Reg. No...

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SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY — OCTOBER, 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 all the questions in one or two sentences.   Each question carries 2 marks.

1. Write down the SI units for moment of inertia and torque.

2. What is meant by gravitational potential ?

3. State Kirchhoff's laws ?

4. What is photoelectric work function ?

5. Distinguish between nuclear fission and fusion ?

$(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

(Answer *any* five questions from the following. Each question carries 6 marks.)

II   1. Derive the expression for moment of inertia of a circular disk about its own axis.

2. Explain the concepts of centripetal force and derive the expression for it in the case of a body in uniform circular motion.

3. Explain what is meant by geostationary satellite and polar satellites. Discuss their uses.

4. Discuss the variation of acceleration due to gravity with altitude and depth.

5. Explain the terms electrical resistance, resistivity and conductivity.

6. Derive the condition for balancing of a Wheatstone's bridge.

7. Explain the principles and working of solid state lasers and its advantages.

$(5 \times 6 = 30)$

[3]

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 angular momentum and torque. How are they related ? 3

(b) The Moon is orbiting the Earth in a nearly circular path radius 3,84,000 km with a period of 27.3 days. Calculate its angular velocity and centripetal acceleration. 6

(c) A broad gauge railway track is constructed around a curve of radius 400m. If the track is designed for a speed of 20 m/s, calculate height difference between outer and inner rails. (Width of broad gauge is 1.43m and $g = 9.8$ m/s^2) 6

OR

IV (a) Why does a cyclist lean inward while riding along a curved path ? Write down the relevant formula for the leaning angle. 3

(b) State parallel axis theorem using a diagram and the relevant equation. The moment of inertia of a circular disk about a diameter is 20 kgm^2. Calculate its moment of inertia about a tangent. 6

(c) Five tiny balls each of mass 1 g are arranged along a line as shown in figure. The seperation between adjacent masses is 0.02m. Calculate the moment of inertia and radius of gyration of the system about an axis perpendicular to the line of masses and through the ball at the centre, m3. 6
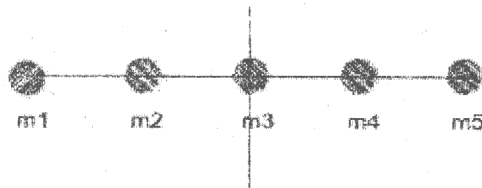

UNIT—II

V (a) What is meant by gravitational potential and gravitational potential energy ? What is the relation between them ? 3

(b) What is meant by geostationary satellite ? Derive an expression for the height of geostationary satellite. 6

(c) Given that the radius of the Earth as 6400km and acceleration due to gravity at the surface of the Earth, $g = 9.8$ ms^{-2}. Calculate escape velocity on the surface of the Earth. 6

OR

VI (a) Write a note on Newton's law of gravitation. 3

(b) Find the orbital velocity of an artificial satellite moving at a height of 600 km from the surface of the earth. Also calculate its period.
($R = 6400$ km and $g = 9.8$ ms^{-2}) 6

(c) Find out the height at which the acceleration due to gravity becomes one fourth of its value on the surface of the Earth. ($R = 6400$ km) 6

Marks

Unit—III

VII (a) Explain the principle of shunt resistance.　　　　　　　　　　　　3

    (b) A wire of length 1 m and diameter 1mm has a resistance of 0.8 Ω. Calculate the resistivity of the material of the wire.　　　　　　　6

    (c) Five resistances each of 10 Ω, are connected as shown in figure. Calculate the effective resistance of the combination as measured between the terminals A and B ?

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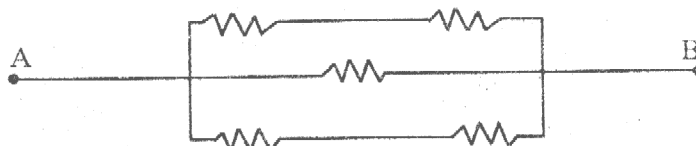
Or

VIII (a) Derive the expression for the magnetic field produces at the centre of a current carrying circular coil.　　　　　　　　3

    (b) With adequate theory explain how a galvanometer can be converted into a volt meter ?　　　　　　　6

    (c) Given three resistances 12 Ω each. Draw the diagrams explain how these resistances can be combined to give 4 Ω, 8 Ω, 18 Ω.　　　　6

Unit—IV

IX (a) Calculate the energy associated with photons corresponding to wavelength 400nm. (Speed of light (c) = 3×10^8 ms^{-1}, Planck's constant (h) = 6.63×10^{-34} Js)　　　3

    (b) Explain the Einstein's theory of photoelectric effect.　　　6

    (c) Explain the energy production in the case of nuclear fission and fusion.　　　6

Or

X (a) Find the amount of energy obtained if 1 gram of mass is completely converted into energy.　　　　3

    (b) Explain the characteristic properties of laser light.　　　6

    (c) Write an essay on nuclear reactors.　　　6