INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech I Semester End Examinations (Regular) - February, 2018
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) Discuss the different polarization mechanisms in dielectrics. **[7M]**

   (b) What should be voltage required to introduce a material of dielectric constant 4 between the plates of a parallel plate capacitor of area 1000 mm^2 having plate separation of 5mm and a charge of $3x10^{-10}$ C? Also determine the applied electric field. **[7M]**

2. (a) What is ferromagnetism? Discuss Domain theory of Ferromagnetism. **[7M]**

   (b) The magnetic field in the interior of a certain solenoid has the value of $6.5x10^{-4}$T when the solenoid is empty. When it is filled with iron the field becomes 1.4T. Find the relative permeability of iron. **[7M]**

UNIT – II

3. (a) Discuss five basic factors affecting the architectural acoustics with their remedies. **[7M]**

   (b) A cinema hall has volume of $7500m^3$. What should be the total absorption in the hall to have reverberation time of 1.5sec. **[7M]**

4. (a) Explain any one method of production of ultrasonic waves with neat diagram. **[7M]**

   (b) An ultrasonic beam is used to determine the thickness of a steel plate. It is noticed that the difference between the adjacent harmonic frequencies is 50 KHz. The velocity of the sound in the steel is 5000 m/s. Determine the thickness of the steel plate. **[7M]**

UNIT – III

5. (a) Define the terms concurrent forces and coplanar forces. **[7M]**

   (b) State the triangle law of forces. A car accelerates uniformly from rest and acquires a speed of 36 km/h in 10 sec. Find **[7M]**

   (i) The acceleration
   (ii) Total distance travelled
   (iii) The speed at the end of 5th second
   (iv) The distance travelled in 5th second.

6. (a) Find the magnitude and direction of resultant of two forces P and Q which are acting at an angle by parallelogram method. **[7M]**

   (b) Find the resultant of the forces equals to the weights of 5 and 3 Kgs respectively and acting at an angle of 60°. **[7M]**

UNIT – IV

7. (a) State the laws of limiting friction. Discuss the static and dynamic friction. **[7M]**

   (b) An aeroplane requires for takeoff a speed of 80 km/hr, the run on the ground being 100m. The mass of the plane is 10,000 kg and the co-efficient of friction between the plane and the ground is 0.2. Assume that the plane accelerates uniformly during the takeoff. What is the minimum force required by the engine of the plane for takeoff. **[7M]**

8. (a) Define the term friction with example. What are the applications of friction. **[7M]**

   (b) A 5 Kg box is being moved across the floor at a constant velocity by a force of 30N as shown in the Figure 1. (i) What is the force of friction acting on the box? (ii) Find μ_k between the box and the floor. **[7M]**
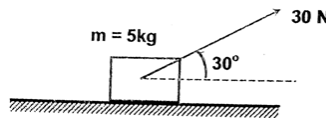

Figure 1

UNIT – V

9. (a) Define torque and angular momentum. Derive a relation between torque and angular momentum. **[7M]**

   (b) A 1 Kg stone attached to the end of a 60 cm chain, is revolving at the rate of 3 revolutions/sec. what is its angular momentum? If after 30 sec, it is making only one revolution per second, find the mean torque. **[7M]**

10. (a) Obtain an expression for moment of inertia of a circular disc about axis through its center and perpendicular to its plane. **[7M]**

    (b) State and prove perpendicular axis theorem for finding moment of inertia. **[7M]**

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