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N19 - 00045

TED (15) – 2003 (REVISION – 2015)

I

Reg. No.

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

ENGINEERING PHYSICS - II

[Time : 3 hours

Marks

 $(5 \times 2 = 10)$

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

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"?

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 $g = 9.8 \text{ m/s}^2$ 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)

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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.

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



Or

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

- (b) Derive an expression for total kinetic energy of a circular disc rolling on a horizontal surface.
- (c) A circular disc has moment of inertia 3.2 kgm² 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.

- V (a) What do you know about geostationary satellite ?
 - (b) With necessary theory derive the expression for orbital velocity of a satellite revolving around earth.
 - (c) Acceleration due to gravity at the earth surface is 9.8 m/s². 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 ?

Or

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

- (b) Discuss the variation of acceleration due to gravity with altitude and depth.
- (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/s².

Marks

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Unit — III

Marks

3 VII (a) State and explain Biot and Savart's law. (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 6 resistance Rp. (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 (a) The resistance of a copper wire of length 100 m and radius 0.3 mm is 6Ω . 3 Calculate the resistivity of copper. 6 (b) Explain the working of moving coil galvanometer with the help of the diagram. (c) Using the circuit diagram, explain how a galvanometer can be converted to 6 a voltmeter. UNIT --- IV 3 IX (a) Explain the principle and condition for laser action. 6 (b) Explain the principle and working of He-Ne gas laser. (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 Х (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 $_{92}U^{235} + _{0}n^{1} \rightarrow _{56}Ba^{141} + _{36}Kr^{92} + 3 _{0}n^{1} + Energy.$ Given that mass of ${}_{02}U^{235} = 235.044 \text{ u}$: mass of Neutron = 1.0087 u : mass of Barium = 140.9136 u and mass of Krypton = 91.8976 u. 6

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