

TED (15) 2003 B
(Revision-2015)

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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 radius of gyration.
(2). State Newton's law of gravitation.
(3). State Kirchoff's laws.
(4). Explain optical pumping and population inversion.
(5). Distinguish between nuclear fusion and nuclear fission. (3 x 2 = 6)

PART – B

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

- II. (1). Show that the magnitude of the centripetal acceleration for a body moving along a circle of radius r with constant speed v is v^2/r .
(2). Derive the expression for moment of inertia of a circular disc about its own axis.
(3). Obtain expression for the orbital velocity and period of revolution of an artificial satellite revolving close to the surface of earth.
(4). Find the acceleration due to gravity (a) at a height 50 km above the earth and (b) at a depth 100 km below the surface. Radius of the earth = 6400 km and g at the surface = 9.8 m/s^2 .
(5). Derive the balancing condition for Wheatstone's bridge
(6). State and explain Biot-Savart law. When a current 2A flows through a circular coil of radius 5 cm, a magnetic field intensity 12.56×10^{-4} tesla is generated at the center. Calculate the number of turns in the coil.
(7). With the help of a diagram explain the working of a Ruby laser. (4 x 6 = 24)

PART – C

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

UNIT –I

- III. (a). Obtain the relationship for torque and angular momentum. (3)
(b). State and explain parallel axes and perpendicular axes theorems. (6)
(c). A disc of moment of inertia 2 kgm^2 rotates about its axis at 50 rpm. Find the torque that can stop it in one minute. (6)

OR

- IV. (a). Define the term center of mass. (3)
(b). 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? (6)
(c). A thin disc of mass 1 kg has a radius 0.5 m. 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). Define gravitational potential. (3)
(b). Obtain an expression for g in terms of gravitational constant G , mass M and radius R of the earth (6)
(c). Two iron spheres each of radius 50 cm are placed at a distance 2 m between their centers. If the force of attraction between them is $2.923 \times 10^{-4} \text{ N}$, determine the gravitational constant G . Density of iron is 8000 kg/m^3 . (6)

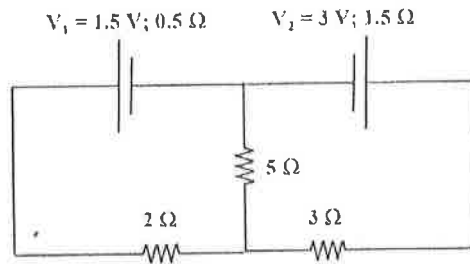
OR

- VI. (a). Define escape velocity. Write an expression for escape velocity (3)
(b). Show that the acceleration due to gravity $g = \frac{4\pi G \rho R}{3}$ where ρ is the mean density of the earth and R the radius of the earth. (6)
(c). Find out the mass of the moon if the acceleration due to gravity at its surface is 1.62 ms^{-2} and the radius is 1750 km. $G = 6.67 \times 10^{-11}$ (6)

UNIT-III

- VII. (a). State Ohms's law. (3)
(b). Describe a meter bridge. How is it used for the measurement of resistivity? (6)

- (c). Find the current in the resistors of the given circuit. The cell V_1 has an emf 1.5 V and internal resistance 0.5Ω . The cell V_2 has emf 3 V and an internal resistance 1.5Ω . (6)



OR

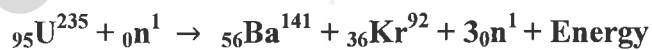
- VIII.(a). Define the term resistivity. How is it related to conductivity? (3)
 (b). How can a galvanometer be converted to an ammeter and a voltmeter. (6)
 (c). A galvanometer has a resistance 30Ω and it gives full scale deflection for 2 mA current. What is the resistance needed to convert it to (a) An ammeter of 0.3 A range (b) A voltmeter of 0.2 V range. (6)

UNIT-IV

- IX. (a). Distinguish between spontaneous emission and stimulated emission. (3)
 (b). Explain the laws of photoelectric effect? State Einstein's photoelectric equation. (6)
 (c). The work function of a metal is 2.8 eV. What is its threshold wavelength and threshold frequency? (6)

OR

- X. (a). Describe few applications of laser. (3)
 (b). What are the essential components of a nuclear reactor? Explain the functions of each. (6)
 (c). Find the energy released when one U^{235} atom undergoes fission in the reaction



Given that mass of ${}_{92}\text{U}^{235} = 235.044\text{ u}$; mass of neutron = 1.0087 u ; mass of ${}_{56}\text{Ba}^{141} = 140.9136\text{ u}$ and mass of ${}_{36}\text{Kr}^{92} = 91.8976\text{ u}$. (6)
