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Question Paper Code: AHS007

MODEL QUESTION PAPER – I

Four Year B.Tech I Semester End Examinations, December – 2016

Regulation: R16

APPLIED PHYSICS

(Common to AE, ME and CE)

Time: 3 Hours **Max Marks: 70**

Answer any ONE question from each Unit
All questions carry equal marks
All parts of the question must be answered in one place only

Unit – I

1. (a) How polarizability is related with electric dipolmoment? Discuss. [3M]
   (b) On what factors do the electronic polarization depend? Derive an expression for electronic polarizability in terms of the radius of the atom. [7M]
   (c) A solid dielectric with density $3\times1028\ atoms/m^3$ shows an electronic polarizability of $10^{-40}\ farad-m^2$. Assuming the internal electric field to be a Lorentz field, calculate the dielectric constant of the material. [4M]

2. (a) How are magnetization M, applied magnetic field H and flux density are related. [3M]
   (b) How are dia, para and ferromagnetic substances differ in their properties? Explain their behavior with the help of examples. [7M]
   (c) If a magnetic field of strength 300 A/m produces a magnetization of 4200 A/m in a ferromagnetic material, find the relative permeability of the material. [4M]

Unit – II

3. (a) Discuss basic requirements for a acoustically good hall. [3M]
   (b) Describe an experimental method to determine the sound absorption coefficient of a material. [7M]
   (c) A hall of volume 85000 m^3 is found to have a reverberation time of 2.2 *sec*. If the area of the sound absorbing surface is 7500 m^2, calculate average sound absorption coefficient. [4M]

4. (a) How ultra sonic waves differ from infrasonic waves? [3M]
   (b) Explain magnetostrictioin methods of producing ultrasonic waves. [7M]
   (c) A quartz crystal of thickness 0.0001 m is vibrating at resonance. Calculate the fundamental frequency when $Y = 7.9 \times 10^{10}\ N/m2$ and $\rho = 2650\ Kg/m^3$. [4M]

Unit – III

5. (a) Differentiate between elastic and a rigid body. [3M]
   (b) Obtain a relation for resultant and concurrent forces in space. [7M]

(c) If two forces P and Q act on a body at an angle θ between them. Obtain an equation for resultant forcer R. Discuss special cases when $\theta = 0^0$, $\theta = 90^0$ and $\theta = 180^0$. [4M]

6. (a) What are concurrent forces? [3M]

(b) Explain triangle law of forces. [7M]

(c) Four forces of 10N, 20N, 25N and 40N are concurrent in space at origin and passing through the points $(3, 2, 5)$; $(1, 7, 4)$; $(4, -2, 4)$ and $(-2, 4, -3)$t respectively. Determine the resultant system of forces [4M]

Unit – IV

7. (a) State laws of friction. [3M]

(b) Derive an equation for acceleration of body of mass 'm' sliding down the inclined plane at an angle ' θ' with horizontal. [7M]

(c) A body of mass M1 placed on rough horizontal plane connected with a string over a frictionless pulley and the second end of the string to connect to M2 suspended vertically down wards. If both the masses moving with uniform acceleration, find tension in the string and also if the horizontal plane is friction less find the tension. [4M]

8. (a) Obtain a relation between angle of friction and coefficient of friction of a body of mass 'm' just sliding on a rough incline plain. [3M]

(b) Show that pushing of lawn roller requires more force than pulling. [7M]

(c) Two bodies of masses M1 and M2 connected by a thin mass less string over a pulley. M1 slides up over on inclined plane of $\theta = 0^0$ with horizontal and M2 move vertically down with uniform acceleration. Find the tension in the string for (i) coefficient of friction (ii) friction less inclined plane. [4M]

Unit – IV

9. (a) State and prove perpendicular axes theorem. [3M]

(b) Calculate moment of inertia of thin rod of length 'L' and mass 'M'. [7M]

(c) A thin wheel has moment of inertia 70 $kg - m$ and its diameter is 4.4 cm. How much pulling force is to be applied on the thread wound on axle to produce an angular acceleration 0.5 rad/s. [4M]

10. (a) Explain basic principle of moment of inertia its applications. [3M]

(b) State and prove parallel axis theorem. [7M]

(c) Calculate MI of a rectangular lamina about centroid and perpendicular to it whose mass is 2 kg, length 10 cm breadth 4 cm [4M]