sequential circuits for various practical problems using basic gates and flip flops I.C's.
6. Implement LSI and MSI circuits using programmable logic devices (PLDs).

Note:-

1. Each laboratory class/section shall not be more than about 20 students.

To allow fair opportunity of practical hands on experience to each student,each experiment may either done by each student individually or in groupofnotmore than 3-4 students. Larger groups be strictly discouraged/disallowed.

PCC-ECE210G **Microcontrollers**

L	T	P	Credits	
3	0	-	03	Sessional Marks: 25 Theory Marks: 75 Total Marks: 100 Duration of Exams: 3 Hours

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

1. To make the students understand the architecture of various microprocessor.
2. To acquaint the students with the exposure of assembly language programming of Microprocessors.
3. To acquaint the students with a first-hand exposure of interfacing various peripheral devices and develop applications based on these devices.

Unit 1

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

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

Unit 3

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

Unit 4

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. Introduction to RISC processors ; ARM microcontrollers design.

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 demonstrate the ability to:

1. Do assembly language programming
2. Do interfacing design of peripherals.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE-214G **Microcontrollers Lab**

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

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

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

LIST OF EXPERIMENTS:

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

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

1. Do assembly language programming of 8086.
2. Do 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.

Course code	**HSMC-02G**				
Course title	**ORGANIZATIONAL BEHAVIOUR**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**0**	0	**3**	
Branches (B. Tech.)	**CSE/ECE**				
Class work	25				
Exam	75				
Total	100 Marks				
Duration of Exam	03 Hours				

The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT - 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - 2

Introduction of organization:- Meaning and process of Organization, Management v/s Organization; **Fundamentals of Organizational Behavior:** Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior**-**Personality**- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept (Brief Introduction) ; **Motivation-** Concept, techniques and importance

UNIT - 3

Interpersonal Processes- **Teams and Groups**- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership. **Communication –** Meaning, process, channels of communication, importance and barriers of communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture -** Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

Course Outcomes: By the end of this course the student will be able to:

1. Students will be able to apply the managerial concepts in practical life.
2. The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.
3. Students will be able to understand the behavioral dynamics in organizations.
4. Students will be able to understand the organizational culture and change

Suggested Books:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.
2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi.
7. Ghuman Karminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi.

Mathematics-III (Partial differential equations and Numerical methods)

BSC-MATH-202G

Course code	BSC-MATH-202G				
Category	Basic Science Course				
Course title	Mathematics-III (Partial differential equations and Numerical methods)				
Scheme and Credits	L	T	P	Credits	Semester-IV
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Unit-I

Partial Differential Equations of first order: Definition of Partial Differential Equations, First order linear partial differential equations, Solutions of first order linear partial differential equations, Charpit's method for solving first order non-linear partial differential equations

Unit-II

Partial Differential Equations of higher order: Second-order linear partial differential equations and their classification, Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method, Initial and boundary conditions, D'Alembert's solution of the wave equation, Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates, One dimensional diffusion equation and its solution by separation of variables

Unit-III

Numerical Methods 1: Solution of polynomial and transcendental equations – Bisection method, Regula-Falsi method and Newton-Raphson method, Finite differences, Interpolation

using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae, Numerical differentiation, Numerical integration, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules

Unit-IV

Numerical Methods 2: Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order for solving first and second order ordinary differential equations, Finite difference solution of two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited
4. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications
5. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company
6. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI

Course Outcomes

The Students will learn:

1. To solve field problems in engineering involving partial differential equations.
2. To find roots of polynomial and transcendental equations using numerical methods.
3. To conduct numerical differentiation and numerical integration.
4. To solve differential equations using numerical methods.

Data Structures

Course code	PCC-CSE-221G				
Category	Professional Core Course				
Course title	tructures				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

1. To impart the basic concepts of data structures and algorithms.
   To understand concepts about searching and sorting techniques
   To understand basic concepts about stacks, queues, lists, trees and graphs.
   To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit 1:

Introduction: Basic Terminologies: Concept of Data Structure, Choice of right Data Structure, Algorithms , how to design and develop algorithm . Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, **Searching:** Linear Search and Binary Search Techniques.

Unit 2:

Stacks and Queues: Stack and its operations: Applications of Stacks: Expression Conversion and evaluation queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues.

Unit 3:

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.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree. Applications of Binary Trees.

Unit 4:

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

Suggested books:

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:

Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

"How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Course outcomes

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
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.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.