

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

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. A particle takes 2 seconds to complete one revolution in a circle. Find the angular velocity of the body.
 2. Write any two equation of motion for a body executing 'angular motion'.
 3. What happens to acceleration due to gravity when we go downwards from the surface of earth?.
 4. Name two materials which have conductivity more than that of Aluminium.
 5. The wavelengths 400 nm, 550 nm, 600 nm, and 820 nm are incident on a photosensitive material. When light of wavelength 550 nm incident on the material, photoelectrons are just starts to emit. Comment the statement. (5 x 2 = 10)

PART-B

[Maximum Marks: 30]

- II. (Answer **any five** of the following questions. Each question carries 6 marks)
1. With the help of necessary equation explain the term 'centripetal acceleration'. Write three examples of centripetal force.
 2. Prove that the period of a satellite revolving close to earth is $2\pi\sqrt{\frac{R}{g}}$. Where R is the radius of earth and g is acceleration due to gravity.
 3. The observations in Ohm's law experiment are tabulated as shown.

Ammeter Reading (ampere)	Voltmeter Reading (Volt)
1.5	3
1.7	3.5
2	4

Find the resistivity of given wire of diameter 0.2 mm and length 50 cm

4. Discuss the variation of acceleration due to gravity of earth due to rotation and shape of the earth.

5. Explain the working of moving coil galvanometer. Show that the current through a galvanometer is proportional to the deflection of coil.
6. Explain the following:
 - a) Principle of laser action. b) Characteristics of laser.
7. Electrons are not emitted from a metal if the wavelength of incident radiation exceeds 664 nm. Calculate the threshold frequency of incident radiation and work function of the metal (5 x 6 = 30)

PART-C

[Maximum Marks: 60]

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

UNIT – I

- III. a. State and explain parallel axes theorem. (3)
- b. Derive the expression for moment of inertia of a circular disc about an axis passing through the centre and perpendicular to its plane. (6)
- c. Apply the law of parallel axes and calculate the moment of inertia of a circular disc about an axis passing through its edge and perpendicular to its plane. Mass of disc 1kg radius 0.5m. (6)

OR

- IV. a. State and explain perpendicular axes theorem. (3)
- b. Derive the expression for total kinetic energy of a circular disc rolling on a horizontal surface. (6)
- c. A uniform disc is rolling on a horizontal surface at a speed 2 revolutions/s. Calculate its rotational kinetic energy. Given that radius of the disc is 20 cm and mass is 2.5 kg. (6)

UNIT – II

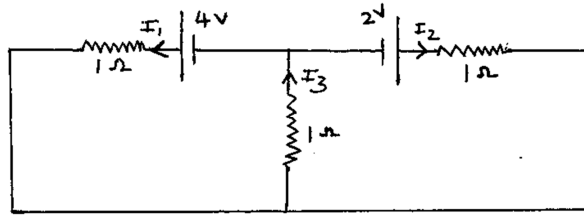
- V. a. Why geostationary satellite is called synchronous satellite? (3)
- b. With necessary theory derive the expression for orbital velocity of a satellite revolving close to earth. (6)
- c. Calculate the velocity of a satellite orbiting the earth very close to the surface, if the value of G is $6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$. Given that Mass of earth is $6 \times 10^{24} \text{ kg}$ and radius of earth 6400 km? (6)

OR

- VI. a. Define gravitational potential. (3)
b. Define escape velocity of Earth. Write an expression for escape velocity. (6)
c. Find the escape velocity of earth from the following data. $g=9.8\text{m/s}^2$, radius of earth is 6400Km. (6)

UNIT- III

- VII. a. State Kirchoff's laws. (3)
b. Explain the principle and working of Meter Bridge. (6)
c. Find the currents I_1 , I_2 and I_3 using Kirchoff's laws. (6)



OR

- VIII. a. Distinguish between galvanometer and ammeter. (3)
b. What are the techniques used to modify a Galvanometer into ammeter? (6)
c. A galvanometer has a resistance of 12 ohm and it shows full scale deflection for 2 mA. How can it be converted to an ammeter of range 3 A. (6)

UNIT - IV

- IX. a. Explain the terms threshold frequency. (3)
b. Derive the expression for maximum Kinetic Energy of a photon produced in photoelectric effect. State the factors on which maximum kinetic energy depends. (6)
c. Photo electric work function of some materials are given below (6)

Metal	Photoelectric work function
X1	$3.1 \times 10^{-19} \text{ J}$
X2	$3.8 \times 10^{-19} \text{ J}$
X3	$5.6 \times 10^{-19} \text{ J}$
X4	$8.2 \times 10^{-19} \text{ J}$

Which of the above metals will eject electrons when irradiated with light of wavelength 500 nm?

OR

- X. a. Write the significance of neutron multiplication factor. (3)
- b. What are the essential components of a nuclear power reactor? Explain the functions of each. (6)
- c. How much energy (in electron volt) will be produced in the fission of 2 g of uranium, if 1 % of mass is converted into energy in the fission process? (6)
