S. B. Roll. No.....

APPLIED PHYSICS-I
1st Exam/Common/0102/Nov'24
(For 2023 Batch Onwards)

Duration: 3Hrs. **M.Marks:50**

SECTION-A

Q1. Do as directed any nine of the following. **9x1=9**

i. Dimensions of pressure is same as that of _____
ii. Unit vector has magnitude equal to _____
iii. Small droplets of liquid attain spherical shape due to_____
iv. I calorie = _____Joules.
v. Friction is accelerating force. (T/F)
vi. Cross product of two parallel vectors is Zero. (T/F)
vii. Atmospheric pressure is 76 mm of Hg column. (T/F)
viii. Convection is mode of transfer of heat where medium particles move while carrying energy. (T/F)
ix. Work done can be Zero when a) Force is Zero b) Displacement is Zero c) Displacement is perpendicular to force. d) All of the above
x. If $\left|\vec{A} \times \vec{B}\right| = \vec{A}.\vec{B}$ then angle θ is a) 0° b) 90° c) 45° d) Can't say exactly
xi. If liquid wets the surface of the container then
a) Adhesion force is greater than cohesion. b) Cohesion force is greater than adhesion
c) Cohesion force and adhesion force are equal d) none of the above
xii. Normal human body temperature in kelvin scale is a) 273K b) 300K c) 0K d) 310K

SECTION-B

Q2. Attempt any five questions. **5x4=20**

a. Write down the laws of limiting friction.
b. Write a note on stress-strain curve along with diagram and discuss various features of the curve.
c. The viscous force acting on a solid spherical body moving in a liquid depends upon coefficient of viscosity (η), radius of the solid sphere (r) and velocity (v). Using dimensional analysis, derive a relation for viscous force.
d. Derive a relation for terminal velocity of a solid spherical body falling through a viscous liquid.
e. A crane can lift a mass of 150 kg vertically upwards with speed of 10m/sec. calculate the power generated by crane.
f. Prove that if dot product of two non-zero vectors is zero, and then two vectors are perpendicular to each other.
g. Write a note on different modes of heat transfer with examples.

SECTION-C

Q3. Attempt any three questions. **3x7=21**

i. Define centripetal force and drive a relation for centripetal force.
ii. State and prove law of conservation of energy of freely falling body.
iii. Derive relationship between α, β and Υ where α is linear thermal expansion coefficient, β is surface thermal expansion coefficient and Υ is volumetric thermal expansion coefficient.
iv. a) Differentiate between scalar and vector quantity. **4**
b) A gun fires a shell of mass 150gms with velocity 1 km/sec. if mass of the gun is 15kg, find the recoil velocity of the gun. **3**
v. a) State and prove principle of homogeneity of equation. **4**
b) Convert the value of Gravitational constant G= 6.67 X 10^{-8} dyne cm^2/gm^2 into S.I. system of units. **3**