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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2022.

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. Obtain the relation between linear velocity and angular velocity for uniform circular motion.
2. Calculate the force on a conductor of length 2 cm carrying 8A current placed perpendicular to a magnetic field of 1 Tesla.
3. State Newton's law of gravitation.
4. Mention any two advantages of gas laser over solid laser.
5. Define radius of gyration. (5x2=10)

PART - B

(Maximum Marks : 30)

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

1. Discuss the variation of acceleration gravity with altitude and depth.
2. State Kirchhoff's laws and use these to derive the condition for balancing of a Wheatstone's bridge.
3. Give Einstein's explanation of photoelectric effect.
4. What is meant by banking of curved tracks? Write an expression for the height of banking in curved railway tracks.
5. Derive the expression for the moment of inertia of a circular disc about an axis perpendicular to its plane and passing through the center.

6. Obtain an expression for the rotational kinetic energy of a circular disc rolling on a horizontal plane. What fraction of its total kinetic energy is rotational?

7. State Ohm's law. Describe the laws of combination of resistances.

(5x6 =30)

PART - C

(Maximum marks : 60)

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

UNIT I

III (a) The moment of inertia of a wheel about an axis of rotation is 3.1Kgm^2 and its kinetic energy of rotation is 600 J. What is its angular velocity? (3)

(b) Show that the magnitude of the centripetal acceleration for a body moving along a circle of radius 'r' with constant speed is 'v^2/r'. (6)

(c) Write equations of angular motion. Find the angle through which a cyclist leans when he rides through a curved path of radius 50m at a speed 10m/s. (6)

OR

IV (a) A disc of moment of inertia 12 kgm^2 gains an angular momentum 384 Nm in 8 seconds starting from rest. What is the torque acting? (3)

(b) State and explain the parallel axes and perpendicular axes theorems. (6)

(c) Five masses 3 Kg, 4Kg, 1Kg, 4kg and 3 Kg are placed in order on alight rod. The distance between two consecutive masses is 2 m. Find the moment of inertia about an axis perpendicular through 1 Kg mass. (6)

UNIT- II

V (a) If the mass and radius of the moon are 7.6 X 10^{22} Kg and 1740km respectively, Calculate the acceleration due to gravity at its surface. (3)

(b) Explain the concept of geo stationary satellite. Derive an expression for its height above the earth. (6)

(c) Define Orbital velocity. Find the orbital velocity of an artificial Satellite moving close to the surface of the Earth (first cosmic velocity). (6)

OR

VI (a) Calculate the mean density of the earth in terms of G, g and R(G-Universal Gravitational constant, g-acceleration due to gravity and R-Radius of the earth). (3)

(b) Define Escape velocity and deduce its formula. Calculate the escape velocity of a body on the moon if the radius and acceleration due to gravity of the moon are 1760 km and 1.63 ms^{-2} respectively. (6)

(c) Write a note on GPS satellite. Obtain an expression for period of artificial satellite. (6)

UNIT- III

VII (a) Calculate the length of a manganin wire of diameter 0.315 mm required to make a 20 ohm resistance. Resistivity of manganin is 44.5×10^{-8} Ohm meter. (3)

(b) Describe with picture, how can a galvanometer be converted to an ammeter? A 10 ohm coil galvanometer can carry a current of 10mA. How can it be used as a voltmeter of range 5V. (6)

(c) State Biot-Savart's law and use it to derive the expression for the magnetic field produces at the center of a current carrying circular coil. (6)

OR

VIII (a) A long straight wire carries a current of 75A. Find the magnitude of the magnetic field at a perpendicular distance 5 cm from it. (3)

(b) Describe with necessary theory, the construction and working of a moving coil galvanometer. (6)

(c) Describe a metre bridge. How is it used to measure the resistivity of a metal wire. (6)

UNIT – IV

IX (a) Copper has photoelectric work function 7.2×10^{-19}J. Calculate the threshold wavelength and threshold frequency. (3)

(b) Briefly describe the essential components of a nuclear reactor? With the help of a diagram, explain the working of a pressurized water reactor. (6)

(c) State and explain Einstein's mass-energy relation. Use it to explain energy production in the case of nuclear fission and fusion with an example. (6)

OR

X (a) 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 respectively 1.00783u; 4.0026u; and 0.0005u. Assume that 1u is equivalent to 931 MeV. (3)

(b) Explain the principle of laser action. Which are the chief characteristics of laser radiation. Mention any four applications of laser. (6)

(c) With the help of a neat diagram, explain the working of a Ruby Laser. (6)

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