Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra.

ıeme of examination :

Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each question should cover all contents of the respective module.

Students have to answer five full questions choosing one full question from each module.

ɪt Books :

B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 42nd edition, 2013.

Erwin Kreyszig, **"Advanced Engineering Mathematics"**-Vol-I & II, Wiley, 2013

ɛrence Books :

B.V. Ramana, **"Higher Engineering Mathematics"**, Tata Mc Graw-Hill, 2006

N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.

H.K.Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.

ENGINEERING PHYSICS

Subject Code :	**14PHY12/14PHY22**	**IA Marks**	**:25**
Hours/Week :	**04**	**Exam. Hours**	**:03**
Total Hours :	**50**	**Exam. Marks**	**:100**

Course Objectives :

The Objective of this course is to make students learn and understand basic concepts and principles of physics to analyze practical engineering problems and apply its solutions effectively and meaningfully. To understand building up of models, design issues, practical oriented skills and problem solving challenges are the great task of the course. Knowledge about shock waves and practical applications is the prime motto to introduce new technology at the initial stage of Engineering.

Module – 1

Modern Physics and Quantum Mechanics :

Black body radiation spectrum, Assumptions of quantum theory of radiation, Plank's law, Weins law and Rayleigh Jeans law, for shorter and longer wavelength limits.Wave Particle dualism, deBroglie hypothesis. Compton Effect and its Physical significance. Matter waves and their Characteristic properties, Phase velocity and group velocity. Relation between phase velocity and group velocity, Relation between group velocity and particle velocity.

Heisenberg's uncertainty principle and its application, (Non-existence of electron in nucleus).Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrodinger wave equation. Eigen values and Eigen functions. Application of Schrodinger wave equation. Energy Eigen values and Eigen functions for a particle in a potential well of infinite depth and for free particle. **10 Hours**

Module – 2

Electrical Properties of Materials :

Free–electron concept (Drift velocity, Thermal velocity, Mean collision time, Mean free path, relaxation time). Failure of classical free electron theory. Quantum free electron theory, Assumptions, Fermi factor, density of states (qualitative only), Fermi–Dirac Statistics. Expression for electrical conductivity based on quantum free electron theory, Merits of quantum free electron theory.

ıductivity of Semi conducting materials, Concentration of electrons and es in intrinsic semiconductors, law of mass action. Fermi level in an insic Semiconductor. Hall effect, Hall coefficient

nperature dependence of resistivity in metals and superconducting erials. Effect of magnetic field (Meissner effect). Type-I and Type-II erconductors–Temperature dependence of critical field. BCS theory alitative). High temperature superconductors. Applications of erconductors –. Maglev vehicles. **10 Hours**

Module – 3

ers and Optical Fibers :

stein's coefficients (expression for energy density). Requisites of a Laser tem. Condition for laser action. Principle, Construction and working of laser and semiconductor Laser. Applications of Laser – Laser welding, ing and drilling. Measurement of atmospheric pollutants. Holography– nciple of Recording and reconstruction of images, applications of ography.

pagation mechanism in optical fibers. Angle of acceptance. Numerical rture. Types of optical fibers and modes of propagation. Attenuation, ck diagram discussion of point to point communication, applications.

10 Hours

Module – 4

stal Structure :

ce lattice, Bravais lattice–Unit cell, primitive cell. Lattice parameters. stal systems. Direction and planes in a crystal. Miller indices. Expression inter – planar spacing. Co-ordination number. Atomic packing factors(SC, C, BCC). Bragg's law, Determination of crystal structure using Bragg's ray difractometer. Polymarphism and Allotropy. Crystal Structure of mond, qualitative discussion of Pervoskites. Principle and working of uid Crystal display. **10 Hours**

Module – 5

ck waves and Science of Nano Materials :

finition of Mach number, distinctions between- acoustic, ultrasonic, sonic and supersonic waves. Description of a shock wave and its lications. Basics of conservation of mass, momentum and energy - ivation of normal shock relationships using simple basic conservation

equations (Rankine-Hugonit equations). Methods of creating shock waves in the laboratory using a shock tube, description of hand operated Reddy shock tube and its characteristics. Experimental analysis of the performance characteristics of Reddy shock tube.

Introduction to Nano Science, Density of states in 1D, 2D and 3D structures. Synthesis : Top–down and Bottom–up approach, Ball Milling and Sol–Gel methods.

CNT – Properties, synthesis: Arc discharge, Pyrolysis methods, Applications. Scanning Electron microscope: Principle, working and applications.

10 Hours

Course Outcomes :

On Completion of this course, students are able to

- Learn and understand more about basic principles and to develop problem solving skills and implementation in technology.
- Gain Knowledge about Modern physics and quantum mechanics will update the basic concepts to implement the skills.
- Study of material properties and their applications is the prime role to understand and use in engineering applications and studies.
- Study Lasers and Optical fibers and its applications are to import knowledge and to develop skills and to use modern instruments in the engineering applications.
- Understand Crystal structure and applications are to boost the technical skills and its applications.
- Expose shock waves concept and its applications will bring latest technology to the students at the first year level to develop research orientation programs at higher semester level and
- Understand basic concepts of nanoscience and technology.

Scheme of examination :

- **Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each question should cover all contents of the respective module.**
- **Students have to answer five full questions choosing one full question from each module**

Text Books :

1. Wiley precise Text, **"Engineering Physics"**, Wiley India Private Ltd., New Delhi. Book series – 2014,
2. Dr.M.N. Avadhanulu, Dr.P.G.Kshirsagar, **"Text Book of Engineering Physics"**, S Chand Publishing, New Delhi – 2012.

erence Books :
Wiley precise Text, **"Engineering Physics"**, Wiley India Private Ltd., New Delhi. Book series – 2014,
S.O.Pillai, **"Solid State Physics"**, New Age International. Sixth Edition
Chintoo S.Kumar , K.Takayana and K.P.J.Reddy,**"Shock waves made simple"**, Willey India Pvt. Ltd. New Delhi,2014
A. Marikani, **"Engineering Physics"**, PHI Learning Private Limited, Delhi–2013
Prof. S. P. Basavaraju, **"Engineering Physics"**, Subhas Stores, Bangalore–2
V. Rajendran, **"Engineering Physics"**, Tata Mc.Graw Hill Company Ltd., New Delhi - 2012
S.Mani Naidu,**"Engineering Physics"**, Pearson India Limited – 2014.

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Dept. Of Physics
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ENGINEERING CHEMISTRY

Sub. Code : 14CHE12/14CHE22	**I.A. Marks : 25**
Hours/ week : 04	**Exam. Hours : 03**
Total Hours : 50	**Exam. Marks : 100**

Course Objectives :
To provide students with knowledge of engineering chemistry for building technical competence in industries, research and development in the following fields

- Electrochemistry & Battery Technology.
- Corrosion & Metal Finishing.
- Fuels & Solar energy.
- Polymers.
- Water Technology & Nano Materials.

Module – 1

Electrochemistry and Battery Technology :
Electrochemistry: Introduction, Derivation of Nernst equation for electrode potential. Types of electrodes: metal-metal ion, metal-metal salt ion, gas, amalgam, redox & ion selective. Reference electrodes: Introduction; construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of standard electrode potential using calomel electrode. Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrode & Electrolyte, numerical problems on electrolyte concentration cells.
Battery Technology : Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc-Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, Li-MnO_2 and Li-ion batteries.
Fuel Cells: Introduction, difference between conventional cell and fuel cell, limitations & advantages. Classification of fuel cells based on temperature, fuel and electrolyte; construction & working of methanol-oxygen fuel cell with H_2SO_4 electrolyte. **10 Hours**

Module – 2

Corrosion and Metal Finishing :
Corrosion : Introduction, electrochemical theory of corrosion, galvanic series.