Syllabus for

Applied Mathematics- III (EN/ET/EE/Mech)

Scheme (Theory: 4 hrs, Tutorial: 1hr.)

UNIT - I: LAPLACE TRANSFORM (15Hrs)

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).

UNIT –VI: MATRICES(12Hrs)

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

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BEELE302T	**NON CONVENTIONAL ENERGY SOURCES**	**L = 4**	**T = 0**	**P = 0**	**Credits = 4**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
• Students will introduce with various sources of Non-conventional energy such as solar wind, small hydro, ocean & wave energy.	A student will be able to • Learn fundamentals of solar radiation geometry, application of solar energy • Selection of sites for wind farm, different types of wind generators. • Understand the basic of small hydro, ocean & wave energy.

UNIT-I

Solar Radiation & its Measurement: Solar Constant, Solar radiation at earth's surface, solar radiation geometry, solar radiation measurement, estimation of average solar radiation, solar radiation on tilted surfaces.

UNIT -II

Solar Energy Collectors: Physical Principles of the conversion of solar radiation into heat,flat plate collectors, transitivity of cover systems, energy balance equation and collector efficiency, concentrating collectors, comparison of concentrating and flat plate collectors, selective absorber coatings.

Solar Energy Storage :

Solar Energy Storage system (Thermal, Electrical, Chemical, Mechanical), Solar ponds.

UNIT-III

Application of Solar Energy: Solar water heating, space heating, space cooling, solar thermal heat conversion, solar photovoltaic energy conversion, solar pumping, solar cooking, online grid connected solar photovoltaic generation system.

UNIT - IV

WIND ENERGY: Basic principles of wind energy conversion, wind energy conversion system, wind data & energy estimation, site selection consideration, basic components of wind energy conversion system (WECS), classification of WEC system, generating system, energy storage, application of wind energy.

UNIT-V

ENERGY from OCEANS: Ocean thermal electric conversation (OTEC), Claude & Anderson cycles, evaporators, Bio-fouling, Hybrid cycle, components of OTEC for power generation.

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Energy from Tides: Introduction, basic principles of Tidal power, components of Tidal Power Plants, operation methods of utilization of Tidal Energy; Estimation of Energy & Power in simple single basin Tidal system, Advantages & limitations of Tidal Power Generations, energy & power from wares, wave energy conversions devices.

UNIT- VI

OTHER NONCONVENTIONAI, ENERGY SOURCE: Brief Introduction to operating principles only): small scale hydro electric power generation, Energy from Bio –Mass, Geothermal Energy, MHD power generation, fuel cell etc.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Non Conventional Energy Sources	G.D. Rai	Khanna publishers
Non Conventional Energy Resources	B. H. Khan	2nd , The McGraw Hill Companies
Energy Technology : Nonconventional, Renewable and Conventional	S. Rao & B. B. Parulekar	1st, Khanna Publisher
Solar Energy: Principles of thermal collection and storage	S. P. Sukhatme	2nd edition, Tata McGraw Hill Publishing Company Ltd.
Solar Photovoltaics : Fundamental, Technologies and Applications	Chetan Singh Solanki	PHI Learning Pvt. Ltd.

BEELE303T	**ELECTRICAL MEASUREMENT AND INSTRUMENTATION**	**L = 4**	**T = 1**	**P = 2**	**Credits = 6**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
Students will learn the details of different electrical instrument used for electrical measurement and Instrumentation, different types of Bridges & different types of potentiometers, CT and PT, various transducers, analog to digital conversions, data acquisition.	• Student has understood the details of different electrical instrument used for electrical measurement And Instrumentation. • Students has understood the details of different Bridges used for measurement of R,L,C • Students have understood the details of different types of potentiometers and CT and PT. • The basic idea about transducer and Measurement of acceleration, velocity Measurement of angular velocity, Torque and Power measurement Torque meter. • the basic idea about Measurement of temperature using thermistor ,RTD and thermocouple and Two color pyrometers, Optical pyrometer.

Unit 1: Measurement of RLC Elements

Loading effect of instruments, Measurement of Resistance: classification, measurements by voltage drop method, Measurement of medium resistance :- Wheatstone Bridge. Low resistance: - Kelvin's Double Bridge. High resistance: - Ohmmeter, Megger & loss of charge method. Earth resistance: - Earth tester, Measurement of inductance using Maxwell's inductance-capacitance bridge, Measurement of Capacitance using Schering's & Hays bridge, LCR meter.

Unit 2: Analog Instruments :
Principle & operation of moving iron, PMMC and dynamometer type instruments.
Special Instruments : Power factor meter, frequency meter, synchronoscope.

Unit 3: Measurement of Power & Energy
True RMS Measurement, Principle of Measurement of active, reactive and apparent power in polyphase circuits. Measurement of Energy in single and polyphase circuits. General theory & extension of range using C.T. & P.T., errors in instrument transformers, applications of instrument transformers for metering.

Unit 4: Generalised instrumentation systems
Active and passive transducers, Digital and analogue mode of operation, Static and Dynamic characteristics and performance of instruments. combination of errors. Introduction to Data Acquisition Systems. Elementary Idea of Microprocessor based instrumentation.

Unit 5: Measurement of Force Torque, Velocity & Acceleration
Different types of load cells – strain gauge load cell, Different methods of torque measurement,– stroboscope. Accelerometers – LVDT, piezo-electric strain gauge and variable reluctance type accelerometers – mechanical type vibration instruments – seismic instrument as an accelerometer and vibrometer

Unit 6: Temperature, Pressure and Flow measurement
Bimetallic thermometers – Electrical methods of temperature measurement, Resistance Temperature Dedectors (RTD) and their characteristics, thermistor, Thermocouples, law of thermocouple, special techniques for measuring high temperature using thermocouples. Units of pressure, Bourdon type bellows, Diaphragms, Electrical methods, elastic elements with LVDT and strain gauges, capacitive type pressure gauge, piezo resistive pressure sensor, measurement of vacuum, McLeod gauge, thermal conductivity gauges, Ionization gauge,
Introduction to flow meters, types and principles, Orifice plate, Venturi tube. Different types of ultrasonic flow meters, pitot tube, electromagnetic flow meter, hot wire anemometer.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Electronic Instrumentation & Measurement Technique	W.D. Cooper	Prentice Hall
Electrical & Electronics Measurements & Instrumentation	A. K. Sawhney	DHANPAT RAI & SONS, 5th REVISE
Instrumentation Devices & Systemes	Rangan	Tata McGraw Hill
Mechanical and Industrial Measurements	R.K.Jain	Khanna Publishers
Reference Books		
Measurement System Application and Design	E.O. Doeblin	McGraw Hill
Instrumentation for Engineering Measurements	Dalley Railey, Mc Connel	John Wiley & Sons
Electrical Instrumentation	H. S. Kalsi	TATA MCGRAW-HILL EDUCATION PVT. LTD.2nd revised

BEELE304T	**NETWORK ANALYSIS**	**L = 4**	**T = 1**	**P = 2**	**Credits = 6**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
The course objective is to impart knowledge of • Behavior of basic circuit elements. • Fundamental concepts and methods used for analysis of dc, single-phase and three-phase circuits.	students should be able to: • Apply node and loop (mesh) analysis • Apply phasor analysis to AC circuits in sinusoidal steady state.

• various mathematical tools/transformations used in circuit analysis	• Use various network theorems for analysis and design of electric circuits. • Analyze periodic inputs to electric circuits using Fourier series and their response. • Compute initial and final conditions for current and voltage in first and second order circuits. • Determine the response of a circuit excited by a waveform composed of various step and ramp components. • Characterize two – port networks by z, y, t and h parameters.

UNIT –1

Voltage current sources, source transformation mosh basis equilibrium equation, matrix approach For complicated network containing independent sources and reactances.

UNIT-2

Nodal basis equilibrium equation matrix for electrical network containing independent sources And reactances, Duality

UNIT-3

NETWORK THEOREM: Superposition, Reciprocity, Thevenin's, Norton's, maximum power transfer, compensation, Tellegen's theorem as applied to A.C. & DC circuits.

UNIT-4

Laplace transform and properties, partial fractions, singularity functions, waveforms, synthesis. Analysis of RC, RL and RLC network with and without initial conditions with Laplace transforms, evaluation of initial condition.

UNIT-5

Transient behaviors concept of complex frequency, Driving points and transfer functions,poles, zeros Of transfer function, their properties.

UNIT-6

Two port network parameters and inter connections, study of series and parallel resonance in a.c. Three phase balanced and unbalanced circuit and power calculations.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Network Analysis	Van Valkenburg	PEARSON EDUCATION 3rd,ed.
Linear Network Theory	Kelkar and Pandit	PRATIBHA PUBLICATION 39Ed.
Circuit and Network	A. Sudhakar and S.P. Shyam Mohan	TATA MCGRAW-HILL EDUCATION PVT. LTD. 2 REVISE
Reference Books		
Network and System	D.P. Roy choudhary	NEW AGE INTERNATIONAL PVT. LTD. 3re ed.
Electrical circuit	Del Toro	Prentice Hall
Electric Circuits & Network	K. Sureshkumar	Pearson Publication

BEELE305T	**ELECTRONIC DEVICES & CIRCUITS**	**L = 4**	**T = 1**	**P = 2**	**Credits = 6**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
• The course objective is to impart knowledge of basic semiconductor devices, transistors, amplifiers, FET & MOSFETS. Students also learn digital circuits with Boolean Algebra, logic gates etc.	students will be able to understand • principle & working of basic semiconductor devices, transistors, amplifiers, FET & MOSFETS. • Conversion of numbers from one code to other code. • Logic gates and truth tables of digital circuits.

Unit 1: Theory of PN-junction diodes, operation and characteristics, Zener diodes and voltage regulators, Half and Full Wave Rectifiers, Filters, Ripple factor, Voltage doublers.

Unit 2: BJT, Theory of operation, characteristics, Biasing arrangements, Stability factor,Small signal analysis of CE, CB, CC amplifiers and their comparison, Power Transistors, Transistor as a switch.

Unit 3: Power amplifiers- classification as A,B, AB, C, Push pull amplifiers, Cross over distortion, Positive and Negative amplifiers- classification, feedback amplifiers, advantages and applications.

Unit 4: Oscillators- Barkhausen's criterion, RC and Crystal oscillators. Field effect transistors and MOSFETs- Principle of operation and characteristics, biasing arrangements.

Unit 5: Differential amplifier circuits and their stages, current source, biasing, level Shifting techniques, Common mode and differential mode gain, Impedance of different stages.

Unit 6: Boolean Identities, Binary, Gray, Octal, Hex & ASCII, Codes, Logic gates and their truth tables, De Morgan's Laws, Concept of Sum of Products and Product of Sums.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Electronic Devices and Circuits	Millman and Halkias	McGraw Hill
Integrated Electronics	Millman and Halkias	McGraw Hill
Digital Integrated Electronics	H. Taub	McGraw Hill
Introduction to Operation Amplifiers	Wait	Tata McGraw Hill
Reference Books		

IV SEM. ELECTRICAL ENGINEERING

Applied Mathematics- IV (Electrical Engg.)

Scheme (Theory: 4 hrs, Tutorial :1 hr)

UNIT–I : MATHEMATICAL MODELING AND TRANSFER FUNCTION (12 Hrs)

Mathematical Modeling of physical systems and Differential equations (Mechanical systems, basic translational and rotational systems, basic R-L-C series and parallel circuits), Concept of transfer function, Transfer function for elementary R-L-C circuits, Elementary block diagram single input single output closed loop system and its reduction. Laplace transform of step, ramp & parabolic signals, Time response of first order systems and second order systems for unit step input, Concept of characteristic equation q(s) = 0 vs time response.

UNIT – II: Z-TRANSFORM (10Hrs)

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

UNIT – III: FUZZY SETS AND FUZZY LOGIC(12 Hrs)

Fuzzy sets and systems, Crisp sets, Overview of Fuzzy logic and classical logic, Fuzzy compliment, fuzzy union and intersection and combinations of these Fuzzy sets operation, Crisp and Fuzzy relations.

UNIT – IV: NUMERICAL METHODS (08 Hrs)

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position, Newton –Raphson method and their convergence, Solution of system of simultaneous linear equations: Gauss elimination method, Crout's method and Gauss-Seidel method

UNIT – V: NUMERICAL METHODS (08 Hrs)

Numerical solution of ordinary differential equations :Taylor's series method, Runge-Kutta 4^{th} order method, Euler's modified method. Milne's Predictor- Corrector method, Solution Of Second Order Differential Equations and Simultaneous Differential Equations by Runge- Kutta method.

UNIT – VI: THEORY OF PROBABILITY (10 Hrs)

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Mathematical Expectation, Functions of random variable, Variance & Standard Deviation, Moments, Moment generating function, Measures of central tendency and Dispersion, Skewness and Kurtosis. Binomial distribution, Poisson distribution, Normal distribution.

Text Books

1. Control Systems Engineering by Nagrath & Gopal, New Age International Publishers.
2. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication.
3. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills.
4. Fuzzy Sets Uncertainty and Information by George, J. Klir and Tina A. Folger.

Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI.
2. Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India.
3. Neural Networks & Fuzzy Systems by Bart Kosko, PHI.
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.
5. Digital Signal Processing, by John Proakis and D.G. Manolakis, Pearson (for Z-Transform)

4S-EE-02T – ELEMENTS OF ELECTROMAGNETICS

BEELE402T	**ELEMENTS OF ELECTROMAGNETICS**	**L = 4**	**T = 1**	**P = 0**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
• To become knowledgeable in static electric and magnetic fields. • To learn various laws of electromagnetic & electrostatic fields.	Students will be able to • Apply various laws in the analysis of electromagnetic systems. • Understand the physical basis for the functioning of circuit elements • Apply Electromagnetic boundary conditions. • Be familiar with the four Maxwell's equations used to study time varying electromagnetic or dynamic fields. • Understand the concept of uniform plane-wave propagation and electromagnetic power density flow in lossless medium.

UNIT-1: VECTOR ANALYSIS : Idea of vector & scalars, Vector Algebra, vector addition, vector subtraction, dot product, scalar product in Cartesian coordinates system, conversion of variables from Cartesian to cylindrical system and vice versa. Spherical co-ordinate system, transformation of Cartesian to spherical and vice versa.

UNIT-2:

Coulomb's law, Electrical field intensity and electric, flux density: Coulomb's law, electric field intensity, field of 'n' point charges, field due to continuous volume charge distribution, field of line charge, filed of sheet charges, concept of flux density.

UNIT-3:

Gauss's law, Energy and potential of charge system : Gauss's law, application of gauss law, divergence theorem, definition of potential difference and potential, potential of a point charges, potential field of system of charge, potential gradient, Energy density in Electrostatic field.

UNIT-4:

Conductors, Dielectric and Capacitance and poison's and Laplace Equations : current and current density, continuity of current, metallic conductors, conductor properties and Boundary conditions, Nature of Dielectric materials capacitance and capacitances, Capacitance of parallel plate capacitor, capacitance of two wire line, poisons and Laplace Equation.

UNIT-5:

The steady Magnetic Field and Magnetic forces: Biot Savarts law, Ampere's Circuital law, Strokes theorem, magnetic flux density, scalar and vector magnetic potentials, force on moving charge, force

between differential current elements nature of magnetic material. Magnetization and permeability, magnetic circuits, potential energy and forces on magnetic materials, Inductance and mutual inductance.

UNIT-6:

Maxwell's equations & boundary conditions. Elementary idea of Electromagnetic waves, uniform plane wave.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Engineering Electromagnetics	W.H. Hayt	7th, Tata McGraw Hill Publication.
Schaum's Outline Series: Theory and Problems of Electromagnetics	Joseph A. Edminister	2nd, McGraw Hill Publication.
Principles of Electromagnetics	Matthew N.O.Sadiku	4th, Oxford University Press
Reference Books		
Applied Electromagnetic	Plonus	McGraw Hill Publication
Electromagnetics	Kraus	McGraw Hill Publication
Fundamentals of Electromagnetics with MATLAB	Karl E. Lonngren, Sava V. Savov, Randy J. Jost	PHI Learning Private Limited

BEELE403T	**DIGITAL AND LINEAR ELECTRONIC CIRCUITS**	**L = 3**	**T = 1**	**P = 2**	**Credits = 5**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
To introduce the basics of logic families, multiplexers, Flip flops, timers. Students will introduce with operational amplifiers, Linear IC's and multivibrators used in digital electronics.	students will be able to understand • Basic fundamentals of logic gates, , Flip flops, timers. • Basic Operational amplifier circuits: • Simple linear circuit • Applications of Operational amplifier • Study of Linear ICS

Unit 1:

TTL, CMOS Logic Families, Combinational Logic concepts, Decoders, Encoders, Multiplexers, De-multiplexers, Code converters, Karanaugh map Principle.

Unit 2:

Introduction to Flip-flop, Latch, Concept of Clock, Overview of RAM, ROM, EPROM & EEPROM, Master slave Flip-flop and conversion of one type to another.

Unit 3:

Introduction to sequential circuits, Synchronous and Asynchronous Counters, Different module counters with reset/ clear facility, Adders, Subtractors, Concept of ALU.

Unit 4:

Basics of Operational Amplifiers, Ideal and non-ideal OPAMPs, Inverting & non-inverting OPAMPs, Integrators, Differentiators, Summer and Averaging circuits, Instrumentation amplifiers, Grounding & Shielding Problems in opamps

Unit 5:

Precision rectifiers, Constant Current & Constant Voltage sources, Introduction to Active filters, Butterworth 2nd order filter – Design & operation, Clipping, clamping and comparator circuits, Sample & Hold circuits, A/D & D/A converters, Phase locked loops.

Unit 6:
Study of Linear ICs : LM 741, LM 555, LM 339, LM 723, LM 78xx & 79xx series, Astable, monostable and bistable multivibrators using IC LM 555.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Digital Integrated Electronics	Herbert Taub	McGraw Hill
Introduction to Operation Amplifiers	Wait	Tata McGraw Hill
Operational Amplifiers- Design and applications	Tobey Grahame-Huelsman	TMH
Reference Books		
Operational Amplifiers and applications	R. Gaikwad	
Linear ICs Manual I, II, III	National Semiconductors	

BEELE404T	**ELECTRICAL MACHINES-I**	**L = 4**	**T = 1**	**P = 2**	**Credits = 6**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
Student will learn • The basic principle of transfer of electrical power, operation, construction of 3-phase transformers, their classification, connections and phasor diagrams. • The basic principle, construction, operation, performance characteristics, steady state analysis and applications of electrical motors and induction generator.	The student will be able to understand • Principle, construction, connections, vector grouping, operation and testing of 3-phase transformer • conversion of 3-phasse supply to 2-phase supply, parallel operation of 3-ph. Transformers. • Principle, armature and field construction, types, operation characteristics, armature reaction, commutation, methods to improve commutation in dc generators. • Principle, types, voltage build up, performance characteristics, torque evaluation in dc motors • Principle, construction, types, torque development, performance characteristics, tests to determine performance indices & parameters of equivalent circuit of 3-phase and double cage induction motors, methods of starting, speed control and braking of induction motors. • Revolving and cross field theories, operation, characteristics, types, equivalent circuit & tests.

UNIT-1

SINGLE PHASE TRANSFORMER :- Transformer phasor diagram, equivalent circuit diagram. Transformer equivalent circuit parameter calculation using O.C. & S.C. test. Polarity test and parallel operation of single phase transformer.

3-PHASE TRANSFORMER: principle and operation of three phase transformer and, O.C. & S.C. test on three phase transformer, determination of equivalent circuit parameters, Regulation, Efficiency, Magnetizing current and harmonics, winding identifications, various connections with vector group.

UNIT-2

Three phase to two conversion, parallel operation of three phase transformer, methods of cooling, back to back test, maintenance of transformer, insulation of transformer.

UNIT-3

D.C. MACHNIES: - Basis principle & operation, Armature reaction & commutation, Compensating winding, interpoles. Type of excitation. Characteristics of shunt series & compound motor and generator speed control of d.c. shunt & series motor, constant horse power & constant torque drive of d.c. motor.

UNIT-4

THREE PHASE INDCTION MOTOR: - Types of induction motor and production of torque. Torque-slip characteristics, No load blocked rotor test, circle diagram, losses, efficiency, double cage motor, operating characteristics & influence of machine parameter on the performance of motor. Induction motor as a induction generator.

UNIT-5

Starting of 3 phase I.M. speed control of I.M. by pole changing, frequency control, rotor resistance by varying supply voltage, braking regenerative braking, plugging, dynamic braking Crawling & cogging.

UNIT-6

SINGLE PHASE I.M.: - Double field revolving and cross field theory split phase motor shaded pole motor, equivalent circuit, Torque-slip characteristics.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Electrical Machines	P.K. Mukherjee & S. Chakraborty	Dhanpat Rai Publication (P) Ltd.
Electrical Machines	I. J. Nagrath & Dr. D.P. Kothari	3rd, Tata McGraw Hill
Electrical Machines	P. S. Bhimbra	Tata McGraw Hill
Reference Books		
Performance & Design of A.C. M/C	M.G. Say	CBS PUBLISHERS AND DISTRIBUTORS PVT. LTD. 3rd ed. Rev.

BEELE405T	**COMPUTER PROGRAMMING**	**L = 4**	**T = 1**	**P = 2**	**Credits = 6**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
The student will learn the concept of programming and topics using C & C++ language and apply it in the field of engineering and technology. Similarly student will know about the Matrix operation and use of graphic tools for representation.	The student on completion has understood • General information of computers and operating systems • Structure of "C" program, Data types, Storage class, variables, expressions and Operators • Use of arrays and sorting techniques • Pointers and structures. • Basics of strings and arrays • C++ concepts • Matrix operation using programming. • Use of graphic tools for presentation.

Unit-I: Structure of 'C' program, Data types, Variables, Input/output statements, Storage class, operators, Program control statements, Concept of function & Recursion.

Unit-II: Arrays, Searching (Linear & Binary), Sorting (Bubble & Selection).

Unit III: Structure(Arrays of Structures, Copying elements of one structure into another, Nested Structure, Structure Pointer)Pointer, File Handling(File open, close, read , write, Copy).

Unit IV: Introduction to C++ concepts.

Unit-V: Introduction to MATLAB Programming
Import/export data, Program and run simple scripts (M-files), Use graphics tools to display data, Conditional Statements (If-else, if-elseif), and Iterative statements (While, For loop).

Unit -VI: Matrix operation (Transpose, determinant, Inverse), Plotting of graphs (Basic plot, generating waveforms) using Matlab Programming. Manipulating text (Writing to a text file, Reading from a text file, Randomising and sorting a list, Searching a list), Programming using MATLAB functions.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
A text book on Programming languages C& C++	Kakade & Deshpande	DREAMTECH PRESS 2nd. Ed.
Pascal & C Programming	Venugopal	TATA MCGRAW-HILL EDUCATION PVT. LTD.
Let us C	Y. Kanetkar	8th BPB PUBLICATIONS
Computer Programming in C	Balguru Swami	
Reference Books		
C Programming languages	B.W. Kernighan and D.M. Ritchie	2nd EDITION PEARSON EDUCATION
METLAB-A Practical introduction to programming problem Solving	Stormy Attaway	Elsevier
Mastering METLAB 7	Duane Hansselman Bruce Littlefield	Pearson

BEELE406T	**ENVIRONMENTAL STUDIES**	**L = 3**	**T = 0**	**P = 0**	**Credits = 0**
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	**Learning Outcomes**
• Student will be able to learn the natural sources available. • Students will also learn about ecosystem, biodiversity, pollution. • Student will also learn the effect on environment on social aspects and Human population.	The student on completion of course will understood the • Ecosystem • Environmental issues related with social and human population. • Biodiversity and its conversion

Unit 1 : Multidisciplinary nature of environmental studies

Definition, scope and importance (2 lectures)
Need for public awareness.
III

Unit 2 : Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.
a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources : Growing energy needs, renewable and non renewable, energy sources, use of alternate energy sources. Case studies.
f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resoureces for sustainable lifestyles. (8 lectures)

Unit 3 : Ecosystems

• Concept of an ecosystem.
• Structure and function of an ecosystem.
• Producers, consumers and decomposers.
• Energy flow in the ecosystem.
• Ecological succession.
• Food chains, food webs and ecological pyramids.
• Introduction, types, characteristic features, structure and function of the following ecosystem :-
a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit 4 : Biodiversity and its conservation

• Introduction – Definition : genetic, species and ecosystem diversity.
• Biogeographical classification of India
• Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
• Biodiversity at global, National and local levels.
• Inida as a mega-diversity nation
V
• Hot-sports of biodiversity.
• Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
• Endangered and endemic species of India
• Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lectures)

Unit 5 : Environmental Pollution

Definition
• Cause, effects and control measures of :-
a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards
• Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
• Role of an individual in prevention of pollution.
• Pollution case studies.
• Diaster management : floods, earthquake, cyclone and landslides. (8 lectures)

VI

Unit 6 : Social Issues and the Environment

• From Unsustainable to Sustainable development
• Urban problems related to energy
• Water conservation, rain water harvesting, watershed management
• Resettlement and rahabilitation of people; its problems and concerns. Case Studies
• Environmental ethics : Issues and possible solutions.
• Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
• Wasteland reclamation.
• Consumerism and waste products.
• Environment Protection Act.
• Air (Prevention and Control of Pollution) Act.
• Water (Prevention and control of Pollution) Act
• Wildlife Protection Act
• Forest Conservation Act
• Issues involved in enforcement of environmental legislation.
• Public awareness. (7 lectures)

Unit 7 : Human Population and the Environment

• Population growth, variation among nations.
• Population explosion – Family Welfare Programme.

VII

• Environment and human health.
• Human Rights.
• Value Education.
• HIV/AIDS.
• Women and Child Welfare.
• Role of Information Technology in Environment and human health.
• Case Studies. (6 lectures)

Unit 8 : Field work

• Visit to a local area to document environmental assetsriver/ forest/grassland/hill/mountain
• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
• Study of common plants, insects, birds.
• Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)