Year: - 2011 **Physics(subs)**

(Based on remember) Answer any five Questions.

- 1) Answer *all* question. Each question has only one correct answer: (1X10=10)
- (i) Vector \vec{F} said to be a Lamellar vector, if
- (a) Grad $\vec{F}=0$ (b) Div $\vec{F}=0$ (c) Curl $\vec{F}=0$ (d) none of those
- (ii) Using the relation between the elastic constants if $Y = 3.4 \times 10^{10} \text{N-m}^2$, $\sigma = 0.33$, then
- (b) $K = 6.6 \times 10^{10} \text{ N-m}^{-2}$ (a) $K = 3.3 \times 10^{10} \text{ N-m}^{-2}$
- (c) $K = 33 \times 10^{10} \text{ N-m}^{-2}$ (d) $K = 66 \times 10^{10} \text{ N-m}^{-2}$
- (iii) According to poissuille's volume of liquid flowing per second through a capillary tube, is
- (a) Independent of the radius of the capillary
- (b) Independent of the pressure difference across the capillary
- (c) Independent of the nature of the liquid
- (d) Depends on the length of the capillary
- (iv) In Forced vibration the force acting on the vibrating particle are
 - (a) Restoring force only (b) Damping force only
 - (c) Applied periodic force only
 - (d) All the above three forces simultaneously
- (v) When Intensity is expressed in logarithmic scale, its unit is
- (a) $J-s^{-1}-m^{-2}$ (b) $W-m^{-2}$ (c) Bell (d) Phon
- (vi) Temperature of Inversion is the temperature
- (a) At which ice, water and water vapour exist
- simultaneously (b) Above which Joule-Thomson expansion produces a
- heating effect
- (c) Below which joule-Thomson expansion produces a heating effect
- (d) At which steam changes its phase
- (vii) The critical temperature in Critical constants of a real gas is define as the temperature
 - (a) Above which a gas cannot be liquefied by increasing pressure alone
 - (b) Below which a gas cannot be liquefied by increasing pressure alone
 - (c) At which liquefaction of the gas starts
 - (d) At which solidification of the gas starts

(viii) The refractive index μ and the polarizing angle ϕ_p of a refracting medium are related by

(a)
$$\mu = cot\phi_p$$
 (b) $\mu = tan\phi_p$

(c)
$$\mu = sin\phi_p$$
 (d) $\mu = cos\phi_p$

- (ix) A polarized light is incident normally on a nicol prism. On rotating the about the direction of incident beam as axis the intensity of the transmitted ray changes from a maximum to a minimum value. It car be concluded that
 - (a) Incident light is circularly polarized
 - (b) Incident light is elliptically polarized
 - (c) Incident light is plane polarized
 - (d) Incident light is partially polarized
- (x) Attracted Disc Electrometer is called an Absolute electrometer because
 - (a) It measures change, which is a fundamental quantity
 - (b) It measures P.D in term of mass. Length and time which are fundamental quantities
 - (c) It measures P.D in term of angle of deflection θ which is a fundamental quantities
 - (d) None of the above.

GROUP-

2) Answer any *two* of the following questions : (5X2=10)

- (a) Derive the relation between Young modulus, Bilk modulus and Poisson's ratio.
- (b) Show that entropy change of the universe in a Carnot engine is zero.
- (c) Obtained the differential equation of Damped-Forced vibration.
- (d) Explain quantitatively the fringe formation in Newton's ring.

GROUP—C

Answer any *four* of the following questions: (10X4)

3) State and prove Gauss' Divergence theorem. (2+8)

- 4) Derive an expression for the volume of liquid flowing per second through a capillary tube. Hence discuss in brief the experimental determination of coefficient of viscosity of a liquid by capillary flow method. (6+4)
- 5) Write Sabine's formula and deduce Sabine's law of reverberation on building. (2+8)
- 6) Discuss with theory the experimental determination of thermal conductivity of a good conductor by Forbe's method. (5+5)
- 7) Derive the expression for Maxwell's velocity distribution law and discuss in brief its experimental verification by Stern's method. (6+4)
- 8) Give the construction and explain the formation of fringes in Michelson's Interferometer. Derive the theory for formation of circular fringes. (2+3+5)
- 9) Discuss the Kerr cell method for experimental determination of velocity of light. (10)
- 10) Give the construction and working of a Quadrant electrometer. Derive the theory for measuring P.D using Quadrant electrometer. (2+3+5)

<u>GROUP-D</u>

Answer any *three* of the following questions: (5X3=15)

- 11) Find the value of the constant b for which the vector field $\vec{A} = x^2 \hat{\imath} + (y 2xy)\hat{g} + (x + bz)\hat{k}$ is solenoidal.
- 12) How many orders will be visible if the wave length of the incident light is 5,000 A and the number of lines in the grating is 2620 in one inch.
- 13) Two spherical soap bubbles of diameter 10 cms and 6cms respectively are formed at each end of a narrow horizontal glass tube. What is the pressure difference between the ends of the tube, if surface tension of the soap is 30 dynes per cm?
- 14) A reversible engine works between two temperature whose difference is100°C. If it absorbs
 7 46joules of hest from the source and gives 546 joules of heat to the sink, calculate the temperature of the source and sink.
- 15) Newton's ring are viewed normally by reflection of light of wavelength 58 9 3. A The diameter of the 10th dark ring is 0.50 cm. Find the radius of curvature of the lens.