Revised Syllabus (Effective from the session 2020-21)
Gurukula Kangri Vishwavidyalaya, Haridwar
Faculty of Engineering & Technology

BEM-C302-ENGINEERING MATHEMATICS – III

MM: 100
Time: 3 hrs
L T P
3 1 0

Sessional: 30
ESE: 70
Credits 4

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Laplace Transform: Laplace transform of elementary functions, Shifting theorems, Transform of derivatives, Differentiation and Integration of transforms, Heaviside unit step and Dirac Delta functions, Convolution theorem, Solution of ordinary linear differential equations used in Mechanics, Electric circuits and Bending of beams.

UNIT II

Fourier Transform : Definition of Fourier transform, Fourier sine and cosine transforms. Fourier integral formula, Parsevel's identity, Applications of Fourier transform in solving heat equations.

UNIT III

Z transform : Definition, Linearity property, Z transform of elementary functions, Shifting theorems, Initial and final value theorem, Convolution theorem, Inversion of Z transforms, Solution of difference equations by Z transforms.

UNIT IV

Functions of Complex Variable: Limit and Continuity of functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

Unit V

Errors and Roots of Equations: Absolute, relative, round-off and truncation errors. Significant digits. Algebraic and Transcendental Equations, Numerical solution, Method of bisection, Newton-Raphson method, Direct iterative method, convergence.

Text Books / References

1. Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
2. Gerald, C.F., Wheatley P.O., Applied Numerical Analysis, Pearson, 2007.
3. Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000.
4. Jain R. K., Iyenger S.R.K., Advanced Engineering Mathematics, Narosa , 2002.
5. Jain R. K., Iyenger S.R.K., Jain M.K., Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 2012.

Revised Syllabus (Effective from the session 2020-21)
Gurukula Kangri Vishwavidyalaya, Haridwar
Faculty of Engineering & Technology
Electrical Engineering

BEE-C 305
ELECTRICAL MACHINES-I

MM:100
Time:3Hr
L T P
3 0 0
Credits 3

Sessional : 30
ESE : 70

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Principles of Electro-Mechanical Energy Conversion: Review of magnetic circuits - MMF, flux, reluctance, inductance; Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems, Singly Excited Systems; determination of mechanical force, mechanical energy, torque equation, Reluctance and Hysteresis motor.
Doubly excited Systems; Energy stored in magnetic field, electromagnetic torque, Generated EMF in machines; torque in machines with cylindrical air gap. Basics of rotating machines, Introduction to rotating magnetic field.

UNIT II

D.C. Machines-Generators: Construction of DC Machines, Armature winding, EMF and torque equation, Armature Reaction, Commutation, Interpoles and Compensating Windings, Performance Characteristics of D.C. generators.

UNIT III

D.C. Machines- Motors: Performance Characteristics of D.C. motors, Starting of D.C. motors; Concept of starting (3 point and 4 point starters), Speed control of D.C. motors; Field Control, Rheostatic control and Voltage Control (Ward Lenonard method), Efficiency and Testing of D.C. machines.

UNIT I V

Transformers: Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test. Nature of magnetizing current.

UNIT V

Three-phase transformer - Construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, Phase conversion - Scott connection, three-phase to six-phase conversion, Open Delta connection, Tap-changing transformers, Introduction to Three-winding transformers. Cooling of transformers.

Text Books

I.J. Nagrath & D.P. Kothari, Electrical Machines, Tata McGraw Hill.
Irving L. Kosow, Electric Machine and Transformers, Prentice Hall of India.
M.G. Say, The Performance and Design of AC machines, Pit man & Sons.
Langsdorf, Theory of Alternating Current Machinery, Tata McGraw Hill.

Reference Books

A.E. Fitggerald, C.Kingsley Jr. and Alexander Kusko, Electric Machinery, McGraw Hill, International Student Edition.
Hussain Ashfaq, Electrical Machines, Dhanpat Rai & Sons.

Revised Syllabus (Effective from the session 2020-21)

Gurukula Kangri Vishwavidyalaya, Haridwar

Faculty of Engineering & Technology

Electrical Engineering

BEE-C 308
ELECTRICAL CIRCUIT ANALYSIS

MM:100
Time:3Hr
L T P
3 0 0
Credits 3

Sessional : 30
ESE : 70

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.

UNIT II

Network Theorems: Applications to ac networks- Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

UNIT III

Sinusoidal steady state analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. series and parallel resonances. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer

UNIT IV

Two Port Networks: Characterization of LTI two port networks Z, Y, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. Image parameters and characteristics impedance.

UNIT V

Network Synthesis: Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

Text Books

M.E. Van Valkenburg, Network Analysis, Prentice Hall of India.
D. Roy Chaudhary, Networks and Systems, Wiley Eastern Ltd.
Donald E. Scott, An Introduction to Circuit analysis: A System Approach, McGraw Hill Book Company.

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Gurukula Kangri Vishwavidyalaya, Haridwar
Faculty of Engineering & Technology
Electrical Engineering

BEE-C 309
ELECTROMAGNETIC FIELDS

Sessional : 30
ESE : 70

MM : 100
Time : 3 Hr
L T P
3 0 0
Credits 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Electrostatics – Fundamentals: Electric charges – Coulomb's Law – Electric Field Intensity – Linear, Surface and Volume charge density – Gauss Law and its application – electric Scalar Potentials and potential difference – Potential due to uniformly charged disc and uniformly charged line, potentials between two coaxial cylinders and between two conducting spherical shell – Electric field lines and equipotential contours
– Potential gradient and electric field due to electric dipoles – Conservative nature of electric field.

UNIT II

Dielectrics & Capacitance: Dielectric boundaries – Capacitance – Capacitance of system of conductors – Overhead lines and underground cables – Methods of images and its application – Electrostatic energy and energy density – Force between charged conductors – dielectric strength and breakdown. Divergence and curl of vector fields – Divergence theorem – Stokes theorem – solutions of electrostatic problems – Examples on Laplace's equation.

UNIT III

Magnetic Fields – Fundamentals: Magnetic field intensity and magnetic flux density – Biot Savarat law – Force between current carrying wires. Torque on closed circuits – Ampere's law – Magnetic scalar and vector potentials – Boundary conditions at magnetic surfaces.

UNIT IV

Magnetic Circuits and Inductance: Faraday's law of electromagnetic induction – Inductor and inductance – Inductance of solenoids, toroids, transmission lines and cables – Mutual inductance – Inductors in series and parallel – energy stored in magnetic field – Pull of an electromagnet – magnetic circuits.

UNIT V

Electro Magnetic Waves: Maxwell's equations – Equation of continuity – displacement current – Maxwell's equation in point and integral forms – The wave equations – Uniform plane wave – relation between electric and magnetic field intensities in a uniform plane wave, Poynting vector – Poynting theorem.

Text Books

1. Gangodhar, K.A., ' Field Theory', Khanna Pub. Delhi 11th edition, 1994.
2. William H. Hayt, ' Engineering electromagnetics', Tata- McGraw Hill, 5th edition, 1992.

References

1. Sarwate, V.V., ' Electromagnetic Fields and Waves', Wiley Eastern Limited, New Delhi, 1993.
2. Mahajan, A.S. and Rangawala, A.A. 'Electricity and Magnetism, Tata-McGraw Hill Publishing Company, Ltd, New Delhi, 1989.
3. Seely, S., Introduction to electromagnetic Fields', McGraw Hill.
4. Joseph, a. Edminister, ' Electromagnetic – Schaum's outline Series', International Edition, McGraw Hill Inc., New York, 1993.
5. Narayana Rao, N., 'Elements of Engineering Electromagnetics', Prentics Hall of India, 1991.
6. David J. Griffths, ' Introcuation to electrodynamics', Prentice Hall of India, New Delhi, 1991.

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Faculty of Engineering & Technology

Electrical Engineering

BET-C 307

ANALOG CIRCUIT

MM : 100
Time : 3 Hr
L T P
3 0 0
Credits 3

Sessional : 30
ESE : 70

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions. Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Multistage Amplifier: Effect of coupling and by-pass capacitors, types of coupling (DC, RC and TC), Darlington connection, cascode amplifier, coupling schemes for multistage amplifier and frequency response of transistor amplifier.

Power amplifiers: ClassA, Class B, Class C and Class AB amplifiers and their efficiencies, harmonic distortion, push-pull amplifier. Basic idea of tuned amplifier.

UNIT II

IC OP-AMP Applications: OP-AMP Fundamentals (brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics) Basic building blocks using OP-AMPS. Inverting/ Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, Instrumentation Amplifiers.

UNIT III

Waveform Generator: Square wave generators: 555Timer,Triangle generator, Sawtooth generator, Sine wave generator, Wien-bridge and twin-T oscillators. Function Generators: Multi op-amp function generators, IC function generators PLL Fundamentals.

Non-linear Circuits: Logarithmic Amplifiers, Log/Antilog Modules, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square and Triangular Wave Generator, Monostable Multivibrator. IC Analog Multiplier applications OTA

UNIT IV

Active Filters: Introduction to filtering: Frequency response, Characteristics and terminology, Active versus passive filters, Low pass filter: First order low pass active filter, second order active filter model, second order low pass filter characteristics, Higher order filters.High pass active filter. Band pass filter: single op-amp band pass filter, multistage band pass filter,State variable filter.

UNIT V

Oscillators: Positive feedback, Berkhausen criterion for sinusoidal oscillation, Phase-shift oscillator, Weinbridge oscillator, Tuned oscillator, Hartley, Colpitts and Crystal oscillator. Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), SMPS.

Text/ Reference Books

1. Sedra and Smith, Microelectronic Circuits", Oxford University press, 5th Edition, 2005.
2. J. Michael Jacob, Applications and design with Analog Integrated Circuits", PHI, 2nd Edition, 2004
3. Gayakwad, R.A, Op-Amp and linear integrated circuits, PHI

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Faculty of Engineering & Technology
Electrical Engineering

BEE-C 351
ELECTRICAL MACHINES- I LAB

Sessional : 15
ESE : 35

MM : 50
Time : 2 Hr
L T P
0 0 2
Credits 1

LIST OF EXPERIMENTS

1. To obtain magnetization characteristics of a D.C. shunt generator.
2. To obtain load characteristics of a D.C. compound generator (a) Cummulatively compounded (b) Differentially compounded.
3. To obtain load characteristics of a D.C. shunt generator.
4. To obtain speed-torque characteristics of a D.C. shunt motor.
5. To obtain speed-torque characteristics of a D.C. series motor.
6. To obtain efficiency of a D.C. shunt machine using Swinburn's test.
7. To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control
8. To perform open circuit and short circuit tests on a single-phase transformer and determine parameters of equivalent circuit.
9. To obtain 3-phase to 2-phase conversion by Scott connection.
10. To obtain efficiency and voltage regulation of a single phase transformer by load test.
11. To perform Sumpner's test (back-to-back) on single-phase transformers.
12. To perform parallel operation of single phase transformer.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Gurukula Kangri Vishwavidyalaya, Haridwar

Faculty of Engineering & Technology

Electrical Engineering

BEE-C 352
ELECTRICAL CIRCUIT AND SIMULATION LAB

Sessional : 15
ESE : 35

MM : 50
Time : 2 Hr
L T P
0 0 2
Credits 1

LIST OF EXPERIMENTS

1. Verification of principle of superposition theorem with A.C. source.
2. Verification of principle of Thevenin's theorem with A.C. source.
3. Verification of principle of Norton's theorem with A.C. source.
4. Verification of principle of maximum power transfer theorem with A.C. source.
5. To study RLC series circuit.
6. To study RLC parallel circuit.
7. Determination of transient response of current in RL and RC circuits.
8. Determination of transient response of current in RLC circuit.
9. Determination of frequency response of current in RLC circuit with sinusoidal A.C. input.
10. To study T and ∏ networks.
11. Determination of z and h parameters (D.C. only) for a network and computation of Y and ABCD parameters.
12. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.
13. Verification of parameter properties in inter-connected two port networks: series, parallel and cascade also study loading effect in cascade.
14. Determination of frequency response of a Twin-t notch filter.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

BEE-C 353
SEMINAR

MM : 50
Time: 2 hrs
L T P
0 0 2
Credits 1

Sessional :15
ESE:35

Objective: To increase the communication ability on students and to prepare then for presenting seminar on advanced topics of their branch.

The students will be required to deliver a seminar on a topic of general interest in or any advanced technical topics related to the theory papers studied. The topic will be decided by mutual consent of the Faculty- in-charge and students.