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

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester Supplementary Examinations - July, 2018

Regulation: IARE – R16

APPLIED PHYSICS

Time: 3 Hours **(Common to AE | ME | CE)** **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) Derive an expression for internal field in case of one dimensional array of atoms in dielectric solids. **[7M]**

   (b) If a NaCl crystal is subjected to an electricfield of 1000 V/m and the resulting polarization is 4.3x10^{-8} cm^2.calculate the relative permeability of NaCl. **[7M]**

2. (a) Explain the domain theory of Ferro magnetism on the basis of hysteresis curve. **[7M]**

   (b) A silicon material is subjected to a magnetic field of strength 1000 A/m. If the magnetic susceptibility of silicon is -0.3 x 10^{-5}, calculate its magnetization. Also evaluate the magnetic flux density of the field inside the material. **[7M]**

UNIT – II

3. (a) What are the conditions for an acoustic design of a hall? Explain the major factors in the acoustic design of a hall. **[7M]**

   (b) The reverberation time is found to be 1.5 sec for an empty hall and it is found to be 1 sec when a certain cloth of 20 m^2 is suspended at the centre of the hall. If the dimensions of the hall are 10x8x6 m^3, calculate the coefficients of absorption of certain cloth. **[7M]**

4. (a) What are ultrasonic waves? Mention their properties. Explain with suitable diagram the production of ultrasonic waves using piezoelectric effect. **[7M]**

   (b) Calculate the natural frequency of ultrasonic waves using the following data. Thickness of the crystal is 5.5x10^{-3} m, Young's modulus of the quartz is 8.0x10^{10} N/m^2 and density is 2.65 x10^3 kg/m^3. **[7M]**

UNIT – III

5. (a) State and explain Triangle law of forces. Write the expression for resultant using law of forces. **[7M]**

   (b) Two forces acting on a body are 500N and 1000 N making an angle with 30^0 with X axis and Y axis respectively. Determine the third force such that the resultant of all the three forces is 1000 N directed at 45^0 to X-axis. **[7M]**

6. (a) State and explain Varignon's theorem, with an example. **[7M]**

   (b) A traffic light weighing 122 N hangs from a cable tied to two other cables fastened to a support with the upper cables make angles of $\theta_1 = 37^0$ and $\theta_2 = 53^0$ with the horizontal. These upper cables are not as strong as the vertical cable and will break if the tension in them exceed 100 N. Does the traffic light remain hanging in this situation, or will one of the cables break? **[7M]**

UNIT – IV

7. (a) Explain a body in equilibrium on a smooth inclined plane under the action of force and on a rough inclined plane with suitable diagram . **[7M]**

   (b) The force required to pull a body up a plane inclined to the horizontal at angle of 18.13^0 is 105 N and the force required to pull it down the plane,10 N. what is the weight of the body and the coefficient of friction between its surface and that of the plane. **[7M]**

8. (a) Explain the usefulness of friction in daily life with suitable examples. **[7M]**

   (b) A load of 24 kg lies on a plane inclined at an angle of 17^0 to the horizontal, the coefficient of friction for the surfaces of the two being 0.36.Calculate the least horizontal force required to make the load move up and down the plane. **[7M]**

UNIT – V

9. (a) Explain the general theorem of moment of inertia of a plane laminar body and three dimensional body for parallel axes. **[7M]**

   (b) Find the moment of inertia of a rectangular lamina **[7M]**

      i. About an axis through its centre and parallel to one of its axis

      ii. About one side.

10. (a) Explain the general theorem of moment of inertia of perpendicular axis for a three dimensional body. **[7M]**

    (b) Obtain the moment of inertia of thin uniform rod **[7M]**

      i. About an axis through its centre and perpendicular to its length

      ii. About an axis passing through one end of the rod and perpendicular to its length.