DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER-2020

## ENGINEERING PHYSICS - II

[Maximum marks: 75]                                           (Time: 2.15 Hours)

### PART – A
(Answer any *three* questions in one or two sentences. Each question carries 2 marks)

I. (1). Define angular velocity. What is its SI unit?

(2). Show that the work done by a centripetal force is zero.

(3). What are geostationary satellites? Mention its uses.

(4). Derive an expression for the effective resistance in the circuit when two resistors R1 and R2 are connected in series.

(5). Write down various forms of energy sources associated with the electricity production.                                           (3 x 2 = 6)

### PART – B
(Answer any *four* of the following questions. Each question carries 6 marks)

II. (1). State and explain parallel axis theorem and perpendicular axis theorem.

(2). Explain why the outer edge of the road is raised over the inner edge on the curved portion of the road.

(3). An artificial satellite revolves around the earth at a height 600 km. Find its period. Given that the radius of the earth is 6400 km.

(4). Define escape velocity. Derive an expression for the escape velocity of an object from the surface of the earth.

(5). State Biot-Savart law. Derive the expression for magnetic field intensity at the center of a circular coil carrying current.

(6). What is photoelectric effect? Explain the laws of photoelectric effect?

(7). Explain nuclear fission reaction of uranium nucleus. What are other fissionable isotopes?                                           (4 x 6= 24)

# PART – C

(Answer *any of the three units* from the following.  Each question carries 15 marks)

## UNIT –I

III. (a). Define centripetal acceleration. Write an expression for it. (3)

   (b). Derive an expression for the kinetic energy of a disc rolling on a horizontal surface. What fraction of its total kinetic energy is rotational? (6)

   (c). A disc of moment of inertia 2 $Kgm^2$ rotates about its axis at 50 rpm. Find the torque required to stop it in one minute. (6)

### OR

IV. (a). Define the radius of gyration. Give its equation and SI unit. (3)

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

   (c). A thin disc of mass 1 kg has a radius of 0.5m. It rotates in a horizontal plane about an axis passing vertically through the center. If the disc makes 10 revolutions in 5 seconds, determine the rotational kinetic energy. (6)

## UNIT-II

V. (a). Distinguish between '$g$' and '$G$'. (3)

   (b). Derive the expression for variation of acceleration due to gravity with altitude and depth. (6)

   (c). The acceleration due to gravity at a height $h$ above the earth's surface is 9.1 $m/s^2$. Find $h$ if the surface value of $g$ is 9.8 $m/s^2$ and R = 6400 km (6)

### OR

VI. (a). State Newton's universal law of gravitation (3)

   (b). Derive the equations for orbital velocity and time period of an artificial satellite. Obtain the expressions for orbital velocity and time period of an artificial satellite revolving close to the  surface of the earth. (6)

   (c). Deduce the value of height of the geostationary satellite above the surface of the earth. Given that g of the earth is 9.8 $m/s^2$ and radius of the earth is 6400 km. (6)

## UNIT-III

VII. (a). State and explain Kirchoff's laws. (3)

(b). Applying Kirchoff's law, derive the balancing condition of Wheatstone's bridge. (6)

(c). Two cells of emf 12V and 5V and three resistances $2\Omega$, $3\Omega$ and $4\Omega$ are connected as shown.
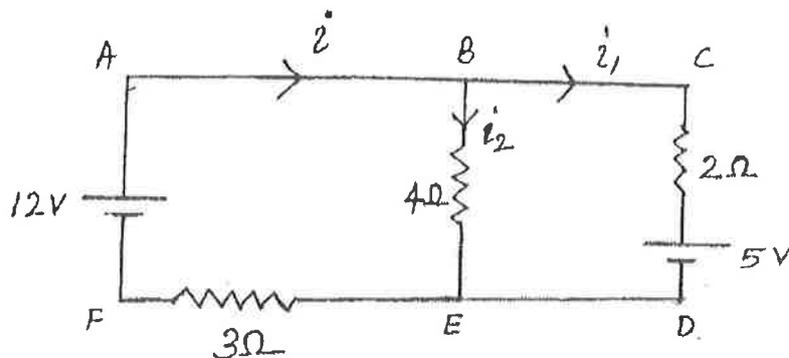


Find the currents $i_1$, $i_2$ and i using Kirchoff's law. (6)

**OR**

VIII.(a). Discuss the variation of magnetic field intensity along the axial line of a circular coil carrying current. (3)

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

(c). The resistance of a metal wire of length 1.5m and radius 1mm is 5 $\Omega$. Determine its conductivity. (6)

## UNIT-IV

IX. (a). Distinguish between spontaneous emission and stimulated emission (3)

(b). What are the characteristics of laser light? With the help of a neat diagram explain the working of a Ruby Laser. (6)

(c). The threshold wavelength for photoelectric emission in a metal is 600nm. What is the maximum velocity of the ejected electrons when it is irradiated with light of wavelength 200 nm?[$h=6.63 \times 10^{-34}$ js;$c=3 \times 10^8$m/s; mass of the electron $m=9.1 \times 10^{-31}$Kg] (6)

**OR**

3

X. (a) Discuss the energy production in the sun. (3)

   (b) Two deuterons ($^2_1H$) fuse together to form a Helium nucleus ($^4_2He$). Calculate the energy released in MeV, given that the masses of $^4_2He$ and $^2_1H$ are 4.0026 $u$ and 2.0147 $u$, respectively. (6)

   (c) What is mean by a nuclear reactor? Describe the essential components of a nuclear reactor. (6)

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