

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE, NOVEMBER – 2023**

**ENGINEERING PHYSICS - II**

[Maximum Marks : 100]

[Time : 3 hours]

**PART – A**  
(Maximum Marks : 10)

Marks

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

1. Define radius of gyration. What is its unit?
2. Define torque. Write down the relation between torque and angular momentum.
3. What is a Polar satellite?
4. State Ohms law.
5. What is a moderator?

(5x2=10)

**PART – B**  
(Maximum Marks : 30)

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

1. Define angular velocity. What is its unit? Deduce relation between linear velocity and angular velocity.
2. Deduce the expression for kinetic energy of a disc rolling on a horizontal surface.
3. Define Orbital velocity. Find the orbital velocity of an artificial satellite moving close to the surface of the Earth.
4. State and explain Kirchhoff's Laws.
5. Using Kirchhoff's laws derive the balancing condition for Wheatstone's bridge.
6. Describe with necessary theory, the construction and working of a moving coil galvanometer.
7. Give Einstein's explanation of Photoelectric effect.

(5x6=30)

**PART – C**  
(Maximum Marks : 60)

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

**UNIT – I**

- III.**
- (a) Explain the term banking of curve and the write down the relationship between optimum speed and angle of Banking. (3)
  - (b) State parallel and perpendicular axis theorem of moment of inertia. Using the theorem find the moment of inertia of a disc about any diameter. (6)
  - (c) A Particle is moving along the circumference of a circle of radius 4m. If the angular velocity changes from 4 to 10 revolutions per second in 6 s, calculate the angular and linear accelerations. (6)

**OR**

- IV.** (a) A disc of moment of inertia  $10 \text{ kg-m}^2$  gains an angular momentum 400 SI units in 5 seconds, starting from rest. What is the torque acting? (3)
- (b) Show that the magnitude of the centripetal acceleration for a body moving along a circle of radius 'r' with constant speed 'v' is ' $v^2/r$ '. (6)
- (c) Calculate the rotational kinetic energy of a disc of mass 10 kg, with the radius 5 cm rolling a horizontal surface with a velocity 10 m/s. (6)

**UNIT – II**

- V.** (a) Find a relation between acceleration due to gravity and gravitational constant. (3)
- (b) Explain the concept of geo stationary satellite. Derive an expression for its height above the Earth. (6)
- (c) Calculate the acceleration due to gravity at a depth 500 km below the surface of earth. (Radius of earth = 6400 km;  $g = 9.8 \text{ m/s}^2$ ). (6)

**OR**

- VI.** (a) List any three uses of artificial satellites. (3)
- (b) Discuss the variation of acceleration due to gravity  $g$  with altitude and depth. (6)
- (c) Find the orbital velocity of an artificial satellite moving at a height of 640 km from the surface of the earth. ( $R = 6400 \text{ km}$  and  $g = 9.8 \text{ m/s}^2$ ). (6)

**UNIT –III**

- VII.** (a) State and explain Biot – Savart's law. (3)
- (b) Find the equation for the effective resistance of two resistors connected (1) in series and (2) in parallel. (6)
- (c) A galvanometer has resistance  $20 \Omega$  and full scale deflection current 10 mA. How it could be converted into an ammeter of range 5 A? (6)

**OR**

- VIII.** (a) Explain resistivity and write its equation. (3)
- (b) Explain the construction and working of Meter Bridge. (6)
- (c) Derive the expression for magnetic field due to straight current carrying conductor. (6)

**UNIT – IV**

- IX.** (a) Write three characteristics of LASER. (3)
- (b) What are the essential components of a nuclear reactor? Describe the functions. (6)
- (c) Calculate the photoelectric work function of a metal of threshold wavelength 600 nm. ( $h = 6.626 \times 10^{-34} \text{ J.s}$  and  $c = 3 \times 10^8 \text{ m/s}$ ). (6)

**OR**

- X.** (a) List three applications of photoelectric effect. (3)
- (b) With the help of a neat diagram, explain the working of a Ruby Laser. (6)
- (c) Four protons are combined to produce a helium nucleus and two positrons. Calculate the energy released in MeV, if the masses of proton, helium and positrons are 1.00783u; 4.0026u; and 0.0005u respectively. Assume that 1u is equivalent to 931 MeV. (6)

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