fibre: optical fibre- physical structure, basic theory, type of modes, characteristics of optical fibre and applications; Illumination: laws of illumination, luminous flux, luminous intensity, candle power, brightness.

Practical

To verify law of transverse vibrations along a string using electrical tuning fork; To determine e/m of electron using magnetron valve method; Determine dielectric constant of material using De Sautys bridge; Study the variation of magnetic field with distance along the axis of a current carrying circular coil and to determine the radius of the coil; Determine the energy band gap in a semi-conductor using a p-n junction diode; Study the LCR circuit; Find the wave length of light by using prism and spectrometer; Determine the low resistance using Carey Foster bridge without calibrating the bridge wire.

Suggested Readings

1. Avadhanulu, M. N. 2013. *An Introduction to Lasers theory and applications*. S. Chand Publication.

2. Chattopadhyay, D. and Rakshit, P. C. 2011. *Electricity and Magnetism*. S. Chand Publication.

3. Ghatak, A. K. and Lokanathan, S. 2022. *Quantum Mechanics*, *Theory and Application*. Trinity Press.

4. Griffiths, D. J. and Schroeter. 2018. *Introduction to Quantum Mechanics*. Cambridge University Press.

5. Khandelwal, D. P. 1985. *A Laboratory Manual of Physics*. Vani Publications.

6. Kittel, C. 2005. *Introduction to Solid State Physics*. Wiley Eastern Pvt. Ltd.

7. Laud, B. B. 2011. *Lasers and Non-linear Optics*. New Age International Publishers.

8. Mani, H. S. and Mehta, G. K. 2022. *Modern Physics*. Affiliated East-West Press.

9. Omar, M. A. 2002. *Elementary Solid State Physics*. Pearson.

10. Prakash, S. 2011. Optics. *Pragati Prakashan*, Meerut.

11. Saraf, B. and Khandelwal, D. P. 1982. *Physics through Experiments.* Vol. I & II. Vikas Publication, New Delhi.

12. Subramanyam, N., Lal, B. and Avadhanulu, M. N. 2012. *A Textbook of Optics*. S. Chand.

13. White, H. E. 2019. *Introduction to Atomic Spectra*. Mc-Graw Hill Publication.

14. Worsnop, B. L. and Flint, H. C. 1951. *Advanced Practical Physics*. Littlehampton Book Services Ltd.

Engineering Chemistry   3 (2+1)Objective

To make the students acquainted with applications of chemistry in engineering and different chemical processes in agricultural and food engineering

Theory

Phase rule: Phase, component, degree of freedom, application to one component system, viz. water system, sulphur system, two component system, viz. pb-Ag system, desilverisation of Pb.

Colloids: Classification, properties like optical activity-Tyndall effect, Brownian movement, electrical properties –electrophoresis, causes, types and methods of prevention- proper designing.

Corrosion: Cathodic protection using pure metal and metal alloys, use of inhibitors.

Water: Temporary and permanent hardness, disadvantages of hard water, scale and sludge formation of boilers, boiler corrosion, basic idea on thermo-gravimetric analysis, polarographic analysis, nuclear radiation, detectors and analytical applications of radio-active materials, discovery of isotopes and new elements, release of atomic energy, radio-active tracer and carbon dating.

Fuels: Classifications, calorific value and its determination by bomb calorimeter.

Principles of food chemistry: Lipids, proteins, carbohydrates and their classifications, vitamins and their importance.

Enzymes and co-enzymes important in food processing and storage, their use in manufacturing of ethanol and acetic acid by fermentation method.

Introduction to food preservatives, definition, types natural and artificial preservative and its use, colouring and flavoring reagents of foods.

Lubricants: Classifications, properties-viscosity, flash point and fire point mechanism, thick film, thin film and extreme pressure, neutralization point, saponification number and mechanical stability.

Type of polymerization with examples (addition, free radical); Different properties of polymers- chemical resistance, crystallinity.

Polymers: Effect of heat on polymers, general use, basic principles of determination of molecular weight by viscosity methods, basic principles of determination of molecular weight by light scattering methods.

Introduction to IR spectroscopy: Basic principles of spectroscopy, Beer-Lambarts law, types of vibration, symmetric, asymmetric vibration and it type, absorbances of different functional group in IR.

Practical

To determine of temporary and permanent hardness of water by EDTA method; To study the different types of fuels and compare their characteristics; To study different types of foods and their ingredients; To study the different types of food preservatives and their active principles; To estimate chloride in water sample; To estimate dissolved oxygen in water sample; To estimate chloride in water samples; To study the different properties of lubricants; To determine λ_{max} and verification of Beer-Lambert law.

Suggested Readings

1.   Bahl, B. S., Bahl, A. and Tuli, B. D. 2007. *Essentials of Physical Chemistry*. S. Chand and Co. Ltd, Delhi.
2.   Finar, I. L. 2002. *Organic Chemistry*. Vol I and II. Pearson.
3.   Glasstone, S. *Elements of Physical Chemistry*. The Macmillan Company of India Limited.

4. Jain and Jain. 2016. *Engineering Chemistry*. Dhanpat Rai Publication.

5. Jain, P. L. and Jain, M. 1994. *Engineering Chemistry*. Danpat Rai publishing company Pvt. Ltd, Delhi.

6. Morrison, R. T., Boyd, R. N. and Bhattacharjee, S. K. 2010. *Organic Chemistry*. Pearson.

7. Sharam, Y. R. 2013. *Elementary Organic Spectroscopy*. S Chand.

Engineering Mechanics   3 (2+1)

Objective

To make the students acquainted with the principles of engineering mechanics and the calculation of different stresses to be helpful for design of engineering structures

Theory

Basic concepts of engineering mechanics, statics, dynamics, kinetics, scalar quantities, vector quantities, systems of units.

Composition and resolution of forces, analytical method, graphical method.

Laws of forces, moments and their application, levers, parallel forces and couples.

Equilibrium of forces, free body diagrams.

Centre of gravity (CG) of simple geometrical figures, CG by moments, plane figures, axis of references, CG of symmetric sections, unsymmetrical sections, solid bodies and cut sections.

Moment of inertia: Methods of finding out M.I., methods of integration, M.I. of different sections, Theorem of perpendicular axes, parallel axes, M.I. of composite sections and cut sections.

Frictional forces, static friction, dynamic friction, limiting friction, normal reaction, angle of friction, coefficient of friction, laws of friction, equilibrium of a body lying in horizontal and inclined planes, ladder friction; wedge friction, screw friction, screw jack.

Analysis of simple framed structures, methods of sections, force table, methods of joints, hinged joints, roller support, vertical and inclined loads.

Simple stresses and strain, Hooke's law, Poisson's ratio, modulus of elasticity, Strain related problems.

Shear force and bending moment, fundamentals of shear force and bending moment, SFD and BMD of cantilever and simply supported and overhanging beams, point of contra-flexture.

Torsion of circular shaft, torsional effect, hoop stress, power transmitted by a shaft.

Principal stresses and strain, analysis of plane and complex stress, principal planes and principal stresses, Mohr's circle, finding out principal stresses, different analysis.

Practical

Problems on composition and resolution of forces; Study the moments of a force; Problems related to resultant of a concurrent-coplanar force system; Problems related to non-concurrent coplanar force system; Systems of couples in space; Problems related to centroids of composite areas;