PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Theory		
		L	T	P	Externals (70)	Internals (30)	Total (100)
Engineering Mathematics-II	BT-301	3	1	-	Min: 28 (D Grade)	Min: Nil	Min: 40 (D Grade)

Duration of Theory (Externals): 3 Hours
Theory Internal - Max Marks: 30

Best of Two Mid Semester Test –Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Unit	Contents (Theory)
I	**FOURIER SERIES:** Introduction of Fourier series, Fourier series for Discontinues Functions, Fourier series for even and odd function, half range series and method of Least Squares.
II	**LAPLACE TRANSFORMATIONS :** Introduction of Laplace Transform of elementary functions, Properties of Laplce transform ,Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform and its properties, Convolution theorem and Applications of Laplace Transformation to solve the ordinary differential equations
III	**SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS with VARIABLE COEFFICIENTS:** Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method.
IV	**LINEAR & NON – LINEAR DIFFERENTIAL EQUATIONS of FIRST ORDER :** Formulation of partial differential equations, solution of equation by direct integration, lagrange's Linear equation, charpit's method, Linear partial differential equation of second and higher order, Linear homogeneous and Non-homogeneous partial differential equation of nth order with constant coefficients.
V	**VECTOR CALCULUS :** Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, Unit Normal vector and directional derivative, physical interpretation of divergence and curl, line integral, surface integral and volume integral, Green's Stroke's and gauss divergence theorem.

TEXT BOOKS:

1. D.C. Aggarwal "Engg. Mathematics – 2"
2. Higher Engineering Mathematics by BS Grewal, Khanna Publication
3. Mathematics for Engineers by S.Arumungam, SCITECH Publications

REFERENCES:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Advance Engineering Mathematics by D.G.Guffy
3. Engineering Mathematics by S S Sastri. P.H.I.
4. Advanced Engineering Mathematics by Peter V.O'Neil, Thomson Learning
5. Higher Engineering Mathematics by John Bird, Elsevier

PEOPLES UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Theory		
		L	T	P			Total (100)
Computer System Organization	ECT-302	3	1	0	Externals (70)	Internals (30)	Min: 40 (D Grade)

Duration of Theory (Externals): 3 Hours
Theory Internal - Max Marks: 30

Best of Two Mid Semester Test – Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Unit	Contents (Theory)
I	**Computer Basics and CPU**: Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer. 8085 microprocessor organization
II	**Control Unit Organization**: Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming, **Arithmetic and Logic Unit**: Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.
III	**Input Output Organization**: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor, 8085 I/O structure, 8085 instruction set and basic programming. Data transfer – Serial / parallel, synchronous/asynchronous, simplex/half duplex and full duplex.
IV	**Memory organization**: Memory Maps, Memory Hierarchy, Cache Memory - Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.
V	**Multiprocessors**: Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.

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References:

1. Morris Mano: Computer System Architecture, PHI.
2. Gaonkar: Microprocessor Architecture, Programming, Applications with 8085; Penram Int.
3. William Stallings: Computer Organization and Architecture, PHI
4. Carter; Computer Architecture (Schaum); TMH
5. Tanenbaum: Structured Computer Organization, Pearson Education

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Electronic Devices	ECT-303	3	1	2			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test –Max Marks: 20

Assignment / Quiz – Max. Marks: 10

Practical Internal - Max Marks: 15

Lab work & Sessional –Max Marks: 10

Assignment / Quiz – Max. Marks: 05

Unit	Contents (Theory)
I	**Semiconductor** intrinsic and extrinsic, p-type and n-type, energy band diagrams, majority and minority carrier, charge density in semiconductor, generation and recombination of charges, process of diffusion, diffusion and drift currents, Hall effects and its applications. p-n junction, depletion layer, potential barrier, electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-I characteristics, cut in voltages of Si and Ge diode, transition and diffusion capacitance, power dissipation, p-n junction diode as rectifier, clipper and clamper.
II	**Optoelectronic and miscellaneous devices**: Characteristics, Equivalent Models and applications of Zener diode, Varactor diode, Schottky diode, Tunnel Diode, PIN diode, LED, photoconductor cells, photodiodes, solar cell, phototransistors, opto-couplers, thermistors, Seven segment displays.
III	**Bipolar junction transistor** – Construction, basic operation, current components, and equation. CB, CE and CC-configuration, input and output characteristics, Equivalent Model, Early effect, region of operation-active, cutoff and saturation region, Ebers-Moll model, power dissipation in transistor (Pdmax rating), Uni-junction Transistor (UJT) : Principle of operation, characteristics and Equivalent Model.
IV	**FET construction**- Construction, n channel and p channel, characteristics, parameters, equivalent model and voltage gain, Enhancement and depletion MOSFET and its characteristics, analysis of FET in various configuration and Equivalent Model.
V	**Thyristor Family**- Silicon Controlled Rectifier, V-I Characteristics, Equivalent Model, Transistor Analogy, Turn-On and Turn-Off Mechanism, Series and Parallel Combination of SCR, Protection Circuits. Introduction to Diac, Triac, Power MOSFET, IGBT and GTO.

References:

1. Boylestad and Nashelsky : Electronic Devices and Circuit Theory, Pearson Education
2. Millman and Halkias : Integrated electronics, TMH
3. Graham Bell : Electronic Devices and Circuits , PHI
4. Sendra and Smith : Microelectronics, Oxford Press.
5. Streetman : Electronic Devices, Pearson Education.
6. Neamen Donald : Electronic Circuits Analysis and Design, TMH

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PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Name of Practical Experiments
1. To Study the V-I Characteristics of Silicon Diode 2. To Study the V-I Characteristics of Germanium Diode 3. To Study the V-I Characteristics of Zener Diode 4. To Study the V-I Characteristics of Light Emitting Diode (LED) 5. To Study the V-I Characteristics of Tunnel Diode 6. To Study the V-I Characteristics of Photo Diode 7. To Study the V-I Characteristics of BJT 8. To Study the V-I Characteristics of MOSFET 9. To Study the V-I Characteristics of JFET 10. To Study the V-I Characteristics of Power Electronic Devices
Procedure for performing the Practical Experiments
All experiments (wherever applicable) should be performed through trainer kit of Electronic Devices.

PEOPLE'S UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Electronic Instrumentation	ECT-304	3	1	2			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test – Max Marks: 20

Assignment / Quiz – Max. Marks: 10

Practical Internal - Max Marks: 15

Lab work & Sessional –Max Marks: 10

Assignment / Quiz – Max. Marks: 05

Unit	Contents (Theory)
I	**Measurement and Error**, Accuracy and Precision, Sensitivity, Linearity, Resolution, Hysterisis, Loading Effect. Measurements of Current, Voltage, Power and Impedance: DC and AC Ammeter, DC Voltmeter-Chopper type and solid-state, AC voltmeter using Rectifier, Average, RMS, Peak Responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.)
II	**Cathode Ray Oscilloscope (CRO):** Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration, Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs-Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital) Oscilloscope. Different electronic component testing with CRO.
III	**AC Bridges**: Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge, Wagner earth detector, Impedance measurement by Q-meter. **Non-Electrical Quantities (Transducer):** Classification of Transducers, Strain gauge, Displacement Transducer- Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer- Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor, Nuclear Radiation Detector.
IV	**Wave Analyzer** (Frequency selective and Heterodyne), Harmonic Distortion Analyzer, Spectrum Analyzer, Network Analyzer, Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator.
V	**Digital Measurement and Instruments**: Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, Weighted converter using Op-amp and transistor, Practical DAC. Analog-to-digital Conversion (ADC) -Ramp Technique, Dual Slope Integrating Type, Integrating Type (voltage to frequency), Successive Approximations, digital voltmeters and multi-meters, Resolution and sensitivity of digital meter, PLC structure, principal of operation, response time and application.

References:

1. H. S. Kalsi : Electronics Instrumentation, TMH.
2. A.K. Sawhney : Instrumentation and Measurements, Dhanpat Rai and Co.
3. Helfric and Cooper: Modern Electronic Instrumentation and Measurement Techniques; Pearson.

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PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Name of Practical Experiments
1. Study of CRO and Function Generator. 2. To Measure Phase difference between LVDT secondary winding. 3. To study input output Characteristics of LVDT 4. To Study the linear range of operation of LVDT 5. To Determine sensitivity of LVDT 6. To measure the value of unknown capacitance with the help of Schering bridge 7. To measure the value of unknown inductance with the help of Anderson bridge 8. To Study the operation of Maxwell's capacitance bridge and to measure the value of unknown inductance and Q factor. 9. To Measure the value of unknown resistance using Wheatstone bridge 10. Force measurement by strain gauge.
Procedure for performing the Practical Experiments
All the experiments will be performed on Instrumentation Trainer Kits and Circuits.

PEOPLE'S UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Network Analysis	BT-325	3	1	2			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test – Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Practical Internal - Max Marks: 15

Lab work & Sessional –Max Marks: 10
Assignment / Quiz – Max. Marks: 05

Unit	Contents (Theory)
I	Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis :- Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis- Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.
II	Network Theorems for AC & DC circuits- Thevenins & Norton's, Superposition's, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.
III	Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain.
IV	Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.
V	Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port network.

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References:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
3. Mithal GK; Network Analysis; Khanna Publisher
3. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH
4. Roy Choudhary D; Network and systems; New Age Pub
5. Chakraborti :Circuit theory: Dhanpat Rai

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Name of Practical Experiments
1. To verify Thevenin Theorem 2. To verify Superposition Theorem 3. To verify Reciprocity Theorem 4. To verify Maximum Power Transfer Theorem 5. To verify Millman's Theorem 6. To determine Open Circuit parameters of a Two Port Network 7. To determine Short Circuit parameters of a Two Port Network 8. To determine A,B,C,D parameters of a Two Port Network 9. To determine h parameters of a Two Port Network. 10. To find frequency Response of RLC Series Circuit.
Procedure for performing the Practical Experiments
All experiments (wherever applicable) should be performed through the following steps. **Step 1**: Circuit should be designed/ drafted on paper. **Step 2**: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Lab view/ CIRCUIT MAKER). **Step 3**: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4**: The bread board circuit should be fabricated on PCB prepared on PCB machine.

PEOPLE'S UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Practical		
		L	T	P	Externals (30)	Internals (20)	Total (50)
C++ Programming	BT-306	-	-	2			Min: 20 (D Grade)

Practical External - Max Marks: 30
Practical Internal - Max Marks: 20

Lab work & Sessional – Max Marks: 10
Assignment / Quiz – Max. Marks: 10

Contents
C++ Basics: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Strings, Structures, conditional statement, control structure, switch-case, break, go to statements.
OOPS : Introduction to OOPS, differences Between OOP and Procedure Oriented Programming, Overview of OOP principles.
FUNCTIONS & CLASSES : Functions: Scope of variables, Parameter passing, Default arguments, inline function, Recursive function, Dynamic memory allocation and reallocation, operators-new and delete, Preprocessor directives, **Classes:** Class Definition, Class Structure, Class Scope, object, Friends to a class, Static class members, Constructors and Destructors, Dynamic creation and destruction of objects, Data Abstraction.
INHERITANCE: Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class member.
POLYMORPHISM : Function overloading, Operator Overloading , Virtual Function Polymorphism: Static and Dynamic binding, Base and Derived class virtual functions, Pure virtual functions, Abstract classes, C++ Exception Handling and File Handling, Comparison of C++ with C, Java and C#.

REFERENCES:

1."Object Oriented programming with C++", E. Balaguruswamy, TMH, 2001
2. Let us C++ by Yashwant Kanitkar
3. "Object Oriented Programming with C++", Radha Ganesan**,** Scitech Publication PVT.LTD. Chennai
4. ERIC NAGLER "Learning C++" JAICO Pub.

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PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Name of Practical Experiments
1. Program to print any message. 2. Program for conditional statement, loping statement and switch case. 3. Program to implement arrays, strings and pointers. 4. Program to implement functions and dynamic memory allocation. 5. Program to implement class and objects. 6. Program to implement friend functions and constructors. 7. Program for inheritance. 8. Program for polymorphism. 9. Program for file handling. 10. Program for exception handling.
Procedure for performing the Practical Experiments
All the experiment will be performed on any of the compiler C/C++ or .Net etc.

PEOPLE'S UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Practical		
		L	T	P	Externals (NIL)	Internals (50)	Total (50)
Professional Skills – I	BT-307	-	-	2			Min: 20 (D Grade)

Practical Internal - Max Marks: 50

Assignment / Quiz – Max. Marks: 50

Contents
Working in Teams Understand and work within the dynamics of a groups. Tips to work effectively in teams, Establish good rapport, interest with others and work effectively with them to meet common objectives, Tips to provide and accept feedback in a constructive and considerate way, Leadership in teams, handling frustrations in group. **Task Management** Introduction to Task identification Task planning, organizing and execution, closing the task. **Business communication** Business communication covering, Role of communication in information age; concept and meaning of communication; skills necessary for technical communication; Communications in a technical organization; Barriers to the process of communication; Style and organization in technical communication covering, Listening, speaking, reading and writing as skills; Objectivity, clarity, precision as defining features of technical communication; Various types of business writing: Letters, reports, notes, memos; Language and format of various types of business letters; Language and style of reports; Report writing strategies; Analysis of a sample report.

PEOPLE'S UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Subject Title	Subject Code	Credits			Practical		
		L	T	P	Externals (30)	Internals (20)	Total (50)
Software Lab – I	ECT-308	-	-	2			Min: 20 (D Grade)

Practical External - Max Marks: 30
Practical Internal - Max Marks: 20

Lab work & Sessional – Max Marks: 10
Assignment / Quiz – Max. Marks: 10

Contents (Practical) CIRCUIT SIMULATION SOFTWARE

Study of circuit simulation software (any one-TINA-PRO/PSPICE/CIRCUIT MAKER/ GPSIM/SAPWIN/ Mentor PADS etc).

Overview and Study of the key features and applications of the software. Application of the software in the field of Electronic Devices, Electronic Instrumentation and Network Analysis.

Design, Optimization and simulation of

1. Basic Electronic circuits (examples rectifiers, clippers, clampers, diode, transistor characteristics etc).
2. Transient and steady state analysis of RL/ RC/ RLC circuits, realization of network theorems.
3. Use of virtual instruments built in the software.

Study of PCB layout software

Overview and use of the software in optimization, designing and fabrication of PCB pertaining to above circuits simulated using above simulation software or other available. Students should simulate and design the PCB for at least two circuits they are learning in the current semester.

PEOPLES UNIVERSITY

PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **III**

Name of Practical Experiments

1. To prepare the circuit of Half wave rectifier and study its characteristics.
2. To prepare the circuit of Full wave rectifier and study its characteristics.
3. To prepare the circuit of Bridge Full wave rectifier and study its characteristics.
4. To prepare the Clipper Circuit and study its characteristics.
5. To prepare the Clamper Circuit and study its characteristics.
6. To prepare the 5volt DC Power Supplier Circuit and study its characteristics.
7. To prepare the NPN Transistor as an amplifier and study its characteristics.
8. To prepare the Voltage Regulator Circuit and study its characteristics.
9. To prepare BJT CE, CB and CC Configuration Circuit and study its characteristics.
10. To prepare 7-Segment Display Circuit and study its characteristics.

Procedure for performing the Practical Experiments

All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Lab view/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

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