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Question Paper Code: AHS007



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech I/II Semester Supplementary Examinations - July, 2017

Regulation: IA-R16

APPLIED PHYSICS

[Common for : I Semester (AE, ME and CE)]

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) What is electronic polarization? Show that electronic polarisability is directly proportional to the cube of the radius. [8M]
(b) The electronic polarizability of He gas is $2.243 \times 10^{-41} Fm^2$. If the gas contains 2.7×10^{25} atoms per m^3 at NTP, calculate dielectric constant of He gas. [6M]
2. (a) Classify different magnetic materials diamagnetic, paramagnetic and ferromagnetic based on their magnetic moments. Discuss different properties exhibited by them with examples. [8M]
(b) A paramagnetic material has a magnetic field intensity of 10^4 A/M. If the susceptibility of the material at room temperature is 3.7×10^{-3} , calculate the magnetization and flux density in the material. [6M]

UNIT – II

3. (a) What is absorption coefficient? What is its unit? Derive an expression for absorption coefficient of a material. [8M]
(b) The volume of a room is $1200 m^3$. The wall area of the room is $220 m^2$, the floor area is $120 m^2$ and ceiling area is $120 m^2$. The average sound absorption coefficient [6M]
 - i. for wall is 0.03,
 - ii. for ceiling 0.80 and
 - iii. for floor is 0.06.Calculate the average sound absorption coefficient and reverberation time of the room.
4. (a) What is piezo electric effect? Explain how it is useful in the construction of an ultrasonic oscillator. Give some of the uses of ultrasonic wave. [8M]
(b) A piezo electric crystal has a thickness 0.002 m. If the velocity of sound wave in crystal is 5750 m/s, calculate the fundamental frequency of crystal. [6M]

UNIT – III

5. (a) State Lami's theorem, which gives condition of equilibrium of three coplanar force systems. Also prove this theorem. [8M]
(b) Three forces acting at a point are in equilibrium. If they make angles of 120° with one another, show that they are equal. [6M]
6. (a) State the triangle law of forces. A car accelerates uniformly from rest and acquires a speed of 36 km/h in 10 sec. Calculate [7M]
i. the acceleration
ii. total distance travelled
iii. the speed at the end of 5^{th} second
iv. the distance travelled in 5^{th} second.
(b) Discuss the couple, considering the two parallel coplanar forces of system. [7M]

UNIT – IV

7. (a) What is limiting friction? A block is placed on an inclined plane. The plane is then raised until it makes an angle α with the horizontal. If μ for block and plane is 0.3. Find value of angle α to which the plane may be raised before the block begins to slide. [7M]
(b) Derive the relation between angle of friction and coefficient of friction. [7M]
8. (a) A body of mass m slides down a rough inclined plane at an angle θ with horizontal. If μ_k is the coefficient of kinetic friction then find an expression for the acceleration of the body. [7M]
(b) A block slides down an inclined plane of angle 30° with horizontal with an acceleration $g/4$. Find the coefficient of kinetic friction. [7M]

UNIT – V

9. (a) A circular disk has mass of 1 kg and diameter of 15 cm. Calculate its moment of inertia about a tangent perpendicular to the plane and a diameter. [7M]
(b) Obtain an expression for moment of inertia rectangular lamina about axis passing through its centre and parallel to one of the side. [7M]
10. (a) State and prove theorem of perpendicular axis. [6M]
(b) A flywheel is a uniform disc of mass 72 Kg and radius of 50 cm. calculate [8M]
i. Moment of inertia.
ii. its kinetic energy when it is rotating at 70 r.p.m.

