COURSE TITLE : ENGINEERING PHYSICS II
COURSE CODE : 2003
COURSE CATEGORY : F
PERIODS PER WEEK : 3
PERIODS /SEMESTER : 45
CREDITS : 3

TIME SCHEDULE

Module	Name of Module	Course Objective Number	Total periods per Semester		
			Instructional	Test	Total
I	Circular Motion and Rotational Dynamics.	1.1 - 1.4	12	1	13
II	Gravitation and Satellites.	2.1 - 2.6	8	1	9
III	Electromagnetism	3.1 - 3.3	12	1	13
IV	Modern Physics	4.1 - 4.9	9	1	10
	TOTAL		**41**	**4**	**45**

COURSE OUTCOME

After the completion of the course student will be able to:

- Create a clear cut understanding of various aspects of circular motion which is relevant to Engineering Science.
- Explain the Banking of roads and rails.
- Know the idea of a rigid body and its motion. It will impart the meaning of technical terms such as Moment of Inertia, Radius of gyration, axis of rotation, angular momentum and torque. He can also estimate various energies associated with rotation.
- Apply Equations of Translational and rotational motion in analysing rolling without slipping.
- Gather detailed ideas of Gravitational force and Acceleration due to gravity.
- Conceive introductory knowledge of different types of satellites.
- Derive technical terms such as Orbital velocity, Period, escape velocity of Satellites.

- Study orbital features of geostationary Satellites and its uses in everyday life.
- Study the orbital features of Polar Satellites and the uses of polar satellites.
- Get an overview of other types of satellites.
- Apply basic laws of Electricity and magnetism to solve simple problems concerning the motion and distribution of charges.
- Analyse complicated electrical circuits and find out currents through different branches and resistances in the circuit.
- Design simple electrical instruments using magnetic effect of electric current and understand how those devices can be used as multi range ammeters and voltmeters.
- Get basic ideas of the nature of light with special reference to quantum theory.
- Study quantitatively as well as qualitatively photoelectric effect.
- Derive Einstein's photoelectric electric equation.
- Get an overview of applications of photoelectric effect in various fields
- Understand the working of a Laser with special reference to Ruby laser, He-Ne gas laser and solid state laser with their merits and demerits.
- Introduction to various applications of Laser including communication.
- Create an awareness of nuclear fission and the working of nuclear reactors.
- Gather an introductory knowledge of nuclear fusion with special reference to energy production in stars.
- Impart an idea of alternative forms of energy sources.

SPECIFIC OUTCOME

MODULE - I 2.1 CIRCULAR MOTION AND ROTATIONAL DYNAMICS

2.1.1. Understand the concept of circular motion.
2.1.2. Define angular displacement and angular velocity.
2.1.3. Derive the relation between linear velocity and angular velocity.
2.1.4. Mention the expression for centripetal acceleration.
2.1.5. Apply the Principle of centripetal force in the case of banking of roads and rails.
2.1.6. Solve the problems related to centripetal force.
2.1.7. Understand the dynamics of rotating body.
2.1.8. Define the moment of inertia of a rigid body.
2.1.9. Define radius of gyration.
2.1.10. State theorems of parallel and perpendicular axes.
2.1.11. Define torque.
2.1.12. Mention the relation between torque and angular momentum.
2.1.13. Mention the expression for kinetic energy of rotation.
2.1.14. Derive the expression for moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane.
2.1.15. Derive expression for kinetic energy of a disc rotating on a horizontal plane.
2.1.16. Solve problems using above expressions.

MODULE – II 2.2 GRAVITATION AND SATELLITES

2.2.1. State Newton's law of gravitation.
2.2.2. Derive expression for orbital velocity, Period of satellite.
2.2.3. Define gravitational potential.
2.2.4. Mention expression for escape velocity.
2.2.5. Understand the idea of satellites.
2.2.6. Explain geostationary satellites and polar satellites.
2.2.7. Mention applications of geostationary and polar satellites.

MODULE - III 2.3 ELECTROMAGNETISM

2.3.1. Understand the terms electric charge and potential difference.
2.3.2. State Ohm's law
2.3.3. Explain the terms resistivity and conductivity.
2.3.4. Understand the law of resistances.
2.3.5. Understand the fundamentals of electricity and its magnetic effect .
2.3.6. State Kirchoff's laws.
2.3.7. Derive expression for balancing condition of wheatstone's Bridge.
2.3.8. State Biots and Savart's law.
2.3.9. Mention the expression for magnetic field due to current through a circular coil.
2.3.10. State Fleming's left hand rule.
2.3.11. Describe the principle and construction of a moving coil galvanometer.
2.3.12. Explain the conversion of galvanometer into ammeter and voltmeter
2.3.13. Solves problems based on the above laws.

MODULE - IV 2.4 MODERN PHYSICS

2.4.1. Understand laser action and its applications.
Explain population inversion, spontaneous emission, stimulated mission and optical pumping.
2.4.2. Write down the characteristics of Laser.
2.4.3. Describe various applications of Laser.
2.4.4. Explain the working of Ruby Laser, He –Ne laser.
2.4.5. Understand the advantage of gas laser over solid state laser.
2.4.6. Comprehend the theories of photoelectric effect
2.4.7. Describe Max plank's quantum theory.
2.4.8. Explain Photoelectric effect and application(photoelectric cell)
2.4.9. State Laws of Photoelectric emission.
2.4.10. Derive Einstein's photoelectric equation.
2.4.11. Solve problems using the above equation.
2.4.12. Understand nuclear fission and explain the working of nuclear reactors.
2.4.13. Understand nuclear fusion and explain the energy production in stars.

CONTENT DETAILS

MODULE – I CIRCULAR MOTION AND ROTATIONAL DYNAMICS (13Hrs)

Angular displacement – angular velocity – angular acceleration – relation between linear velocity and angular velocity in circular motion – centripetal acceleration – centripetal force – banking of roads and rails – problems.

Rigid body – centre of mass - moment of inertia – radius of gyration – statement of parallel and perpendicular axes theorems – derivation of moment of inertia of a disc about an axis passing through the centre and perpendicular to its plane – angular momentum and torque – relation between torque and angular momentum (only expression) – rotational kinetic energy – kinetic energy of a disc rolling on a horizontal surface – problems.

MODULE- II GRAVITATION AND SATELLITES (9Hrs)

Newton's law of gravitation- Expression for acceleration due to gravity- Factors affecting the value of g- variation of acceleration due to gravity- satellites- Artificial satellites- orbital velocity and period of a satellite-gravitational potential –escape velocity- geostationary satellites and it's uses- polar satellites and it's uses - uses of artificial satellites

MODULE - III ELECTROMAGNETISM (13Hrs)

Electric charge – potential difference – Ohm's law – verification of Ohm's law – resistivity – conductivity – law of resistances – Kirchhoff's laws – Wheatstone's Bridge – Metre Bridge- magnetic effect of electric current—Biot-savart law-magnetic field due to a current carrying conductor- force on a current carrying conductor placed in a magnetic field- Moving Coil Galvanometer and its working – shunt- conversion of a galvanometer into an ammeter - conversion of a galvanometer into a voltmeter – problems.

MODULE - IV MODERN PHYSICS (10Hrs)

Quantum theory – photoelectric effect – experiment to illustrate photoelectric effect – laws of photoelectric effect – Einstein's photoelectric equation – applications of photoelectric effect – problems.

Laser – principle of laser – characteristics – Ruby laser and its working–gas laser – Helium Neon gas laser and its working – advantages of gas laser over solid state laser – applications of laser.

Nuclear fission – chain reaction – nuclear reactor and its working – uses – nuclear fusion.- alternative forms of energy sources.

REFERENCE BOOKS

1. Resnick and Halliday - Physics
2. D.S.Mathur - Mechanics
3. Narayana Kurup - Mechanics
4. Murukesan - Modern Physics
5. A.Marikani - Engineering Physics
6. M N Avadhanulu - An Introduction to Lasers- Theory and Applications
7. H D Young - University Physics