PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electrical Engineering)**

Semester: **IV**

Subject Title	Subject Code	Credits			Theory		
		L	T	P	Externals (70)	Internals (30)	Total (100)
Engineering Mathematics-III	**BT-401**	3	1	-	Min: 28	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	**FUNCTIONS of COMPLEX VARIABLES:** Analytic functions, Harmonic Conjugate, Cauchy – Riemann Equations, Line integral, Cauchy's theorem, Cauchy's Integral formula, Singular points, Poles and Residues, Residue theorem and Evaluation of Real Integral
II	**NUMERICAL ANALYSIS:** Difference operators, Errors and Approximations, Interpolation, Inverse interpolation, Numerical differentiation, Numerical Integration by using Simpson's method, Weddel's rule and Trapezoidal Rule.
III	**SOLUTION OF ALGEBRIAC & SIMULTANEOUS EQUATIONS :** Solutions of algebraic and transcendental equations(Regular False, Newton-Raphson, Iterative, Graffe's root squaring methods) and Solutions of simultaneous algebraic equations (Gauss Elimination, Gauss Jordan, Gauss Iterative, Jacobi,Gauss Seidel and Crout's Traingularization).
IV	**SOLUTION TO DIFFERENTIAL EQUATIONS:** Solutions of ordinary differential equations (Taylor's Series, Picard's Method, Euler Method, Modified Euler's method, Runge Method and Runge Kutta Method).
V	**OPTIMIZATION by LINEAR PROGRAMMING:** Introduction, 2 Variable Problems, Solution by Graphical and Simplex Methods, Concept of Degeneracy and Duality, Simple 3 Variable Transport and Assignment Problems and Modeling into LPP.

REFERENCES :

1. Higher Engineering Methematics by B.S. Grewal,Khanna Publications
2. D.C. Aggarwal "Engineering Mathematics II
3. Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication
4. Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
5. Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
6. Numerical Methods using Matlab by Yang,Wiley India
7. Pobability and Statistics by Ravichandran ,Wiley India
8. Mathematical Statistics by George R., Springer.

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Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Electrical Machine II	EET-402	3	1	2		Min: Nil	Min: 40 (D Grade)	Min: 14	Min: Nil	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	**General equation of inducted emf, AC armature windings:** concentric and Distributed winding, chording, skewing, effect on induced emf. Armature and field mmf, effect of power factor and current on armature mmf, harmonics. Rotating fields.
II	**Single phase Induction motors:** Construction, Theories of operation, Revolving Field Theory, Equivalent Circuit, Phasor diagram, Starting methods, Speed-torque characteristics, Cross-field theory.
III	**Three phase Induction motor:** Construction and types, Rotating Magnetic Field, Equivalent circuit, Phasor diagram, Speed-torque characteristics, Circle diagram, Deep bar rotor and Double cage rotor. Cogging and Crawling, Starting and Speed control of 3-phase induction motor, induction generator.
IV	**Synchronous Generator:** Constructions and types, Emf equation, Phasor diagram, Armature reaction, Characteristics, Voltage regulations, Synchronization, Parallel operation, Power angle characteristics, Excitation characteristics. Salient pole synchronous machine: Two-reaction theory, Phasor diagram and Voltage regulation.
V	**Synchronous Motor:** Expression for torque, Phasor diagram, Operating characteristics, Electrical and mechanical power, V-curves and O-curves, Starting, Hunting and Damper winding.

REFERENCES:

1. Electric Machinery, Fitzgerald & Kingsley, MGH.
2. Theory of alternating current machinery, A.S. Langsdorf , TMH.
3. Electrical Machines, P.S.Bhimbra, Khanna Publishers Delhi

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PRACTICALS:

1. To plot the O.C.C. & S.C.C. of an alternator and to determine its regulation by synchronous impedance method.
2. To synchronize an alternator across the infinite bus (RSEB) & summarize the effects of variation of excitation on load sharing.
3. To plot the V-curve for a synchronous motor for different values of loads.
4. To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of its equivalent circuits.
5. To perform the load test on a 3-phase induction motor and determine its performance characteristics (a) Speed vs load curve (b) p.f. vs load curve (c) Efficiency vs load curve (d) Speed vs torque curve
6. Determination of losses and efficiency of an alternator.
7. To find Xd and Xq of a salient pole synchronous machine by slip test.
8. To perform no load test on a 3 phase alternator (cylindrical rotor).

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Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Electronic Circuits	BT- 423	3	1	2		Min: Nil	Min: 40	Min: 14 (D Grade)	Min: Nil	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	**Amplifier Basics**, Transistor as an amplifier, load line, Q-point and its selection criteria, designing of fixed bias and self-bias, stability of biasing circuits, calculation of stability factor. **Transistor at low frequency**: frequency response, bandwidth, h-parameter analysis of CC, CB and CE configuration, simplified model, gain and impedance calculation of single stage amplifier. **Transistor at high frequency**, high frequency model (hybrid- pie), Parameters and their definition, Miller capacitance and its effect on voltage gain,
II	**Feedback amplifier**: positive and negative feedback loop gain, effect of negative feedback on gain stability, distortion, bandwidth, input and output impedance of amplifier, types of feedback (voltage, current, series and shunt) and their analysis. **Oscillators**: condition of sustained oscillation, RC phase shift, LC (Hartley and Collpit) Oscillators, Wein Bridge, Negative resistance (Tunnel diode and UJT) oscillators, crystal oscillators.
III	**Power amplifier**, classification, operation, analysis and design of Class A, Class B, Class-AB, Class C, transformer coupled, push pull and complementary symmetry amplifiers, power dissipation in transistors (Pdmax rating) and efficiency calculations. **Tuned amplifier** and its applications, Q factor, selectivity and bandwidth, effect of loading, double tuning (synchronous and stagger)
IV	**Cascade amplifiers**, Calculation of gain, Input and output impedance, Effect of Cascading on bandwidth, Transformer, RC and direct-coupled amplifier and their performance. **Darlington connection**, equivalent circuit and Calculation of gain and impedances, Cascade amplifier: advantage, circuit diagram and analysis, feedback pair and applications of BIFET, Bootstrapping technique. **Differential amplifier** - configuration, transfer characteristics, DC analysis, h-parameter analysis, differential and common mode gain, CMRR, constant current source and current mirror, level shift.

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V	**Operational amplifier** (IC741), specifications, ideal and practical characteristics, frequency response, unity gain bandwidth, limitations, slew rate and its effect on full power bandwidth, input offset voltage, bias and offset currents, compensation. **Applications of Op-Amp: I**nverting and non-inverting amplifier Analog computation, summer (inverting and non-inverting), averager, integrator, differentiator, scalar, sign changer, phase changer, multiplier, buffer, Differential amplifier, instrumentation amplifier, comparator, Schmitt trigger, precision rectifier, log and antilog amplifier, voltage-to-current and current-to-voltage converter.

References:

1. Millman and Halkias : Integrated electronics, TMH
2. Gayakwad ; OPAMP and Linear Integrated Circuits, Pearson Education
3. Boylestad and Nashelsky : Electronic Devices and Circuit Theory, PHI
4. Sendra and Smith : Microelectronics, Oxford Press
5. Graham Bell : Electronic Devices and Circuits , PHI
6. Donald A Neamen : Electronic Circuits Analysis and Design, TMH
7. Salivahanan et al : Electronic Devices and Circuits, TMH

List of Experiments (Expandable):

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/ Labview/ 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.

PRACTICALS:

1. To Study the OPAMP as a Summing Amplifier.
2. To Study the OPAMP as a Scaling Amplifier.
3. To Study the operation of Colpitts Oscillator.
4. To Study the operation of Wein Bridge Oscillator.
5. To Study the operation of Hartley Oscillator.
6. To Study the operation of class A amplifier.
7. To Study the operation of Class B amplifier.
8. To Study the differential amplifier.
9. To Study the OPAMP as a Schmitt trigger.
10. To Study the OPAMP as a Logarithmic amplifier.

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Subject Title	Subject Code	Credits			Theory		
		L	**T**	**P**	**Externals (70)**	**Internals (30)**	**Total (100)**
Electrical Power Generation	**EET-404**	3	1	-		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	**Choice of power station and unit:** Type of Generator, Size of Generator and number of units. Thermal Power Station: Main parts and working, Main flow circuits of Thermal Power Station, Power Station auxiliaries, Cooling system of alternators, Starting up procedure of thermal units.
II	**Nuclear Power Station:** Principles of Nuclear reaction, Layout of Nuclear Power Station, Types of power reactors, Main parts and Control reactors, Nuclear waste disposal, Radioactivity and Hazards
III	**Hydroelectric Power Station:** Stream flow, Hydrographs, Flow duration curve, Arrangement and location of hydroelectric stations, Principle of working, Power station control, Pump and Storage system.
IV	**Advanced Direct Energy Conversion Systems**: Basic Principles of Design and Operations of Photovoltaic Energy Systems, Fuel Cells, Magneto-hydrodynamic Power Generators
V	**Introduction of non-conventional energy sources:** Solar Energy, Wind electricity, Energy from Biomass gasifiers and Biogas reactors, Tidal energy, geothermal energy.

REFERENCES:

1. G. R. Nagpal, Power Plant Engineering, Khanna Publisher
2. M.V. Deshpandey, Modern Design of Power Station.
3. K. K.Ramaligaum Power Plant Engineering,SciTech

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Semester: **IV**

Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Analog & Digital Communication	EET-405	3	1	2		Min: Nil	Min: 40 (D Grade)	Min: 14	Min: Nil	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	Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, Concept of energy density and power density (Parseval's theorem), Power density of periodic gate and impulse function, impulse response of a system, convolutions, convolution with impulse function, causal and non causal system impulse response of ideal low pass filter, Correlation & Auto correlation
II	Base band signal, need of modulation, Introduction of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power distribution. AM suppressed carrier waveform equation and frequency domain representation Generation (Balance/Chopper modulator) and synchronous detection technique, errors in synchronous detection, Introduction to SSB and VSB Transmission Angle modulation, Frequency and phase modulation equation and their relative phase and frequency deviations, modulation index frequency spectrum, NBFM and WBFM, Bandwidth comparison of modulation techniques
III	Sampling of signal, sampling theorem for low pass and Band pass signal, Pulse amplitude modulation (PAM), Time division, multiplexing (TDM). Channel Bandwidth for PAM-TDM signal Type of sampling instantaneous, Natural and flat top, Aperture effect, Introduction to pulse position and pulse duration modulations, Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM) and Adaptive Delta Modulation (ADM), comparison of various systems.
IV	Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM, Introduction to probability of error.
V	**Information theory and coding-** Information, entropies (Marginal and conditional), Model of a communication system, Mathematical representation of source, channel and receiver characteristics, Mutual information, channel capacity efficiency of noise free channel Binary symmetric channel (BSC) Binary erasure channel (BEC), Repetition of signal, NM symmetric Binary channel, Shannon theorem,

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	Shanon-Hartley theorem (S/N-BW trade off)Source encoding code properties; Shanon, Fano and Huffman coding methods and their efficiency error control coding, Minimum Hamming distance, Linear Block Code, Cyclic code and convolution codes.

REFERENCES:

1. Singh & Sapre, Communication System, TMH
2. Taub & shilling, Communication System, TMH
3. Hsu; Analog and digital communication (Schaum); TMH
4. B.P. Lathi, Modern Digital and analog communication system,
5. Simon Haykins, Communication System. John Willy
6. Wayne Tomasi, Electronic Communication system.

7. Martin S. Roden, Analog & Digital Communication System; Discovery Press

PRACTICALS:

1. Study of sampling process and signal reconstruction and aliasing.
2. Study of PAM PPM and PDM
3. Study of PCM transmitter and receiver.
4. Time division multiplexing (TDM) and De multiplexing
5. Study of ASK PSK and FSK transmitter and receiver.
6. Study of AM modulation and Demodulation techniques (Transmitter and Receiver) Calculate of parameter
7. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
8. Study of super heterodyne receiver and characteristics of ratio radio receiver.
9. To construct frequency multiplier circuit and to observe the waveform
10. Study of AVC and AFC.

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Subject Title	Subject Code	Credits			Practical		
Professional Skills II	BT-406	L	T	P	Externals	Internals (50)	Total (50)
		-	-	2	Min :Nil	Min: 20	Min: 20 (D Grade)

Practical Internal - Max Marks: 50

Assignment / Quiz – Max. Marks: 50

Contents
Elements of Effective Presentation: Body Language and use of voice during presentation; Dress, Posture, Gestures, Eye contact and facial expression, Connecting with the audience during presentation; Projecting a positive image while speaking; Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Basics of public speaking; Preparing for a speech. **Stage fright, Voice and language:** Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP, LCD Projector, white board.

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Subject Title	Subject Code	Credits			Practical		
		L	T	P	External (35)	Internal (15)	Total (50)
Java programming	**BT-407**	-	-	2	Min (14)	Min: Nil	Min: (D Grade)

Practical Internal - Max Marks: 15

Lab Performa, Lab Record & Viva –Max Marks: 10

Attendance: – Max. Marks: 05

Unit	Contents *(Practical)*
I	**Introduction to java programming**: Introduction to java, Fundamentals of objects oriented programming, Object and classes , Data abstraction and encapsulation , Inheritance, Polymorphism , dynamic Binding , Java Features compiled and Interprets , Platform Independent and portable ,object orients Distributes , Multithreaded and interactive , High Performance , constant , Variables and data Types, Scope and Variable Operators and Expression , Statements LOPs ,Jumps in Loops (Break continue)
II	**Object oriented Programming with Java Classes and Objects**: Classes, Objects and methods Defining a class, creating object, Accessing class members, visibility control constructor , Methods overloading Static Member <Inheritance ,Overriding Methods ,Final Variable and Methods ,Final classes ,Abstract Method and classers , Array , interfaces, Multiple Inheritance Defining Interface <Extending Interfaces, Accessing Interface Variable ,Packages : Putting classes together system package , Using system package ,Naming convection , certain package accessing a package , using a package , adding a classes a package
III	Advance java features :Multithreading : threads states priorities and thread scheduling , life cycle of a thread synchronization, creating and executing threads , multithreading with GUI , monitors and monitors lock Network ng : Manipulating URLs , reading a file on a web server , socket programming , Security and the networks , RMI , Networking accessing database with JDBC , relational database ,SQL,MYSQL,Oracle,
IV	Advance Java Technologies :Servlets: Overview and architecture, Setting up the apache tomcat server , Handling ,HTTP get requests Deploying a web application , multitier application s, using JDBC form a servlelts java Server pages (JSP),Overview ,First jsp examples , implicit objects ,Scripting Standard Action Directives ,Multimedia : APPlets and application loading , displaying and Scaling , animating a series of iMages ,Loading and Playing audio clips
V	Advanced web/Internet programming (overview):J2ME, J2EE,EJB and XML

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Subject Title	Subject Code	Credits			Practical		
Electrical Software Lab-I	EET-408	L	T	P	Externals (35)	Internals (15)	Total (50)
		-	-	2	Min: 14	Min: Nil	Min: (D Grade)

Practical Internals - Max Marks: 15
Lab work & Sessional – Max Marks: 10
Assignment / Quiz – Max. Marks: 05

Contents (Practical)
Electrical Software Lab-I(MatLab)
MATLAB PROGRAMMING LAB: 1 Basics of MATLAB matrices and vectors, matrix and array operations, Saving and loading data, plotting simple graphs, scripts and functions, Script files, Function files, Global Variables, Loops, Branches, Control flow, Advanced data objects, Multi-dimensional matrices, Structures, Applications in linear algebra curve fitting and interpolation. Numerical integration, Ordinary differential equation. (All contents is to B.Tech covered with tutorial sheets) **Simulink:** Idea about simulink, problems based on simulink. (All contents is to be covered with tutorial sheets).

REFERENCES:

Matlab and simulink Malik SciTech