ENGINEERING PHYSICS
(Theory : 2(A))

Full Marks : 80   *Time* : 3 hours

Answer any **five** questions including **Q. Nos. 1 & 2**
Figures in the right-hand margin indicate marks

1. Answer *all* questions : 2×10

   (*a*) Write down the dimensional formula of the following physical quantities :

   　(*i*) Power

   　(*ii*) Frequency

   (*b*) Given, $\vec{A} = \hat{i} - 2\hat{j} - 3\hat{k}$, $\vec{B} = 2\hat{i} + \hat{j} - 5\hat{k}$, Find $\vec{A} \cdot \vec{B}$.

   (*c*) State Triangle law of vector addition.

   (*d*) Define Latent Heat of Vaporization.

   (*e*) Draw a ray diagram for refraction through a prism.

   (*f*) Define Unit Pole.

   (*g*) State the First Law of Thermodynamics.

   (*h*) State Kirchhoff's 2nd Law.

   (*i*) Write down two important applications of LASERS in Industry.

   (*j*) State Fleming's Left Hand Rule.

2. Answer any *six* questions : 5×6

   (*a*) Two forces whose magnitudes are in the ratio 3 : 5 give a resultant equal to 70 N. If the angle between them is $60°$, find the magnitude of each force.

   (*b*) A car attains a velocity of 50 m/sec in 5 minutes from standstill. Calculate the acceleration.

   (*c*) Distinguish between mass and weight.

   (*d*) State Newton's Laws of Gravitation and define G.

   (*e*) Write different methods to reduce Friction.

   (*f*) Establish the relation between α and β.

   (*g*) State Coulomb's Laws in magnetism.

   (*h*) State Faraday's Laws of Electromagnetic Induction.

3. Derive expressions for time of flight, maximum height and range of a projectile fired at an angle θ with the horizontal.   10

4. Calculate the amount of heat required to convert 5 gm of ice at -5°C to water at 60°C. Given, specific Heat of Ice = 0.5 Cal/gm $^{\circ}$C, Latent Heat of ice = 80 Cal/gm.   10

5. Define Critical Angle and Total Internal Reflection with diagram. Write down the principle and application of Optical Fibre.   6 + 4

6. State Coulomb's Laws of Electrostatics. Find out the equivalent resistance of 5 Resistors of which 2 Ω, 3 Ω and 5 Ω connected in series and 10 Ω and 20 Ω are connected in parallel to them.   5 + 5

7. Derive an expression for force acting on a current carrying conductor placed in a uniform magnetic field. Compare between Fleming's Left Hand Rule and Right Hand Rule.   6 + 4

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