`

Department of Electronics and Communication Engineering
Bhagat Phool Singh Mahila Vishwavidyalaya, Khanpur Kalan (Sonepat), Haryana-131305
(A state university established by govt. of Haryana vides Act no. 31 of 2006)
www.bpswomenuniversity.ac.in

S. No.	Code	Course Title	Hrs/Week			Total Credits	Internal Marks	External Marks	Total Marks
			L	T	P				
Course Structure for B. Tech Third Semester (Second Year)									
Subjects									
1.	ECL-231	Electronics Devices	3	0	0	3	20	80	100
2.	ECL-233	Digital Electronics	3	0	0	3	20	80	100
3.	ECL-235	Signal and System	3	0	0	3	20	80	100
4.	ECL-237	Network Theory	3	0	0	3	20	80	100
5.	*	BS/ES/HS-3	3	0	0	3	20	80	100
6.	**	BS/ES/HS-4	3	0	0	3	20	80	100
7.	**MCL-231**[#]	[#]**Constitution of India**	**3**	**0**	**0**	**0**	**20**	**80**	**100**[#]
Labs									
8.	ECP-231	Electronics Devices Lab	0	0	2	1	10	40	50
9.	ECP-233	Digital Electronics Lab	0	0	2	1	10	40	50
10.	ECP-235	Electronics Project Workshop – I	0	0	2	1	10	40	50
11.	**BSC-233**[#]	[#]**Quantitative Aptitude**	**2**	**0**	**0**	**0**	**50**	**0**	**50**[#]
		Total	**23**	**0**	**6**	**21**	**150**	**600**	**750**

*BS/ES/HS-3		**BS/ES/HS-4	
Code	Subject	Code	Subject
ESC-231	Electronic Equipment and Maintenance	HSMC-235	Engineering Economics and Management
ESC-233	Data Structure and Applications	BSC-235	Natural Disaster Management
HSMC-231	Financial Literacy	ESC-237	Renewable Energy Sources
HSMC-233	Corporate Social Responsibilities	HSMC-239	Public Policy and Governance
BSC-233	Modeling and Simulation	BSC-237	Vedic Mathematics & Data Interpretation
******	MOOC / NPTEL Course	******	MOOC / NPTEL Course

Note:
1. Student will be permitted to opt from BS/ES/HS-3 & BS/ES/HS-4 subject course for a group of 15 students.
2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examination of the subject.

1

`

3. #**Constitution of India (MCL-231) & Quantitative Aptitude (BSC-233)** is a mandatory non credit and qualifying course in which the students will be required passing marks in theory. The marks of the same will not be counted in grand total and towards award of degree.

`

ECL-231	**Total Credits: 3**
L T P	**Internal Marks: 20**
3 0 0	**External Marks: 80**
	Total Marks: 100

Course objective: The objective of this course is:

- The working of switching devices and apply the same in designing complex circuits with fewer devices.
- Design amplifier and other complex circuits with the help of special semiconductor devices which will further increase real time applications and reduce runaway situations.
- 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.

Pre-requisite: Basic knowledge of Electrical Technology and Semiconductor Materials.

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

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

Contents

Unit – I	12 Hours
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 – II	10 Hours
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 – III	10 Hours

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, Advantages & 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 – IV	8 Hours

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 Semiconductor 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.

Suggested 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 Devices & Circuit, By Dharam Raj Cheruku -- Pearson Education.
6.	Electronics Device &Circuit, By B.P Singh and Rekha Singh 2nd Edition -Pearson Education.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`

<div align="center">**Digital Electronics**</div>

ECL-233	**Total Credits: 3**
L T P	**Internal Marks: 20**
3 0 0	**External Marks: 80**
	Total Marks: 100

Course Objective:
- To understand the concept of various components.
- To understand number representation and conversion between different number system in digital electronic circuits.
- To analyse logic processes and implement logical operations using combinational logic circuits.
- To understand concepts of sequential circuits and to analyse sequential systems.
- To understand concept of Programmable Devices, PLA, PAL, TTL, ECL, CMOS logic families.

Pre-requisite: Basic understanding of diode and transistor operation.

Course Outcomes: At the end of the course, students will demonstrate the ability to:
- Understand binary codes, binary arithmetic, minimization techniques and their relevance to digital logic design.
- Design & analyse modular combinational circuits with MUX/DEMUX, Decoder, Encoder and sequential logic circuits.
- Understand and develop a digital logic to find out sustainable solution of a real life problem.
- Understand different semiconductor memories.
- Formulate and implement various digital integrated circuits using different logic families and simple systems composed of PLDs.

<div align="center">**Contents**</div>

Unit – I	12 Hours
Combinational Circuit Designs: Fundamentals of Digital Techniques, number system, various codes, Sum of products and product of sums, Minterms and Maxterms, Design using gates, Karnaugh map and Quine McCluskey methods of simplification, Problem formulation and design of combinational circuits, Adder/Subtractor, Encoder/decoder,Multiplexer/ Demultiplixer, Code-converters, BCD arithmetic circuits, Drivers for display devices.	
Unit – II	**12 Hours**
Sequential Circuits: Flip Flops: S-R, J-K, T, D, master-slave, Conversion of Flip Flop, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Timing signal, Analysis of clocked sequential circuits- their design, **Fundamental Mode Sequential Circuits:** Design of Synchronous and Asynchronous sequential circuits, State equivalence, minimization, state assignment, Circuit implementation, Registers-Shift registers. Stable, Unstable states, Output specifications.	
Unit – III	**10 Hours**
Digital Logic Families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS, BiCMOS logic families, Calculation of noise margin and fan-out, Tristate logic, interfacing of CMOS and TTL families, tristate logic.	
Unit – IV	**8 Hours**

|	
A/D and D/A Converters: Sample and hold circuit, weighted resistor and R-2 R ladder D/A Converters, specifications for D/A converters, A/D converters: Quantization, parallel, Successive approximation, counting type, dual-slope ADC, specifications of ADCs.	
Programmable Logic Devices and Semiconductor Memories: ROM, PLA, PAL, FPGA and CPLDs, RAM, Semiconductor memories.	
Suggested Text/Reference Books	
1.	R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2.	Malvino and Leach, "Digital Principles and Applications", TMH, 7th Edition, 2010.
3.	R. J. Tocci, "Digital Systems", 10th Edition, PHI, 2009.
4.	A. Anand Kumar, "Switching Theory & Logic Design", PHI.
5.	W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.
6.	Morris Mano, "Logic & Computer Fundamentals", 4th Edition, Pearson Education.
Other Useful Resource(s)	
1.	https://archive.nptel.ac.in/content/syllabus_pdf/108105132.pdf by Prof. Goutam Saha Department of Electronics and Communication Engineering, IIT Kharagpur.
2.	https://ocw.mit.edu/search/?t=Digital+Systems (Prof. Anantha Chandrakasan)

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`
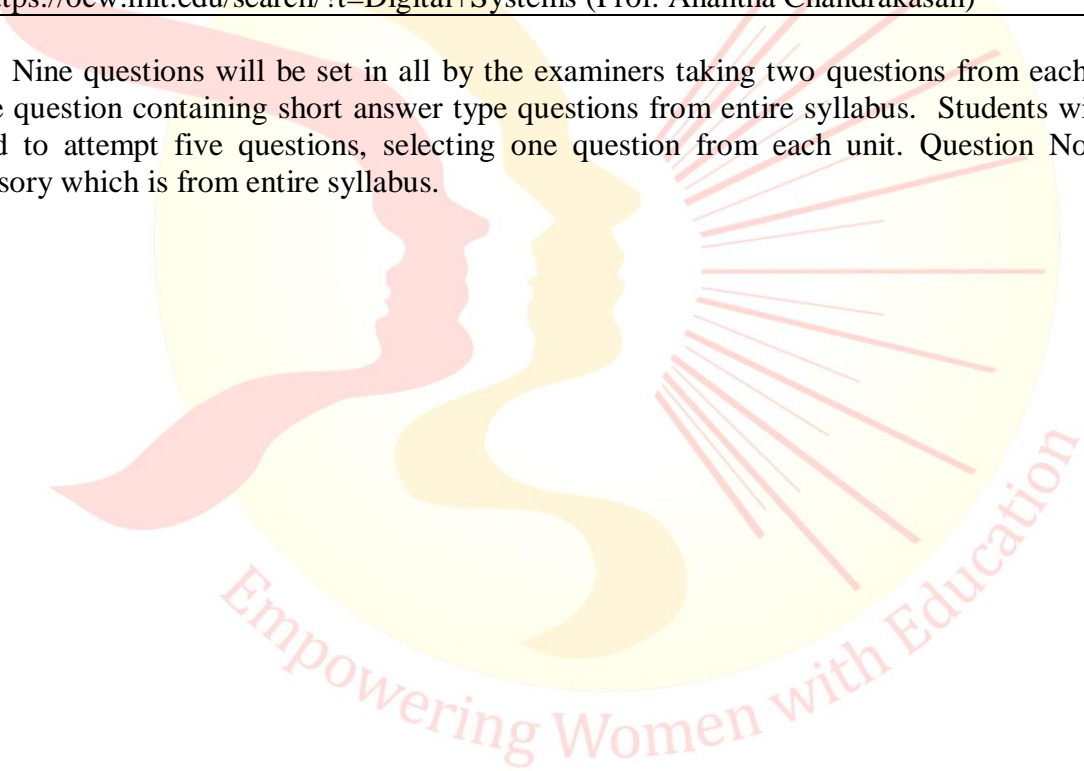
Signal and System

ECL-235
L T P
3   0   0

<div align="right">

Total Credits: 3
Internal Marks: 20
Total Marks: 80
Total Marks:100

</div>

Course Objective:
- To understand the concept of various types of signals and systems, mathematical representations, their characteristics, classification and analysis using differential /difference equations.
- To learn the different transform like Fourier series, Fourier Transform, Laplace Transform and Z Transform and also understand their importance for signals and systems analysis.

Pre-requisite: Fundamental of mathematics such as integration, differentiation, complex numbers, differential equations and trigonometry formulae.

Course Outcomes: On successful completion of teaching-learning and valuation activities, at the end of the course the students would be able to:
- To understand the concept of signals and systems and their classifications.
- To understand the role and concept of impulse response, convolution and its applications in the analysis of LTI systems.
- To predict and analyze the response of LTI systems to various types of input signals
- To formulate and solve differential /difference equations describing LTI systems
- To understand and evaluate the frequency response of LTI systems using Fourier series and transform.
- To analysis continuous-time and discrete-time signals and systems using Laplace transform and Z- transform.

Contents

UNIT-I	10 Hours
Signals: Signal and its classification; Representation of discrete time signals. **Independent variable transformations:** Time shifting, reversal, scaling, time shifting and reversal. **Elementary Signals:** Unit impulse, unit step, unit ramp, complex and exponential, parabolic, Signum, Sinc etc. Properties of unit impulse in continuous and discrete domain, Discrete time signal representation in terms of impulses. **Systems:** Systems and their representation, classification, System described by differential equation and difference equation. **Sampling:** Sampling and its types of sampling, Proof, Signal reconstruction.	

UNIT-II	14 Hours
Linear-Time Invariant (LTI) Systems: Properties of LTI System, impulse response, convolution and its properties in continuous and discrete domain. Linear convolution in continuous and discrete domain using graphical method. LTI systems representation by constant –coefficient difference equation, LTI System characterization, cascade & parallel connection of LTI systems. **Fourier Series:** Fourier series representation of continuous time and discrete time signals using exponential method and trigonometric method. Magnitude and Phase spectrum of signals. **Fourier Transform:** Properties of the Continuous time Fourier Transform. Magnitude and	

Phase representations of frequency response of LTI systems Analysis and characterization of LTI systems using differential equations.

UNIT-III	12 Hours

Laplace Transform: Definition, properties and region of convergence (ROC), Applications to LTI systems, Transfer function of LTI systems, Poles and zeros in S-plane, Stability in S-domain.

Z-Transform: Definition, properties and region of convergence (ROC), Relationship with Fourier Transform, Inverse Z-Transform, Rational Z –Transforms, Poles & Zeros, Applications of Z-transform, System function of an LTI System, Causality & stability of LTI Systems, Pole zero cancellation.

UNIT-IV	6 Hours

State Variable Technique: State space representation of continuous time systems (CTS) with multi-input, multi-output; Solution of state equation for CTS.

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).

Suggested Text/ Reference Books	
1.	Simon Haykin and Barry Van Veen, "Signals and Systems", John Willey & Sons, Inc, second edition 2013.
2.	A.V. Oppenheim & A.S. Willsky & S.H. Nawab: Signals & Systems, 2nd Edition, Prentice- Hall of India, 2015.
3.	Tarun Kumar Rawat, Signals and Systems, Oxford University Press, 1st Edition, 2010.
4.	B.P. Lathi: Signal Processing and Linear Systems, 2nd Edition. Oxford University Press, 2006.
5.	H P HSU and R Ranjan, Signals and Systems, Schaum's Outline Series, 2nd edition.
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.

Other Useful Resource(s)	
1.	http://nptel.ac.in/courses/108104100/ by Prof Aditya K. Jagannatham, IIT Kanpur.
2.	https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/(Prof. Alan V. Oppenheim)

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`

Network Theory

ECL-237   **Total Credits: 3**
L T P   **Internal Marks: 20**
3 0 0   **External Marks: 80**
                                                                     Total Marks: 100

Course Objective: The basic objective of this course is:
* To understand the Laplace Transform in the context of circuit representations.
* Evaluate the behavior of R, R-L, R-L-C electrical circuits considering Initial conditions.
* To understand the concept of graphical solution to electrical network.
* To learn techniques of solving circuits involving different active and passive elements
* To analyse various types of filters and different types of two-port network using network parameters, with different types of connections.

Pre-requisite: Fundamentals of Electrical Engineering.

Course Outcomes: At the end of the course, students will be able to:
* Apply Laplace Transform for steady state and transient analysis.
* Determine different network functions.
* Construct and analyze two port networks and its parameters.
* Understand and remember network synthesis.

Contents

UNIT- I	10 Hours
Laplace Transform: Introduction to Laplace transform & its properties, Laplace transform of special signal waveforms, Inverse Laplace transform, Use of Laplace Transform in solving electrical networks. **Transient Response:** Initial Conditions of resistive, inductive & capacitive Elements, Time domain analysis of simple linear circuits: Transient & Steady state Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform.	
UNIT- II	**11 Hours**
Network Functions: Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions, Time domain behaviour from the pole-zero plot. **Parameters of Two Port Networks:** Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.	
UNIT- III	**9 Hours**
Network Synthesis: Concept & significance of Positive real functions, concept of network synthesis, driving point immittance function structure of LC network, LC network synthesis using foster and cauer form, driving point immittance function structure of RC & RL network, RC & RL network synthesis by Foster and Cauer form.	
UNIT- IV	**12 Hours**
Network Graph Theory: Concept of network graph , terminology used in network graph, relation between Twigs and Links, properties of tree in a graph, formation of incidence Matrix, number of trees in a graph, Graph matrices: cut-set matrix, tie set matrix, formulation of	

network equilibrium equations, network analysis using graph theory.

Filters: Introduction to filters, Characteristics of filters, Filter Classification, Passive Filters: Analysis & Design of prototype HPF, LPF, BPF, & BSF, Introduction to m-derived filters, Active Filters: Introduction of active filters.

	Suggested Text Books
1.	Engineering Network Analysis & Filter Design: G.G Bhise, P.R Chadha, D.C Kulshreshtha; Umesh Publication.
2.	Circuit Theory: A Chakrabarty; Dhanpat Rai Publication.
3.	Van, Valkenburg.; "Network analysis" ; Prentice hall of India, 2000
4.	Sudhakar A. Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
5.	A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education
6.	Network Analysis & Synthesis: S.P Ghosh; McGraw Hill.
7.	Network Analysis & Synthesis: K.M. Soni;S.K Kataria & Sons Publication.
8.	Network Analysis & Synthesis: F.F.Kuo; John Wiley & Sons Inc.
9.	Network Theory by U. A Bakshi, V.A Bakshi, Technical Publications

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`
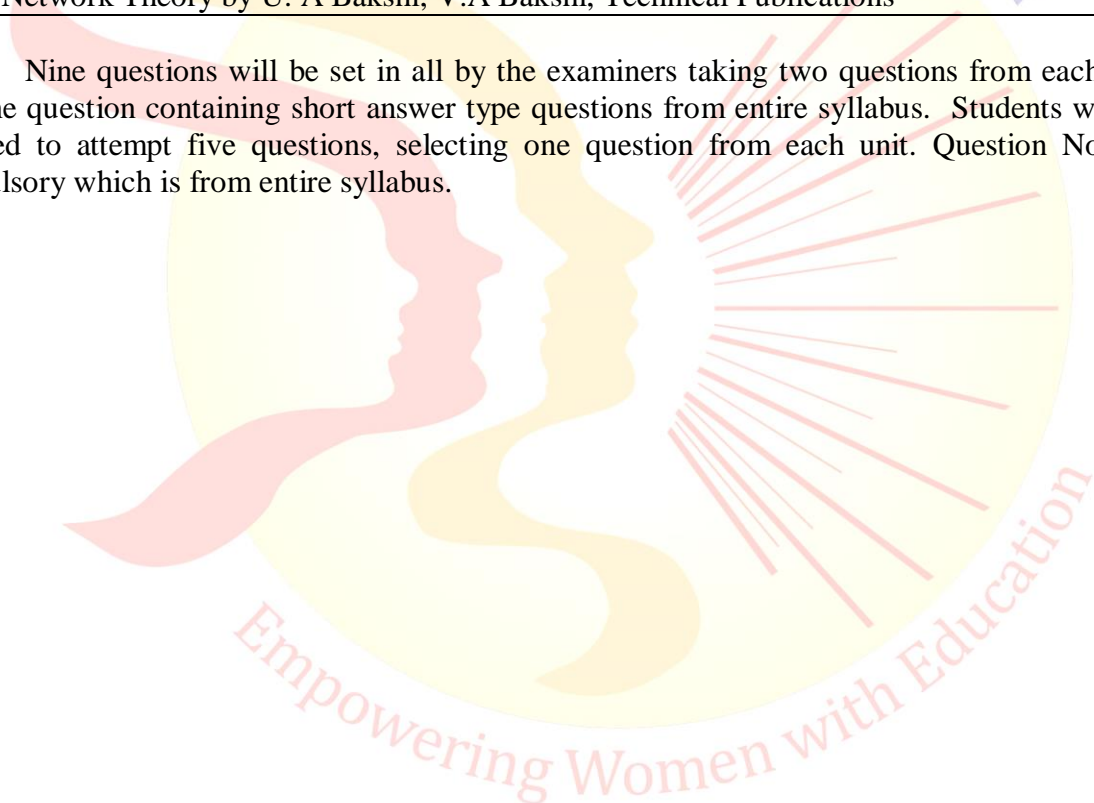
<h1 style="text-align:center">Electronic Equipment and Maintenance</h1>

ESC-231	**Total Credits: 3**
L T P	**Internal Marks: 20**
3 0 0	**External Marks: 80**
	Total Marks:100

Course Objectives: The objective of this course is:
- To study basic preparatory topics of components and their testing.
- To understand the troubleshooting procedures.
- To familiarize students with the various passive components used in electrical circuits and study fundamentals of electric circuits.
- To acquire basic knowledge about testing and troubleshooting of various electrical and electronic equipments

Pre-requisite: Fundamental of electronics devices

**Course Outcome:** After studying this course, students will be able to:
- Explores causes of failures components and devices in electronic systems.
- Acquires skill of troubleshooting analog and digital circuits.
- Understands the importance of preventive maintenance.

Contents

UNIT-I	12 Hours
Failures and Testing of Semiconductor Devices: Types of semiconductor devices, Causes of failure in Semiconductor Devices, Types of failure, Test procedures for Diodes, special types of Diodes, Bipolar Junction Transistors, Field Effect Transistors, Thyristors, Operational Amplifiers, Fault diagnosis in op-amp circuits.	
UNIT-II	**12 Hours**
Desktop & Peripherals Trouble shooting: Construction, working principle and applications of: Desktop PC, CPU, connectors on the CPU, motherboard, latest processors and peripherals. Video adapters and color display standards. Printers-dot matrix, inkjet, laser, Different types of scanners, FAX machine, Photocopying machine, EPABX system PC peripherals such as keyboard, different types of mouse, monitors-CRT and Light pen, memory card reader, Touch Screen and their applications.	
UNIT-III	**12 Hours**
Troubleshooting of Various Equipments : Power supply Circuits – Types of Regulators, Power Supply Troubleshooting, SMPS, High Voltage DC Power supplies Oscilloscope – Fault Diagnosis chart, CRT replacement, Cordless Telephone – Principle of Operation using detailed functional block diagram, Troubleshooting and maintenance of cordless telephone Mobile Phone – faults in microphone, earpiece, ringer, vibrator etc and solutions Digital Still Camera – typical faults and troubleshooting	
UNIT-IV	**12 Hours**
Laptop Troubleshooting: Block diagram of Laptop computer, Peripherals for use in Laptop computer. Use of LCD TV as a PC, EPABX and its programming	
Suggested Text/ Reference Books	
1.	Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur,

`

	TMH 2006
2.	Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
3.	Electronic Testing and Fault Diagnosis by G. C. Loveday, A. H. Wheeler Publishing
4.	Computer Hardware Installation, Interfacing, Troubleshooting and Maintenance by K. L. James. PHI

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.
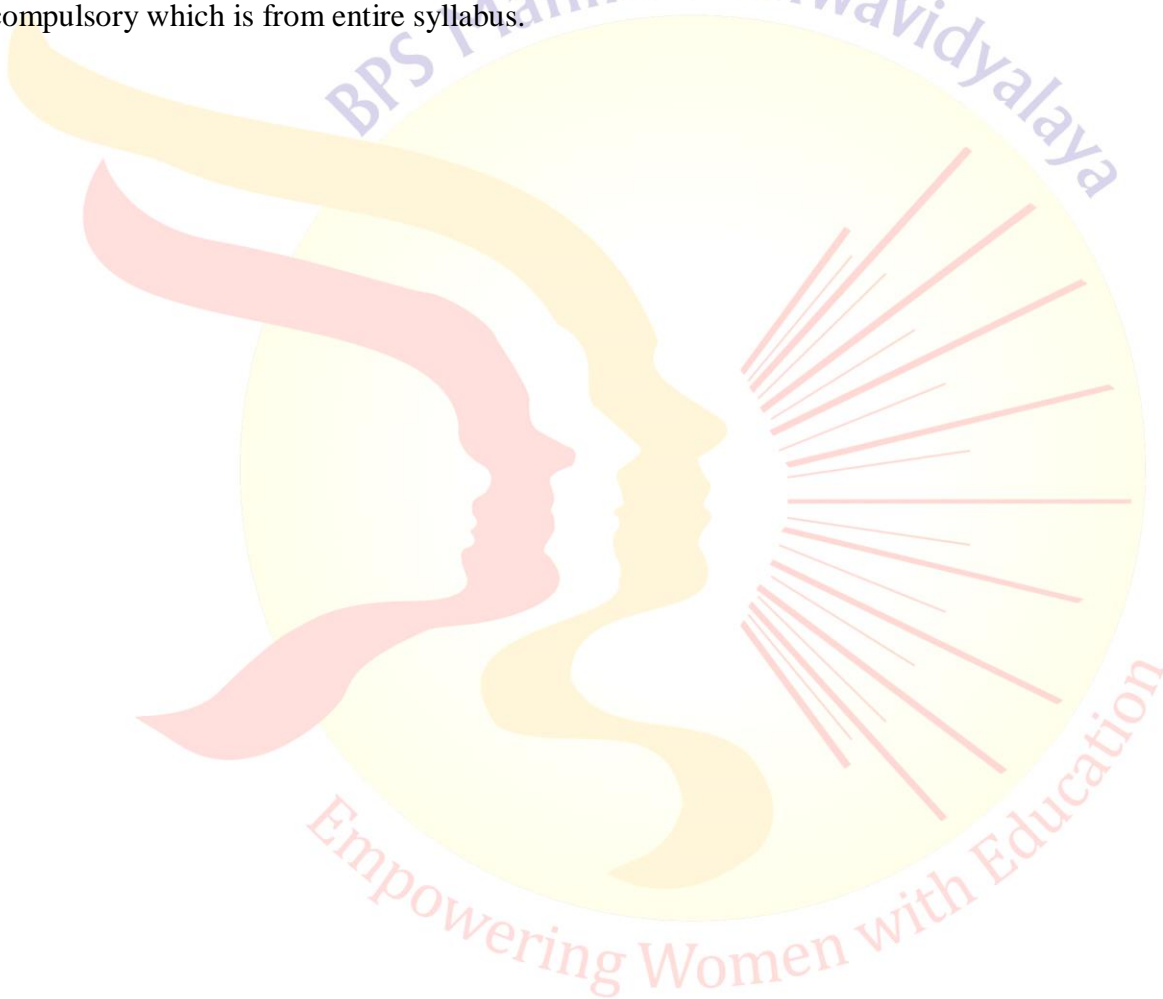
Data Structure and Applications

ESC- 233   **Total Credits: 3**
L T P   **Internal Marks: 20**
3 0 0   **External Marks: 80**
                                                        Total Marks: 100

Course Objective: The objective of this course is:
- To understand the programming and the various techniques for enhancing the programming skills for solving and getting efficient results.

Pre- requisites: NA

Course Outcomes: At the end of the course, students will be able to:
- Use different types of data structures, operations and algorithms
- Apply searching and sorting operations on files
- Use stack, Queue, Lists, Trees and Graphs in problem solving
- Implement all data structures in a high-level language for problem solving.

Contents

UNIT – I	10 Hours
Introduction to programming methodologies and design of algorithms. Abstract Data Type, array, array organization, sparse array. Stacks and Stack ADT, Stack Manipulation, Prefix, infix and postfix expressions, their inter-conversion and expression evaluation. Queues and Queue ADT, Queue manipulation. General Lists and List ADT, List manipulations,	
UNIT – II	**10 Hours**
Trees, Properties of Trees, Binary trees, Binary Tree traversal, Tree manipulation algorithms, Expression trees and their usage, binary search trees, AVL Trees, Heaps and their implementation.	
UNIT – III	**12 Hours**
Graph representation, Graph traversal. Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices.	
UNIT – IV	**12 Hours**
Sorting concept, order, stability, Selection sorts (straight, heap), insertion sort (Straight Insertion, Shell sort), Exchange Sort (Bubble, quicksort), Merge sort (only 2-way merge sort). Searching – List search, sequential search, binary search, hashing concepts, hashing methods (Direct, subtraction, modulo-division, midsquare, folding, pseudorandom hashing), collision resolution (by open addressing: linear probe, quadratic probe	
Suggested Text Books	
1.	R. F. Gilberg, and B. A. Forouzan, "Data structures: A Pseudocode approach with C", Thomson Learning. [T2] A .V. Aho, J .E .Hopcroft, J .D .Ulman "Data Structures and Algorithm", Pearson Education.
2.	R. F. Gilberg, and B. A. Forouzan, "Data structures: A Pseudocode approach with C", Thomson Learning. [T2] A .V. Aho, J .E .Hopcroft, J .D .Ulman "Data Structures and Algorithm", Pearson Education.
3.	S. Sahni and E. Horowitz, "Data Structures", Galgotia Publications
4.	A M Tenenbaum, Data Structures using C, PHI, 1989

`

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`

Financial Literacy

HSMC-231	**Total Credits: 3**
L T P	**Internal Marks: 20**
3 0 0	**External Marks: 80**
	Total Marks:100

Course Objective: The aim of this course is:
- To make the students aware of the benefits of financial planning.
- To develop a broad understanding of financial concepts and tools.
- To effectively communicate financial information.

Pre- requisites: None

Course Outcomes: At the end of the course, students will be able to:
- Provide in-depth knowledge of the banking and Principles of Investment, financial planning.
- Understand the fundamentals of a budget, including income, expenses, and savings.
- Help people from overspending and inculcates a habit of savings and investments.

Contents

UNIT – I	10 Hours
Financial Literacy: Introduction of Financial Literacy, Need for Financial Literacy, Role of financial education in achieving financial wellbeing, Define Financial Planning, Importance of Financial Planning, Financial Planning Process	
UNIT – II	**10 Hours**
Budgeting: Concepts of Budgeting, its importance, process and techniques. Three pillars of investments. Concepts of risk and return.	
UNIT – III	**12 Hours**
Savings: Types of bank accounts: Savings account, Current account, fixed deposits, recurring deposits. Do's and don'ts while using digital payments Role of Reserve Bank of India. Salient features of various Government Scheme	
UNIT – IV	**12 Hours**
Caution against Ponzi Schemes and unregistered Investment Advisers: Ponzi schemes and their broad characteristics. Various financial frauds: Investment frauds, Do's and don'ts while dealing with Investment Advisers. Grievance Redressal Agencies and the category of complaints they try to resolve.	
Suggested Text Books	
1.	A Textbook of Financial Education by S. K. Gupta & Vijay Gupta, Goyal Brothers Prakashan Paperback – 1 January 2017
2.	Indian financial System, by T. R. Jain and R. L .Sharma, VK Global Publisher
3.	Money and Banking by T. R. Jain and R. K. Kaundal, VK Global Publisher

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Corporate Social Responsibilities

HSMC-233
L T P
3 0 0

Total Credits: 3
Internal Marks: 20
External Marks: 80
Total Marks: 100

Course Objective: The aim of this course is:
- To familiarize the students with the understanding of issues and practices of corporate governance in the global and Indian context
- To gives the student an understanding of the political, social, and economic drivers behind Corporate Social Responsibility (CSR).

Pre- requisites: Have basic understanding of CSR

Course Outcomes:
- The course will support students to prepare themselves to work with corporate understanding collective aspiration of the society, individual and corporate social responsibility.
- The course will help students to understand corporate and emerging social responsibility for the corporate in reference to India and global situation.

Contents

Unit – I	10 Hours
Corporate Social Responsibility (CSR): Meaning and concept; corporate sustainability reporting; CSR and business ethics; environmental aspect of CSR; CSR models; drivers of CSR	
Unit – II	**10Hours**
Whistle blowing and Corporate Governance: The Concept of Whistle-Blowing; Types of Whistleblowers; Whistle-blower Policy; the Whistle-Blower Legislation across Countries; developments in India	
Unit – III	**12 Hours**
Conceptual Framework Of Corporate Governance: Evolution of corporate governance; developments in India; regulatory framework of corporate governance in India; SEBI guidelines and clause 49; reforms in the Companies Act; secretarial audit; class action; NCLT; insider trading; rating agencies; green governance/e-governance; shareholders' activism; corporate governance in PSUs and banks	
Unit – IV	**12 Hours**
Corporate Management: Management vs. Governance; internal constituents of the corporate governance; chairman- qualities of a chairman, powers, responsibilities and duties of a chairman; chief executive officer (CEO), role and responsibilities of the CEO; separation of roles of chairman and CEO; CFO; manager; company secretary; auditor	
Suggested Text Books	
1.	Rani, Geeta D., and R.K. Mishra, Corporate Governance-Theory and Practice, Excel Books, New Delhi
2.	Mallin, Christine A., Corporate Governance (Indian Edition), Oxford University Press, New Delhi
3.	Blowfield, Michael, and Alan Murray, Corporate Responsibility, Oxford University

	Press.
4.	Francesco Perrini, Stefano, and Antonio Tencati, Developing Corporate Social Responsibility A European Perspective, Edward Elgar

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Modeling and Simulation

BSC-233   **Total Credits: 3**
L T P   **Internal Marks: 20**
3 0 0   **External Marks: 80**
                                       Total Marks: 100

Course Objective:
- To understand the fundamental concept of system modelling and simulation.
- To understand the fundamental concept of telecommunication system modelling and simulation.
- To hands on software's for modeling and simulation

Pre- requisites: None

Course Outcomes:
- Grasping modeling concepts using mean value analysis with some information technology applications.
- Grasping how to build appropriate simulation models together with their parameterization and the analysis of simulator output data.

Contents

Unit – I	10 Hours
Introduction: Concept of Simulation, System, Model, Types of Model, Univariat & Multivariat Models, and Deterministic & Stochastic models, Continuous & Discreet Models, Analog & Digital Simulation, Real Time Simulation, Hybrid Simulation, Advantages & Limitations of Simulation, Steps in Simulation Study.	
Unit – II	**12 Hours**
Fundamental of Programming using Scientific Computing tool Mathematical Operations with Arrays, Function & Function Files, Nested Loops, 2 Dimensional & 3 Dimensional Plots **Arrays & Structures:** Strings, Cell Arrays, Nesting of Cell Arrays, Creation of Structure, Structure of Structures, Arrays of Structure, Conversion of Cell Arrays to Structure, Control Statement, Application of Computing tool in Electronics and Communication engineering	
Unit – III	**10 Hours**
Functions and GUI: Subfunctions, Function handler, Nested Functions, File Input Output Handling, Graphical User Interface (GUI), Components of GUI, Dialogue Box, File Dialogue Box, Graphics Features	
Unit – IV	**12 Hours**
Modeling of Dynamic System: Modeling of Dynamic System using various graphical programming tool, modeling of agricultural system, environmental system, electrical system, various communication system and application related to agricultural and rural development.	
Suggested Text Books	
1.	Contemporary Communication Systems using MATLAB, John G. Prokis, Masoud Salehi, Gerhard Bauch, Wadsworth Publishing Co Inc.
2.	MATAB Programming by Y. Kirani Singh, B.B. Choudhary, PHI
3.	System Simulation–by DS Hira by S.chand & company
4.	Discret Event System Simulation–by Banks, Carsen, Nelson, Persian Edu. Asia.

`

5.	Using MATLAB (User's Guide), Math Works Inc

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Engineering Economics and Management

HSMC-235
L T P
0 0 3

Total Credits: 3
Internal Marks: 20
External Marks: 80
Total Marks: 100

Course Objective:

- Examine the meaning, importance, nature of management, its difference between management and administration and role of managers in management.
- Examine the meaning characteristics principles and process of organizing.
- Describe effective communication process, its importance, types and purpose for running an organization.
- Explain the importance of engineering economics, Law of demand and supply in engineering decision making.

Pre- requisites: Basic understanding of Application of Economics and Management.

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

- Learn basic economics concept, laws and implications.
- Lean basic management concepts.
- Learn how production is done and will also get familiar with the basic concept of market and promotion of product.

Contents

Unit – I	14 Hours
Definition of Economics, Role of economics in Science, Engineering and Technology, circular flow of economic activity, Production possibility curve Economic laws and their nature, Globalization, Privatization, Liberalization. Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance	
Unit – II	**10 Hours**
Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand, the indifference curve theory, consumers surplus	
Unit – III	**15 Hours**
Definition of Management, Characteristics of Management, Management Vs Administration, Art, Science and Profession, Importance of Management, Principles of Management, the Management Functions, Inter-Relationship of Managerial Functions. Nature And Significance of Staffing, Manpower Planning, Process of Manpower Planning, Recruitment, Selection, Promotion- Seniority Vs. Merit, Objective Training and its Type.	
Unit – IV	**15 Hours**
Production Management: definition, objective, functions, and scope, production planning and control: its significance, stages in production planning and control, brief introduction to the concept of material management, inventory control, its importance and various methods. Marketing Information System, Marketing Management, objective and functions of marketing,	

STP concept. Marketing Research- definition, objectives, importance, limitation and process Advertisement-definition, objective, function, criticism.	
Suggested Text Books	
1.	Principles of Economics: P.N. Chopra; Kalyani Publishers
2.	Economics for Engineers 1st Edition ,V. K. Ohri, T. R. Jain, O. P. Khanna English, Paperback
3.	Fundamentals of Management: Goya Alok, Publisher: V k Global Publications
4.	Modern Economic Theory– K.K. Dewett ; publisher S. Chand
5.	Engineering Economics & Management, by Vilas Kulkarni & Hardik Bhavishi,Vikas Publishing

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`
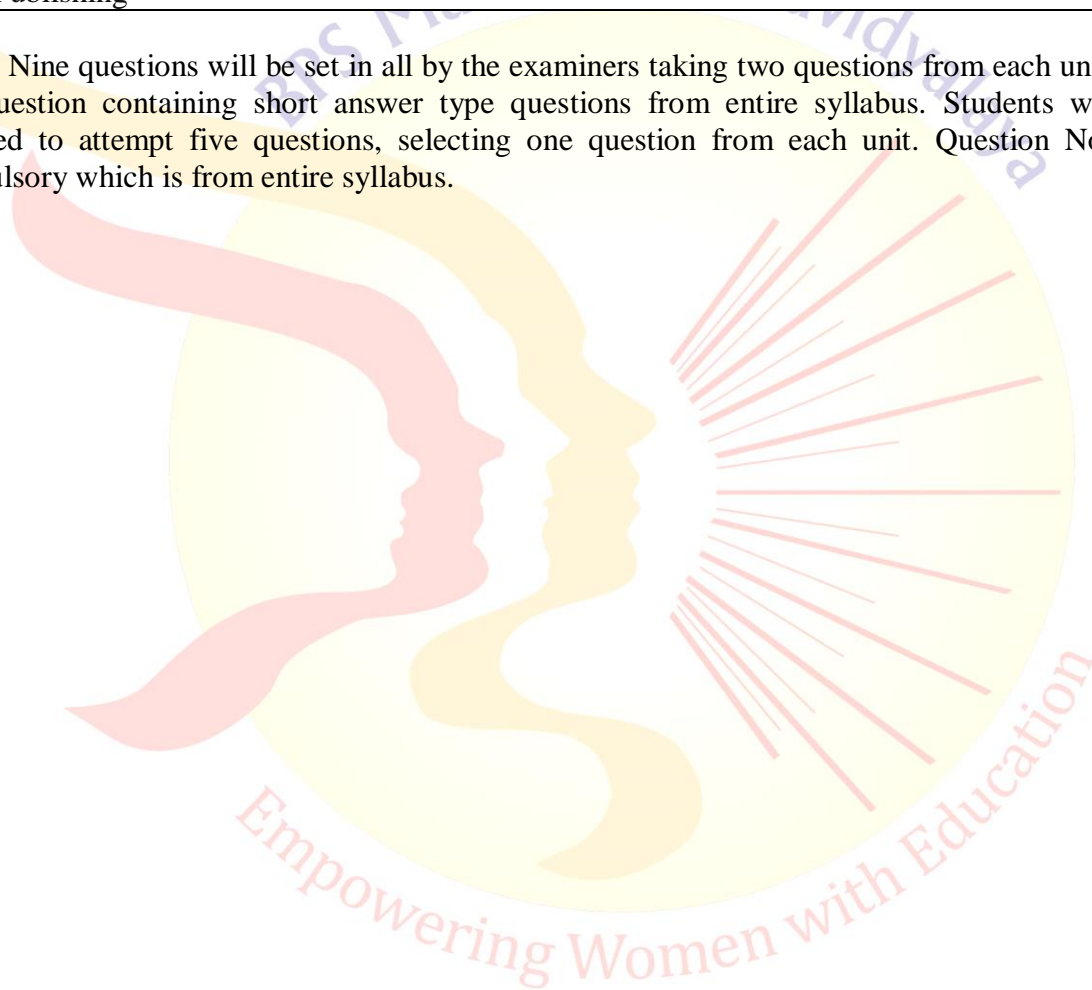
Natural Disaster Management

BSC-235   **Total Credits: 3**
L T P   **Internal Marks: 20**
0 0 3   **External Marks: 80**
                                                                  Total Marks: 100

Course Objective:
- To develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- To understand the strengths and weaknesses of disaster management approaches,
- Planning and programming in different countries, particularly their home country.

Pre- requisites: Fundamental concepts of hazards and disaster management.

**Course Outcomes:** At the end of the course, students will be able to:
- Differentiate the types of disasters, causes and their impact on the environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Analyse the Disaster Preparedness and Disaster Mitigation
- Implement disaster management techniques in garment industry.

<div align="center">Contents</div>

UNIT – I	12 Hours
Introduction: Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude. Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts	
UNIT – II	**10 Hours**
Disaster Prone Areas In India: Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides And Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to sunami; Post-Disaster Diseases and Epidemics.	
UNIT – III	**12 Hours**
Risk Assessment: Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival. Disaster Mitigation;-Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	
UNIT – IV	**12 Hours**
Disaster Preparedness And Management: Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and other Agencies, Media Reports: Governmental and Community Preparedness. Disaster management and risk reduction in garment industry	

`

	Suggested Text Books
1.	Singhal J.P. Disaster Management, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2.	Pardeep Sahni, Madhavi malalgoda and ariyabandu, "Disaster risk reduction in south Asia", PHI
3.	Amita sinvhal, "Understanding earthquake disasters" TMH, 2010.
4.	Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`
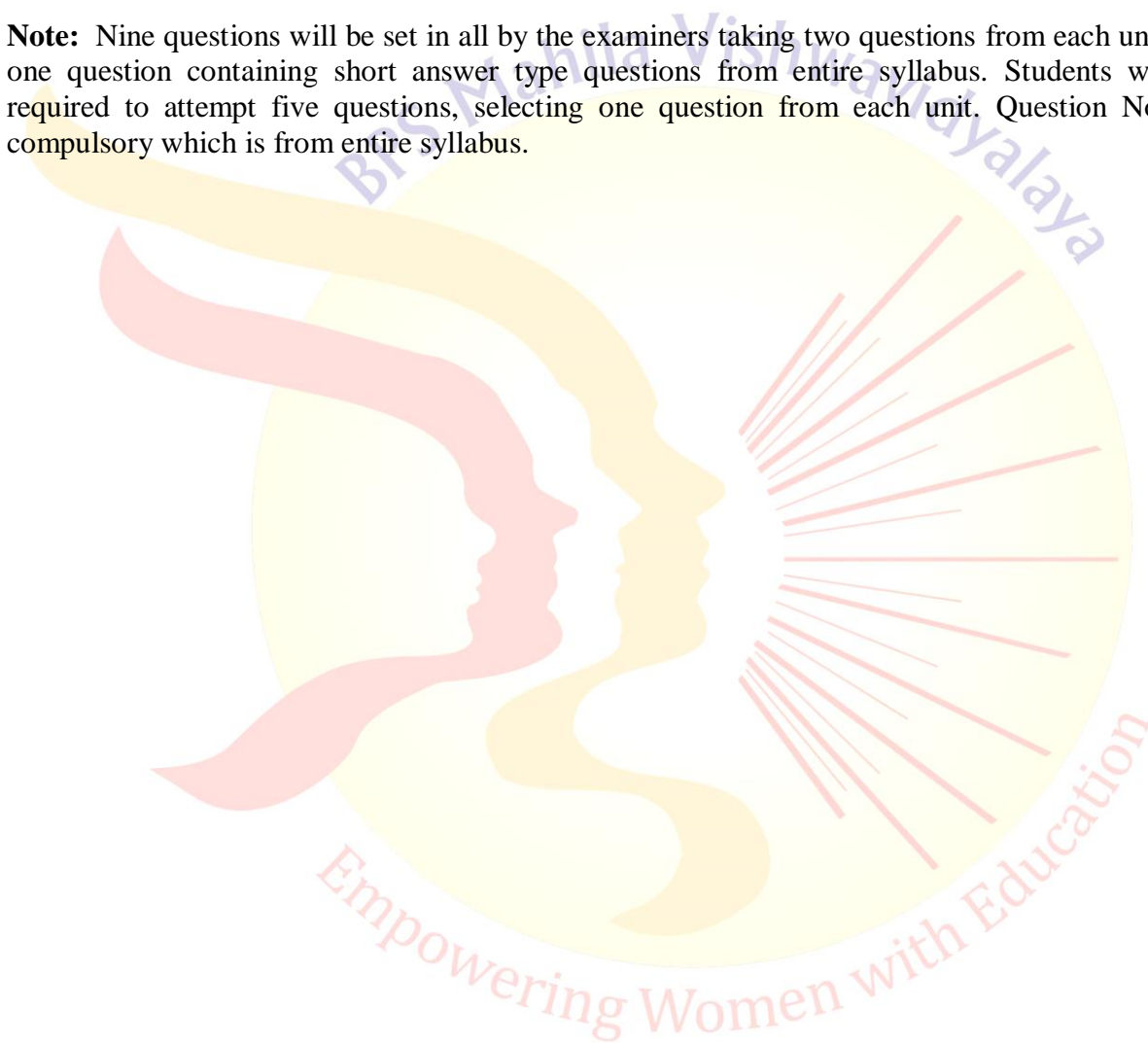
Renewable Energy Sources

ESC-237
L T P
0 0 3

Total Credits: 3
Internal Marks: 20
External Marks: 80
Total Marks: 100

Course Objective: The basic objective of this course is to:
- Understand the design and analysis of various non-conventional energy resources.
- Understand the fundamental concepts and techniques used for energy conversion and integration of various sources to grid.

Pre-requisite: Basic concept of circuit theory, Power electronics, Power systems.

Course Outcomes: At the end of the course, students will be able to:
- Understand the generation of electrical energy from various renewable energy resources.
- Understand the need of renewable energy resources.
- Understand the application and utility of energy from renewable energy sources.

Contents

UNIT- I	9 Hours
Introduction: Basics of energy, conventional energy sources, fossil fuels limitations, renewable energy sources, advantages and limitations, global energy scenario, energy scenario of India, Recent technological development.	
UNIT- II	**10 Hours**
Solar Energy: Theory of solar cells, solar cell materials, I-V characteristics of solar cell, PV module and PV array, MPPT, PV systems, Stand alone and grid connected PV systems, applications, solar radiation, flat plate collectors and their materials, applications and performance, solar thermal power plants.	
UNIT- III	**10 Hours**
Wind Energy: Wind power and its sources, Types of wind power plants, Types of wind turbine generator units, Site selection, Merits and demerits of wind power generation. **Biomass Energy:** Availability of bio-mass and its conversion theory. **Thermo-electrical and Thermionic Conversions:** Working, Performance and limitations.	
UNIT- IV	**10 Hours**
Various Types of Energy Sources: Overview and application of hydro, geothermal energy, Ocean Wave and Tidal Wave energy **Energy Management System:** Energy Management system, Energy Audit, Energy crises, Energy planning, Energy exploited and energy demand, Energy demand management.	
Suggested Text Books	
1.	Raja et al, "Introduction to Non-Conventional Energy Resources" Scitech Publications.
2.	B.H Khan, "Non-Conventional Energy Resources" Tata McGraw-Hill Education.
3.	H.P. Garg & Jai Prakash "Solar Energy: Fundamentals and Applications",Tata McGraw Hill
4.	D.S. Chauhan, "Non-Conventional Energy Resources", New Age International.
5.	S.Hasan Saeed and D.K.Sharma, "Non- Conventional Energy Resources" S.K.Kataria & Sons.
6.	C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI

`

	Learning.
7.	Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.
8.	G. D. Rai, Non Conventional Energy Resources, Dhanpat Rai, India, 2006
9.	D. P. Kothari, Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, PHI, India.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`

Public Policy and Governance

HSMC-239
L T P
3 0 0

Total Credits:3
Internal Marks: 20
External Marks: 80
Total Marks:100

Course Objective:
- To understand the importance of concepts in Public Policy.
- To familiarize the students with the basic ideas, thoughts and theories in Policy making
- Enable the students to develop qualities of responsible and active citizenry in a democracy.

Pre- requisites: None

Course Outcomes: At the end of the course, students will be able to:
- Public Policy, theoretically and will gain knowledge to explain and analyse Policy at large context.
- The dynamics of public policy process.
- To inculcate critical outlook towards policy making process.

Contents

UNIT – I	10 Hours
Public policy- Meaning, nature and scope Evolution of Public Policy as a discipline, Types of Public Policy, Basis of Policy making, Significance and reasons for the study of Public Policy	
UNIT – II	**10Hours**
Role of institutions/ official policy makers in policy making- role and reality : Legislature Executive Bureaucracy Judiciary, Challenges in Policy Formulation	
UNIT – III	**12 Hours**
Concept of Government & Governance Differentiate Government and Governance, Concept of Governance and its features	
UNIT – IV	**14 Hours**
Ethical Foundations of Governance Morale, Ethics and Professions standard in public services, E- Governance Issues and Challenges, Measuring Governance Agencies UNDP Human Development Report: HDI	
Suggested Text Books	
1.	Bhatnagar S.C (2004) E- Government From vision to Implementation: A practical guide with case studies, Sage publications New Delhi
2.	Stella Theodoulou and Mathew Cahn – Public Policy The essential readings, Pearson Publication
3.	Ram Ahuja- Society in India: concepts: Theories and Recent Trends, Rawat Publications

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`

Vedic Mathematics and Data Interpretation

BSC-237	**Total Credits: 3**
L T P	**Internal Marks: 20**
3 0 0	**Total Marks: 80**
	Total Marks:100

Course Objective:

- To enable the learners to explore the power of Vedic Mathematics in Electronics and Communication Engineering.
- To make learners foundation strong in numerical computation.
- To enable learners to recognize and understand simple techniques of arithmetic calculations.
- To train learners to use the ideas of Vedic Mathematics in daily calculations, competitive examinations to saves precious and make those calculations with accuracy and speed.

Pre-requisite: None

**Course Outcomes:** By successfully completing this course, the learner will be able to:

- Understand the power of Vedic Mathematics in Electronics and Communication Engineering
- Enable students to the analyze power of Vedic Mathematics in performing difficult calculations, speedily disposal of numerical aptitude of Competitive Examination *viz.* GATE, CGL, banking sector etc confidently with speed and accuracy.
- Will be able to generate tables of any number.
- To perform products of large numbers quickly.
- Develop confidence in calculating square roots and cube roots of integers.

Contents

UNIT-I	8 Hours
Brief History and evolution of Vedic Mathematics, Vedic Maths Formulae, Vedic Maths–16 sutras, Vedic Maths–13 sub-sutras, Application of Vedic mathematics in Electronics and communication Engineering.	
UNIT-II	**12 Hours**
Introduction of Basic Vedic Mathematics Techniques in Multiplication (Special Case, Series of 9, Series of 1 etc), Tables etc., Comparison of standard methods with Vedic Methods. Various techniques to carry out basic operations covering Addition, Subtraction, Multiplication, Division, Complements and Bases, Vinculum number, General multiplication (Vertically Crosswise). Multiplications by numbers near base, Verifying answers by use of digital roots, Divisibility tests, Division of numbers near base, Comparison of fractions.	
UNIT-III	**10 Hours**
Applications of Vinculum, Different methods of Squares, Cubes, Cube roots, Square roots, General division, Quadratic Equations, Simultaneous Equations, Use of various Vedic Techniques for answering numerical aptitude questions from Competitive Examinations.	
UNIT-IV	**10 Hours**
Data Interpretation: data graphs (bar graphs, pie charts and other graphs representing data), 2 and 3- dimensional plots, maps and tables. Tables, Venn diagrams and other forms of visualization, Application of data interpretation.	
Suggested Text Books:	
1.	Bhatiya Dhaval, Vedic Mathematics Made Easy, Jaico Publishing House
2.	Thakur Rajesh Kumar, Vedic Mathematics for students taking Competitive Examinations.

	Unicorn Books 2015 or Later Edition
3.	Gupta Atul, Power of Vedic Mathematics with Trigonometry, Jaico Books
4.	V. G. Unkalkar, Magical World of Mathematics (Vedic Mathematics), Vandana Publishers, Bangalore.
5.	Data Interpretation & Data Sufficiency for CAT & Other MBA Exams 2nd Edition By Gajendra Kumar, Abhishek Banerjee · 2019
6.	Logical Reasoning and Data Interpretation for the CAT By Sinha Nishit K. · 2016
7.	New Pattern Data Analysis & Interpretation for SBI/ IBPS Bank PO/ SO/ Clerk/ RRB/ SSC Exams 2nd Edition By Disha Publication · 2019
8.	Data Interpretation: Practice Book for the CAT and Other MBA Entrance Examinations By Nishit Sinha

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.
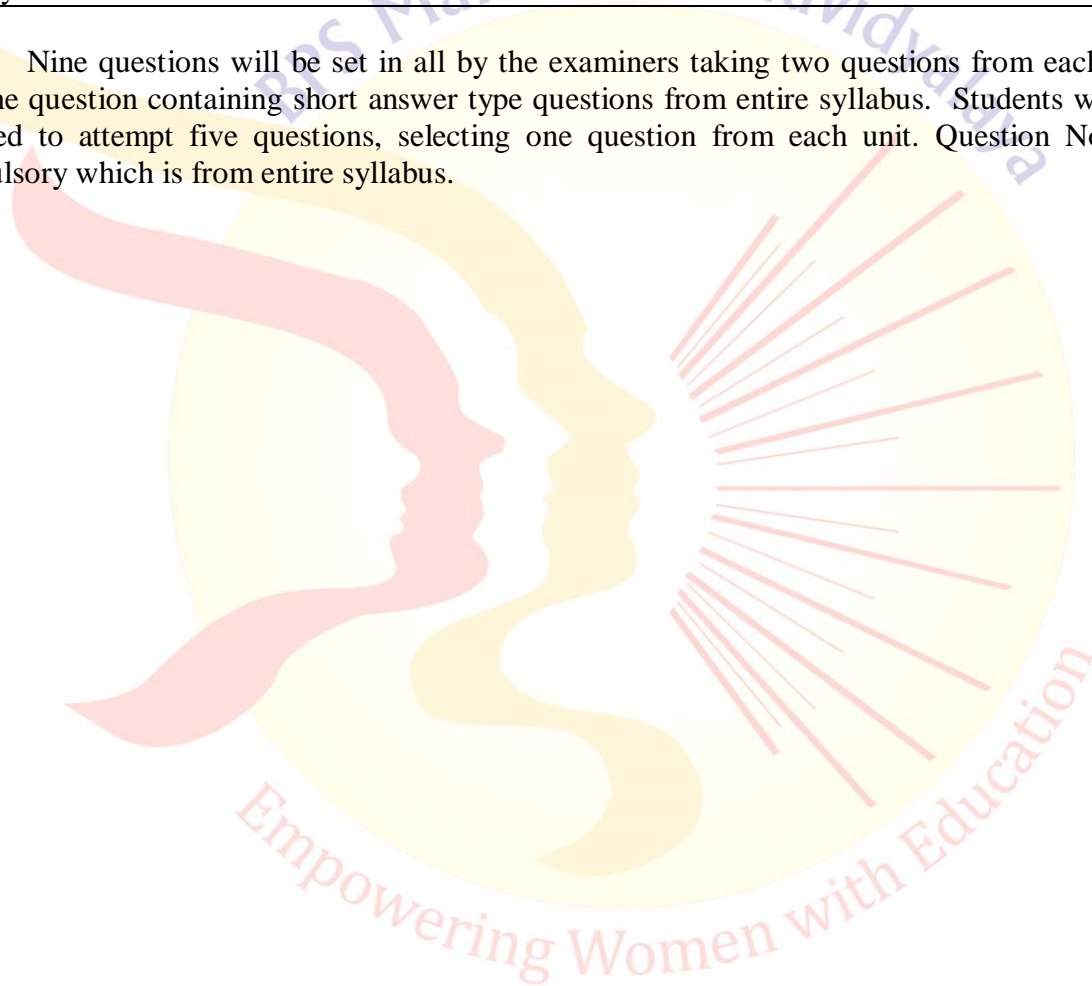
Constitution of India

MCL-231   **Total Credits: 3**
L T P   **Internal Marks: 20**
3 0 0   **External Marks: 80**
                                                                        Total Marks:100

Course objective: The objective of this course is:
- The objective of this course is to understand basic feature of the Indian constitutional Law.

Pre-requisite: NA.

Course Outcomes: At the end of the course, students will be able to:
- The external theory examination shall carry eighty marks only.
- The whole syllabus is divided into four units. the question paper shall consists of two parts namely Part-A and B. Part-A shall be mandatory which shall carry eight short answered questions of two marks each from each unit. Part-B consists of four units and each unit shall carry two long answered questions of sixteen marks each and a candidate shall answer four questions selecting one question from each unit.

Contents

Unit – I	12 Hours
Constitution: Definition and classifications. Its sources, Constitutional conventions, Constitutional Law, rule of Law. Federalism and its classifications, Separation of Powers Citizenship, Fundamental Rights and Directive Principles of State Policy.	
Unit – II	**10 Hours**
Constitutional Organs: Parliaments, Executive and Judiciary. Their interns' relations.	
Unit – III	**10 Hours**
Center – State Relations: Legislative, Financial and Administrative.	
Unit – IV	**10 Hours**
Breakdown of Constitutional Machinery in a State, Emergency Provisions, Amendment of Constitutions, Doctrine of Basic Structure	
Suggested Text Books	
1. V.N Shukla constitutions of India Publisher- Eastern Book Company	
2. M.P Jain, Indian Constitutional law, **Publisher-** Lexi Nexis	
3. D.D Basu, Constitutional law of India, **Publisher-** Lexi Nexis	

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

`

Electronics Devices Lab

ECP-231	**Total Credits: 1**
L T P	**Internal Marks: 10**
0 0 2	**Internal Marks: 40**
	Total Marks: 50

Course Objective: The objective of this course is:
- To give students deep knowledge in Core Electronic components and their specifications and creates interest in Hardware Technology.
- To enhance the knowledge of component applications in Hardware.
- To understand the basic concept of Layout Creation.
- To understand Auto routing.

Pre-requisite: Basic knowledge of Electrical Engineering

Laboratory Outcomes: At the end of the course, students will be able to:
- Understand the characteristics of diodes, transistors, JFETs, and op-amps.
- Understand the operation and characteristics of different configurations of BJT.
- Understand the operation and characteristics of different special semiconductor devices.
- Design complex electronic circuits with fewer devices.

List of Experiments

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

Suggested Text Books	
1.	Paul B Zbar and Alber P Malvino, Michael A Miller, "Basic Electronics: A Text Lab Manual", 7th edition, Tata McGraw Hill, 2009
2.	David A Bell, "Laboratory Manual for Electronic Devices and Circuits", 4th edition, PHI, 2001.
3.	Muhammed H Rashid, "SPICE for circuits and electronics using PSPICE", 2nd edition, PHI, 1995
4.	Mithal. G.K, "Practicals in Basic Electronics", G K Publishers Private Limited, 1997
5.	Maheswari. L.K and Anand.M.M.S, "Laboratory Manual for Introductory Electronic

	Experiments",New Age, 2010
6.	Poornachandra Rao.S and Sasikala.B, "Handbook of Experiments in Electronics and Communication Engineering", Vikas publishers, 2003

Note: At least 10 experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus .

`

Digital Electronics Lab

ECP-233
L T P
0 0 2

Total Credits: 1
Internal Marks: 10
External Marks: 40
Total Marks: 50

Course Objective: The aim of this course is to:
- To analyze basic discrete circuits.
- To Understand and evaluate Adder, Subtractor, MUX and DEMUX Operations.
- To analyse the performance of sequential circuits.

Pre-requisite: Basic understanding of Logic Gates and Boolean Algebra.

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

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 subtractor and Full subtractor.
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 flop.
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.
Suggested Text 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.

Note: At least 10 experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may

`

either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

Electronics Project Workshop-I

ECP-235
L T P
0 0 2

<div align="right">

Total Credits: 1
Internal Marks: 10
External Marks: 40
Total Marks: 50

</div>

Course Objective: The aim of this course is to:
- To familiarize the students with electronics components.
- To introduce various tools for designing of PCB.

Pre-requisite: None

Course Outcomes: At the end of the course, students will be able to:
- Implement the basic analog and digital circuits using various components.
- Design, analyze and troubleshoot broad range of electronics components.
- PCB Designing for Electronics Circuits using Software and using hardware components in PCB design lab.

List of Experiments

1.	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. (Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
2.	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Dia or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
3.	Familiarization/Application of testing instruments and commonly used tools. (Multimeter, Function generator, Power supply, DSO etc.) (Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.)
4.	Testing of electronic components (Resistor, Capacitor, Diode, Transistor and JFET using multimeter.)
5.	Inter-connection methods and soldering practice. (Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.)
6.	To study single sided PCB designing and component mounting.
7.	A project related to the implementation of an application based electronic circuit covering the scope above workshop.

Note: Each student will individually carry out a project related to the implementation of an application based electronic and communication circuit covering the scope of above workshop. At least 10 experiments are to be performed by students in the semester from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

Quantitative Aptitude

BSC-233   **Total Credits: 0**
L T P   **Internal Marks: 10**
2 0 0   **External Marks: 40**
                                                                               Total Marks: 50

Course Objective:
This course is aimed and designed to provide the right knowledge, appropriate skill and aptitude to outgoing students to face any competitive examination and to succeed in preliminary selection process for recruitment in campus interviews and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning.

Pre-requisite: None

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

- Understand the basic concepts of quantitative ability to solve quantitative aptitude problems, puzzle, and related questions from competitive examination.
- Acquire satisfactory competency, grasp the approaches and strategies to solve problems with speed and accuracy in use of quantitative and arithmetic reasoning aptitude.
- Apply logical thinking and analytical abilities to solve quantitative aptitude questions from company specific and other competitive tests.
- Solve campus placements aptitude papers covering quantitative ability and arithmetic reasoning.
- Apply reasoning ability to compete in various competitive exams like GATE, CAT, CMAT, GRE, UPSC, GPSC etc.

Contents

Unit-I	10 Hours
Number system, number of unit digit, number of zeros, square root and cube root, remainder concept, identities, Fraction and decimals, Indices and surds, Problem on ages and numbers, Profit loss and discount, Simple and compound interest, share, growth and depreciation.	
Unit-II	**10 Hours**
Numerical Computation and Estimation: Ratio, percentage, powers, exponents, and logarithms, permutation and combination and series, Allegation and mixture.	
Unit-III	**10 Hours**
Time, work and wages, Pipes and cisterns, Time and distance, Trains, Boats and streams, Races, Clocks, Calendar.	
Unit-IV	**14 Hours**
Menstruation and Geometry: Area, Volume and surface area of solid figures. Elementary statistics and Probability. Data Interpretation: data graphs (bar graphs, pie charts and other graphs representing data), 2 and 3- dimensional plots, maps and tables. Tables, Venn diagrams and other forms of visualization, Application of data interpretation.	
References/ Text Books:	
1.	Dinesh Khattar, Quantitative Aptitude for competitive examinations, Pearson Guide.
2.	Nishit K Sinha, Quantitative Aptitude and data Interpretation for the CAT, Pearson Guide.
3.	R S Agarwal, Quantitative Aptitude for competitive examinations, S. Chand & Company

	Limited 2011.
4.	Abhijit Guha, Quantitative aptitude for competitive examinations, Tata McGraw Hill, 3rd Edition, 2011.
5.	Arun Sharma-Quantitative aptitude for CAT, Tata McGraw Hill.
6.	Edgar Thrope, Test of Reasoning for Competitive Examinations, Tata McGraw Hill, 4th Edition, 2012.
7.	R S Agarwal, A modern approach to non-verbal reasoning, S. Chand & Company Limited 2011.
Web Resources	
1.	www.indiabix.com
2.	www.lofoya.com
3.	https://prepinsta.com/
4.	https://www.javatpoint.com/
5.	www.careerbless.com
6.	www.achieversforce.com

NOTE: The evaluation of the course Quantitative Aptitude is carried out throughout the semester in the analogy of internal assessment. The continuous assessment may be done at the Departmental level.