

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, NOVEMBER – 2024**

ENGINEERING PHYSICS II

[Maximum Marks : 100]

[Time : 3 hours]

PART – A

(Maximum Marks : 10)

I. Answer **all** questions in one or two sentences. Each question carries 2 marks.

1. What is meant by centripetal acceleration, give its expression?
2. State Newton's law of gravitation.
3. State Kirchhoff's voltage law.
4. Define threshold frequency.
5. What is pumping in laser? (5x2=10)

PART – B

(Maximum Marks : 30)

II. Answer any **five** of the following questions. Each question carries 6 marks.

1. Why do bicycle riders lean in when taking a curve at high speed?
Justify your answer. Explain banking of curve.
2. State parallel and perpendicular axis theorem of moment of inertia.
3. Explain geostationary satellite and give three applications.
4. State Biot and Savarts law. Mention expression for magnetic field due to current through circular coil at its centre.
5. State three laws of photoelectric effect.
6. Write three characteristics and three applications of Laser.
7. Explain nuclear fusion. Find out energy released in Mev in fusion reaction
 ${}_1\text{H}^2 + {}_1\text{H}^2 \rightarrow {}_2\text{He}^4 + \text{energy}$. Mass of one ${}_1\text{H}^2 = 2.015$ amu. Mass of one
 ${}_2\text{He}^4 = 4.03$ amu. $1\text{amu} = 931$ Mev. (5x6=30)

PART – C

(Maximum Marks : 60)

(Answer **one full** question from each unit. Each full question carries 15 marks)

UNIT – I

- III.** (a) Define moment of inertia of a rigid body. (3)
- (b) Derive the expression for Moment of inertia of a uniform circular disc about axis through its centre and perpendicular to its plane. (6)
- (c) Determine rotational kinetic energy of a disc of mass 1 kg and radius 0.05m rolling along a horizontal surface with velocity 0.3m/s. (6)

OR

- IV.** (a) Define Torque and write the relation between Torque and angular momentum. (3)
- (b) Define angular velocity. Derive the relation between linear velocity and angular velocity. (6)
- (c) A body moving along a circle changes its angular velocity from 3000rpm to 4500rpm in 1 minute. Determine angular acceleration. (3)
- (d) A stone of mass 0.05kg is attached to a string of length 0.2m and rotated in horizontal circle. The string can withstand a maximum tension of 100 N. Find maximum angular velocity with which body can be rotated without breaking. (3)

UNIT – II

- V.** (a) Write a short note of polar satellite with two applications. (3)
- (b) Derive the expression for orbital velocity and period of artificial satellite. (6)
- (c) Calculate mean distance from earth's surface for a geostationary satellite.
 $G = 6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$. $M = 6 \times 10^{24} \text{ kg}$. $R = 6400 \text{ Km}$ (6)

OR

- VI.** (a) Deduce the expression for acceleration due to gravity from newtons law of gravitation.(3)
- (b) Define gravitational potential. What is meant by escape velocity and give its expression? (6)
- (c) Calculate the orbital velocity of a satellite at a height 300Km from the surface of earth.
 $M = 6 \times 10^{24} \text{ kg}$, $G = 6.6 \times 10^{-11} \text{ Nm}^2 \text{ kg}^2$ $R = 6400 \text{ Km}$. (6)

UNIT –III

- VII.** (a) State ohms law. (3)
- (b) With Principle and diagram give the construction and working of moving coil galvanometer. (6)
- (c) You have a galvanometer of range 10 mA and resistance 50 ohm. How would you convert it into an ammeter to measure a current up to 1A. and a voltmeter to measure up to 5V. (6)

OR

- VIII.** (a) Explain the term resistivity and conductivity. (3)
- (b) Describe Wheat stone's bridge experiment to determine resistance of wire. (6)
- (c) The resistance of copper wire of length 100m and radius 0.3mm is 6 ohm. Calculate resistivity of copper. (6)

UNIT – IV

- IX.** (a) Give three advantages of gas laser over other lasers. (3)
- (b) With diagram explain the working of Ruby Laser. (6)
- (c) When a metal is radiated with light of wavelength 100 nm, maximum kinetic energy of liberated electron is 10^{-18} J. Calculate photoelectric work function for the metal.
($h = 6.62 \times 10^{-34}$ Js. $c = 3 \times 10^8$ m/s) (6)

OR

- X.** (a) Give three uses of nuclear reactor. (3)
- (b) With diagram explain the working of nuclear reactor. (6)
- (c) Threshold wavelength for a metal for photoelectric emission is 400nm. Find maximum kinetic energy of electrons emitted when it is exposed to radiation of wavelength 200nm. (6)
