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Reg. No.....

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SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY— MARCH, 2016

ENGINEERING PHYSICS - II

(Common to all branches except DCP and CABM)

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define torque. What is its unit ?
2. On what factors do moment of inertia of a body depend on ?
3. Define gravitational potential. Give an expression for it.
4. What is the use of shunt resistance in an ammeter ?
5. Give two applications of photoelectric effect.

(5×2=10)

PART — B

(Maximum marks : 30)

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

1. A train has to negotiate a curve of radius 400m. By how much the outer rail be raised as compared with the inner rail for a speed of 54km/hr. The distance between the rails is 1m.
2. A flywheel starting from rest is accelerated by a steady torque of 24Nm so that it acquires an angular velocity of 6π rad/s after 2 seconds. The mass of the fly wheel is 15kg. Calculate angular acceleration and radius of gyration.
3. Derive an expression for the escape velocity. Calculate the escape velocity on the surface of earth. Mass of earth is 6×10^{24} kg, $G = 6.67 \times 10^{-11} Nm^2kg^{-2}$, Radius of earth is 6.4×10^6m.
4. At what height from the surface of earth will the value of g be reduced to $\frac{1}{4}^{th}$ the value at the surface of earth? Radius of earth is 6400 km.

Marks

5. Describe the terms resistance and resistivity. A constantan wire of length 1m and diameter 0.71mm has a resistance of 1.2Ω. Calculate the resistivity of constantan.

6. State Biot-Savart law and apply it to calculate the magnetic field intensity at the centre of a circular coil carrying a current.

7. The work function of a metal is 2.8eV. What is its threshold wavelength ? ($1eV = 1.6 \times 10^{-19}J$, $h = 6.63 \times 10^{-34}$ Js) (5×6=30)

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) What is meant by angular velocity ? Derive the relation between linear velocity and angular velocity for uniform circular motion. 3

(b) Derive an expression for the moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane. 6

(c) A ring of mass 2kg and radius 10cm is rolling on a horizontal surface with constant angular velocity 6π rad/s. Calculate moment of inertia about its axis and rotational kinetic energy. 6

OR

IV (a) Derive an expression for the centripetal acceleration of a body in uniform circular motion. 3

(b) State and explain parallel axes and perpendicular axes theorem. 6

(c) Five masses 3kg, 4kg, 1kg, 4kg and 3kg are placed on a light rod. The distance between two consecutive masses is 2m. Find the moment of inertia and radius of gyration about the perpendicular axis passing through the 1kg mass. 6

UNIT — II

V (a) Discuss the variation of g with altitude. 3

(b) Derive expressions for orbital velocity and period of revolution of an artificial satellite. 6

(c) An Artificial satellite is revolving around the earth of radius 6400 km takes 10 hours to complete one revolution. Find the distance to it from the surface of the earth. Acceleration due to gravity on the surface of earth is $9.8m/s^2$. 6

OR

Marks

VI (a) What are geostationary satellites ? Describe its applications. 3

(b) Calculate the height at which a geostationary satellite revolves above the earth. Acceleration due to gravity is $9.8 m/s^2$ on the surface of earth and the radius of earth is 6400km. 6

(c) Derive expressions for variation of g with altitude and depth. 6

UNIT — III

VII (a) Give expression for the force acting on a current carrying conductor placed in a magnetic field. Also state Fleming's left hand rule. 3

(b) With the help of a neat diagram, explain the working of a metre bridge. How is it used for the measurement of resistance ? 6

(c) A galvanometer of resistance 70Ω shows full scale deflection for a current of 2mA. How can it be converted to :

(a) an ammeter of range 10A, (b) a voltmeter of range 5V ? 6

OR

VIII (a) Two resistors 10Ω and 10Ω are connected in parallel and the combination is then connected in series with 8Ω. Find the effective resistance. 3

(b) State Ohm's law. Describe the laws of combination of resistances. 6

(c) When a current 2A flows through a circular coil of radius 5cm a magnetic field intensity 12.56×10^{-4} tesla is generated at the centre. Calculate the number of turns in the coil. 6

UNIT — IV

IX (a) What are the advantages of solid state laser over other lasers ? 3

(b) With the help of a neat diagram, explain the working of a Ruby laser. 6

(c) The photoelectric work function of copper is 7.2×10^{-19} J. Calculate the threshold wavelength and threshold frequency.
($h = 6.63 \times 10^{-34}$ Js, $c = 3 \times 10^8$ m/s) 6

OR

X (a) Mention three uses of a nuclear reactors. 3

(b) Mention the essential components of a nuclear reactor and explain the working of a power reactor. 6

(c) When a metal is irradiated with light of wavelength 100nm, the maximum kinetic energy of the liberated electrons is 10^{-18} J. Calculate the work function of the metal. 6
