Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS007

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
B.Tech I Semester End Examinations (Regular) - December, 2017
Regulation: IARE – R16
APPLIED PHYSICS
Common for (AE | CE | ME)

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

Answer 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) I. Define the terms dielectric constant and polarizability. **[10M]**
   II. Discuss the hysteresis loop with B-H curve.

   (b) Sulphur is elemental solid dielectric whose dielectric constant is 3.4. Assuming a cubic lattice for its structure, calculate the electronic polarizability of sulphur. Given that sulphur density is 2.07×10^3 kg/m^3 and atomic weight is 32.07. **[4M]**

2. (a) Discuss the classification of magnetic materials. **[7M]**

   (b) I. Define magnetic flux density, magnetic susceptibility and magnetic permeability. **[7M]**
   II. An elemental solid dielectric material has polarizability 7 x 10^{-40}Fm^2. Assuming the internal field to be Lorentz field. Calculate the dielectric constant for the material if the material has 3×10^{28} atoms/m^3.

UNIT – II

3. (a) I. What is Sabine's formula? What are factors controlling the reverberation time? **[10M]**
   II. Discuss the three major acoustical defects and their remedies.

   (b) A loudspeaker emits energy in all direction at the rate of 1.5 J/s. What is the intensity level at a distance of 20 m? Standard intensity level of sound is 10^{-12} W/m^2. **[4M]**

4. (a) Explain the ultrasonic generator with figure. **[7M]**

   (b) I. What is reverberation and reverberation time? **[7M]**
   II. A quartz crystal with 1mm thickness is vibrating at resonance. Calculate the fundamental frequency. Given that Young's modulus for quartz is 7.9×10^{10} N/m^2 and density for quartz is 2650 kg/m^3.

UNIT – III

5. (a) State and proof polygon law of forces. **[8M]**

   (b) A particle is acted upon by forces represented by P, 2P, $3\sqrt{3}$P and 4P, the angle between the first and second, the second and third and third and fourth are 60°, 90° and 150° respectively. Show that the resultant is a force P in a direction inclined at an angle of 120° to that of first force. **[6M]**

6. (a) Discuss the conditions of equilibrium of coplanar forces system. **[7M]**

   (b) I. Define moment of a force? Explain the principles of moments. **[7M]**

   II. A ball is thrown vertically upward and reaches a height of 90 m find

   (i) the velocity with which it was thrown

   (ii) how for the ball will be from its starting point 7 second after it was thrown.

UNIT – IV

7. (a) What are angle of friction and angle of repose? Show that the coefficient of limiting friction is equal to the tangent of angle of repose. **[10M]**

   (b) Find the resultant of the forces equals to the weights of 5 and 3 Kgs respectively and acting at an angle of 60°. **[4M]**

8. (a) Pulling a roller with a force F at an angle θ with horizontal is easier than pushing with the same force and same angle with horizontal. Explain **[10M]**

   (b) A block of mass 2 Kg is pressed against a rigid vertical wall by a horizontal force of 100 N. If coefficient of static and Kinetic friction are each equal to 0.3, then find the magnitude and direction of frictional force and force required for vertical equilibrium on the block. Take g = 10 m/s^2 **[4M]**

UNIT – V

9. (a) I. Define the terms moment of inertia and radius of gyration. **[10M]**

   II. Obtain the expression for moment of inertia of thin uniform rod about an axis perpendicular to be its length and passing through centre of mass.

   (b) An uniform disc of radius R meter and mass M kg can rotate without friction on the axes passing through its centre and perpendicular to its plane. A card is round at the rim of the disc and uniform force F of Newton is applied on the card. Find the tangential acceleration of a point on the rim of the disc. **[4M]**

10. (a) I. Define the terms angular velocity and angular acceleration. **[10M]**

    II. State and prove the parallel axis theorem.

    (b) The mass, length and breadth of rectangular plate are 1 kg, 15 cm and 10 cm respectively. Calculate the moment of inertia and radius of gyration about **[4M]**

    (i) an axis passing through a corner and perpendicular to the plane

    (ii) about an axis passing through a corner and parallel to the breadth.

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