Flexible Scheme & Syllabus

2020-2021

B.Tech.

in

Electrical Engineering

(I Semester)

Madhav Institute of Technology & Science
Gwalior-474005

Engineering Mathematics –I : 100011

Course Objectives:

- To understand the techniques of differential and integral calculus in engineering problems
- To expose to the concept of ordinary and partial differentiation
- To explore with matrix and its applications
- To understand Boolean algebra and graph theory

Unit 1:

Maclaurins's and Taylor's theorem, Partial differentiation, Euler's theorem, Jacobian, Maxima and Minima of one and two variables, Convergence of Sequence and series Test.

Unit 2:

Definite integral as limit of a sum, application in summation of series, Beta and Gamma function and its properties, transformation of Beta function, Gama functions, transformation of Gama function, relation between Beta and Gama function, Legendre's duplication formula, double & triple integral, Change of order of integration, Length of the curves, Volumes and surfaces.

Unit 3:

Ordinary differential equations of first and higher order, Linear higher order differential equation with constant coefficients, Homogeneous linear differential equation and Simultaneous differential equations.

Unit 4:

Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem and its application to finding inverse of matrix.

Unit 5:

Introduction to Algebra of Logic, statement, Logical connector, Types of Conditional statement, Logical equivalence, CNF and DNF, Algebraic laws, De morgan's laws, Boolean algebra, Principle of duality basic theorems, Boolean expressions and function, DNF and CNF form and Switching circuit.
Graph Theory, graph, Types of graphs, walk, path, circuit, Hamiltonian graph, Euler graph and its applications, Tree, Spanning tree and its properties.

Course Outcomes

After completing this course, student will be able to:

CO1 Apply differential calculus in solving basic engineering problems
CO2 Use integration techniques to determine the solution of various complex problems
CO3 Solve linear higher order differential equation with constant coefficients
CO4 Apply the concepts, terminology, methods and conventions of Matrix to solve the mathematical problems.
CO5 Concept of Boolean algebra and graph theory

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Recommended Books:

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.
3. R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt.Ltd, 5th Edition (2016).
4. F. B .Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice- Hall, 2nd Edition (1980).
5. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015).
6. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

Engineering Physics : 100013

Course Objective:

This course is designed to impart fundamental knowledge about some areas of physics which are to the core of emerging technologies. It is planned to provide knowledge about Quantum mechanics, Lasers, Fiber Optics, Hologhphy, Superconductor, Nano materials, Dielectric and piezoelectric materials. Laboratory sessions are also designed which are blended with experiments on the fundamental and advanced areas of physics.

Unit I

Quantum mechanics: Planck's quantum hypothesis, Wave-particle duality of radiation, de-Broglie matter waves, Davisson and Germen's electron diffraction experiment, Compton effect, Phase and group velocity, Heisenberg uncertainty principle and its applications, wave function and its significance, Eigen value and Eigen function, Schrödinger wave equations, particle in one dimensional potential box.

Unit II

Lasers: Properties of lasers, the basic process of lasers, Population- inversion, classification of lasers, working of He-Ne, Ruby, Nd: YAG andCO_2 lasers, Applications of Lasers in Communication, Medical and Industry.

Optical fibers: Light guidance through optical fibers, the qualitative idea of critical and acceptance angle, types of fibers, numerical aperture, V- Number, intermodal & material dispersions in fiber.

Holography: Basic principle of holography, Construction and reconstruction of Image on hologram and applications of holography.

Unit III

Basic of semiconductors: Density of energy states, Energy-bandformations, direct and indirect band gap, Effective mass, Fermi energy levels. Mobility and carrier concentrations (intrinsic).

Semiconductor Devices: Properties of PN junction and I-V diode equation, Photovoltaic cell, LED Materials for fabrication, LED Structures and Characteristics; Injection Laser Diode (ILD).

Unit IV

Superconductors: Free electrons theory of metals, Temperature dependence of resistivity in superconducting Metals, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors, BCS theory (Qualitative), High- temperature superconductors and Applications of superconductors.

Nanomaterials: Basic principle of nanoscience and technology, structure, properties ad uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.

Unit V

Dielectrics Materials: Polar and Non-Polar Dielectrics, Dipole moment and Polarization, Dielectric constant& Polarization, Gauss law in Dielectric, the relation between electric field vector E, P and D.

Piezoelectric materials- Ferroelectric materials, Piezoelectric effect direct and converse parameter definitions.

Course outcomes: Upon successful completion of the course, the student will be able to

CO1 Explain the basic knowledge of quantum physics and apply it to the behaviour of asystem at the microscopic level and solve the problems.

CO2 Interpret the requirements classification properties and application of laser and opticalfibers.

CO3 Describe the basic concepts and theory of semiconductor for devices application.

CO4 Explain the principle, types, properties and application of superconductors andnanomaterials.

CO5 Apply the knowledge of characteristic of Dielectrics and Piezoelectric materials

Reference books

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Concepts of Modern Physics, Arthur Beiser, Tata McGraw-Hill,6th edition,2009.

1. Optics, A.Ghatak, McGraw Hill, 2012.
2. Engineering Physics , Hitendra K Malik& A.K. Singh, Mc Graw Hill Education PrivateLimited
3. Elements of Modern Physics, S.H. Patil
4. Kiruthiga Sivaprastha, Modern Physics, S. Chand
5. A Textbook of Engineering Physics, Gaur and Gupta, Dhanpat Rai Publishers, NewDelhi,8th edition,.2011.
6. Electrical Engineering Materials by A.J. Dekker, PHI publication
7. Lasers and non-linear optics, B.B.Laud, New Age international,3rdedition,2011
8. Solid State Physics, S.O.Pillai , New Age International Ltd, publishers
9. Theory for Telecommunications, C.S.Liu and V.K.Tripathi, Foundation Books, NewDelhi,2007

Engineering Graphics: 100014

Course Objectives:

- To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects.
- To impart knowledge about principles/methods related to projections of one, two, and three-dimensional objects.

Unit - 1

Introduction and scale: Basics of instruments, Lettering and dimensioning, Plane geometrical constructions. Plain and diagonal scale - Representative fraction, Unit conversion and Exercises based on linear, area, volume and speed. Scale of chord.

Engineering curves: Cycloidal curves - cycloid, epicycloid and hypocycloid curve, tangent and normal.

Spiral curves - Archimedean and logarithmic spiral curves. Tangent & normal on the curves. Involute curve.

Unit - 2

Projection of points: Introduction, types of projections, quadrant system, positions of points and Exercise.

Projection of straight line: Introduction, Orientation of a straight line, Traces of a line and Exercise.

Unit - 3

Projection of planes: Introduction, Types of planes, Traces of planes, Position of planes and Exercise.

Projection of solids: Introduction, Types of solids, Positions of solids and Exercise.

Unit - 4

Section of solids: introduction, Types of section planes and Anti-section and Exercise.

Development of surfaces of right solids: Introduction, Methods of development & anti-development and exercise.

Intersection of cylinders: Introduction, methods of developments, intersection of cylinder by another cylinder and exercise.

Unit - 5

Isometric projections: Introduction, isometric scale, isometric axis, isometric view and isometric

projections from orthographic views, orthographic views from pictorial view and exercise.

Computer Aided Drafting using Auto CAD: Introduction, software's basic commands, transformation

and editing commands.

Course Outcomes:

After successful completion of this course students will be able to:

CO1. **Visualize** the geometric details of engineering objects.

CO2. **Translate** the geometric information of engineering objects into engineering drawings.

CO3. **Draw** orthographic projections and sections.

CO4. **Develop** knowledge to read, understand and explain drawing.

CO5. I**mprove** their skills so that they can apply these skills in developing new products.

CO6. **Prepare** simple layout of factory, machine and buildings.

Text books:

1. Engineering Drawing by N. D. Bhatt, Charotar Publication Pvt. Ltd.
2. Engineering Drawing by P.S. Gill, S. K. kataria& sons, Delhi
3. Engineering Drawing by BasantAgrawal& C. M. Agrawal, Tata McGraw Hill Education Pvt. Ltd.
4. Engineering Graphics by K. Venugopal, New Age International Publication, India

NPTEL Link for Engineering Graphics:

http://nptel.ac.in/courses/112103019/