TED (15) – 2003
(REVISION — 2015)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2019

ENGINEERING PHYSICS - II

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. What is meant by "super elevation" ?
2. Define the term gravitational potential.
3. State Ohm's law.
4. What is polar satellite ? Mention its use.
5. What do you understand by the term "Nuclear fusion" ? (5 × 2 = 10)

PART — B

(Maximum marks : 30)

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

1. Obtain the relation between
   (a) Linear velocity (v) and angular velocity (ω).
   (b) Linear acceleration (a) and angular acceleration (α).
2. Derive the expression for acceleration due to gravity at the surface of the earth starting from Newton's law of gravitation.
3. State and explain Kirchhoff's laws. Using these laws, derive the balancing condition of Wheatstone's net work.
4. What are the laws of photoelectric effect ? Explain them using Einstein's theory.
5. Derive an expression for the moment of inertia of a uniform circular disc about an axis passing through the centre and perpendicular to its plane.
6. Calculate the height at which a geostationary satellite revolves above the earth if acceleration due to gravity g = 9.8 m/s^2 and radius of earth R = 6400 km.
7. Give the circuit diagram and calculate the current through two resistors 5Ω and 10Ω, if they are in parallel and connected to a potential difference of 20 Volt. (5 × 6 = 30)

Marks

PART — C

(Maximum marks : 60)

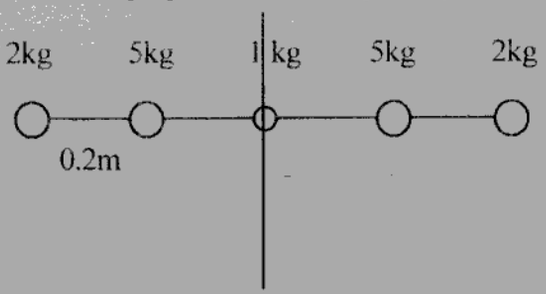
(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) State and explain parallel axes theorem. 3

(b) Define angular momentum and torque of an object in rotational motion and write the relation between angular momentum and torque. 6

(c) Five masses 2 kg, 5 kg, 1 kg, 5 kg and 2 kg are placed on a mass less rod as shown in the figure. The distance between consecutive masses is 0.2 m. Find the moment of inertia about the perpendicular axis passing through the 1 kg mass.



6

OR

IV (a) Explain the idea of centripetal force with one example. 3

(b) Derive an expression for total kinetic energy of a circular disc rolling on a horizontal surface. 6

(c) A circular disc has moment of inertia 3.2 kgm^2 about its axis. When a constant torque is applied, it acquires an angular velocity 4π rad/s in 4 seconds after starting from rest. Calculate the value of torque acting. 6

UNIT — II

V (a) What do you know about geostationary satellite ? 3

(b) With necessary theory derive the expression for orbital velocity of a satellite revolving around earth. 6

(c) Acceleration due to gravity at the earth surface is 9.8 m/s^2. Considering earth as a sphere of radius 6400 km, find the acceleration due to gravity at an altitude 100 km. What will be the acceleration due to gravity at a depth 120 km from earth's surface ? 6

OR

VI (a) Define escape velocity. Write an expression for escape velocity. 3

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

(c) An artificial satellite revolves the earth very close to the surface. Calculate the orbital velocity and period of revolution from the following data. Radius of earth R = 6400 km, acceleration due to gravity g = 9.8 m/s^2. 6

Marks

UNIT — III

VII (a) State and explain Biot and Savart's law. 3

(b) Draw the circuit diagram for two resistors in parallel, connected to a potential difference "V". With necessary arguments, arrive at an expression for effective resistance R_p. 6

(c) A galvanometer has a resistance 20 Ω and range 10 mA. Show how it could be converted into an ammeter to read upto 1 A. 6

OR

VIII (a) The resistance of a copper wire of length 100 m and radius 0.3 mm is 6Ω. Calculate the resistivity of copper. 3

(b) Explain the working of moving coil galvanometer with the help of the diagram. 6

(c) Using the circuit diagram, explain how a galvanometer can be converted to a voltmeter. 6

UNIT — IV

IX (a) Explain the principle and condition for laser action. 3

(b) Explain the principle and working of He-Ne gas laser. 6

(c) **The threshold wavelength for photoelectric effect in a metal is 600 nm.** What is the maximum Kinetic energy of the emitted electrons when it is irradiated with ultraviolet light of wavelength 200 nm ? 6

OR

X (a) What are the characteristics of laser radiation ? 3

(b) With the help of a diagram, describe the working of a pressurised water reactor. 6

(c) Find the energy released when one U^{235} atom undergoes fission in the reaction

$$_{92}U^{235} + {}_0n^1 \rightarrow {}_{56}Ba^{141} + {}_{36}Kr^{92} + 3\ {}_0n^1 + \text{Energy}.$$

Given that mass of $_{92}U^{235}$ = 235.044 u ; mass of Neutron = 1.0087 u ; mass of Barium = 140.9136 u and mass of Krypton = 91.8976 u. 6