TED (15/19) – 2003
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N22 - 00481

Reg.No……………..
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**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – NOVEMBER – 2022**

ENGINEERING PHYSICS – II

(Maximum Marks : 100)
(Time : 3 hours)

PART – A
(Maximum Marks : 10)

Marks

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

   1. What is centripetal acceleration? Write down its expression.

   2. State Newton's Universal law of gravitation.

   3. Define moment of inertia.

   4. State and explain Ohm's law.

   5. Write down any two applications of LASER.   (5x2=10)

PART –B
(Maximum Marks : 30)

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

   1. Calculate the centripetal force required for a vehicle of mass 5000 kg
       to turn around a curve of radius 1 km with an optimum speed 72 km/h.

   2. Define torque and angular momentum. Give the relationship between them.

   3. Two resistances 20 Ω and 30 Ω are connected in parallel and the
       combination is in series with 8 Ω . Calculate the effective resistance.

   4. How can a Galvanometer of 50 Ω resistance shows a full scale deflection
       for 1 mA to be converted into an ammeter of range 5 A.

   5. Mount Everest is 8.85 km height. Find out the value of acceleration due to
       gravity at its top if its value on the surface is 9.8 m/s^2 given R=6400km.

   6. When a metal is irradiated with a light of wavelength 100 nm.
       The maximum kinetic energy of the liberated electrons is 10^{-18}J. Calculate
       the work function of the metal Given h=6.63 x 10^{-34} SI unit, c=3x10^8 m/s.

   7. What are the essential components of a nuclear reactor? Explain the
       functions of each.   (5x6=30)

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 banking of curve and the write down the relationship between optimum speed and angle of Banking. (3)

(b) State Parallel and perpendicular axis theorem of moment of inertia. Using the theorem find the moment of inertia of a disc about any diameter. (6)

(c) Calculate the Rolling kinetic energy of a disc of mass 10 kg, with the radius 10 cm rolling a horizontal surface with a velocity 5 m/s. (6)

OR

IV. (a) Define angular velocity and derive the relationship between angular velocity and linear velocity. (3)

(b) Derive the expression for moment of inertia of a disc about an Axis perpendicular to the plane of the disc and passing through the centre of mass. (6)

(c) Find the angle through which a cyclist leans when he rides through curved path of radius 50m at a speed 10 m/s. (6)

UNIT – II

V. (a) What are geostationary satellites. Write down any two uses. (3)

(b) Explain the term escape velocity and derive the expression for escape velocity. (6)

(c) India's EMISAT–(electronic intelligence satellite – a spy in the sky) was developed by DRDO and ISRO launched by PSLV C-45 in a sun synchronous polar orbit at a height 748 km from the surface of Earth. Calculate its orbital velocity and the period (given R = 6400 km   g =9.8 m/s^2) (6)

OR

VI. (a) Write down the expressions for variation of acceleration due to gravity with respect to depth, height and latitude. (3)

(b) Derive the expressions for orbital velocity and period of a satellite. (6)

(c) Calculate the acceleration due to gravity on the surface of moon if it has a radius 1750 km and mass 7.44 x 10^{22} kg given G = 6.67 x 10^{-11} SI unit. (6)

UNIT –III

VII. (a) State Fleming's left hand rule. Write down the equation for force acting on a current carrying conductor placed in a uniform magnetic field. (3)

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

(c) The resistivity of copper is 1.7×10^{-8} Ωm. Find the length of a copper wire of radius 1 mm having a resistance 1Ω. (6)

OR

VIII. (a) State and explain biot-savart's law. (3)

(b) State Kirchhoff's laws and derive Wheatstone principle with the diagram of Wheatstone bridge. (6)

(c) Calculate the magnetic field under an overhead transmission line at a distance 10 m below it when it carries a current of 10 A through it. (6)

UNIT – IV

IX. (a) What are the characteristics of laser. (3)

(b) State laws of Photoelectric effect and derive Einstein's Photoelectric equation. (6)

(c) Calculate the threshold frequency required for a metal having a work function 2.8 eV Given h = 6.63×10^{-34} Js. (6)

OR

X. (a) Explain Nuclear Fission and Nuclear Fusion. (3)

(b) Explain the terms population inversion and optical pumping.
Explain the working of a ruby laser with diagram. (6)

(c) $_1H^2 + _1H^2 \rightarrow _2He^4 +$ energy. Calculate the energy released in MeV if mass of $_1H^2 = 2.0147$ u and mass of $_2He^4 = 4.0026$ u. (6)

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