## (Based on remember) Answer any five Questions.

## GROUP-A

1) Answer all question. Each question has only one correct answer: ( $1 \mathrm{X} 10=10$ )
(i) Vector $\overrightarrow{\boldsymbol{F}}$ said to be a Lamellar vector, if
(a) Grad $\vec{F}=\mathbf{0}$
(b) $\operatorname{Div} \vec{F}=\mathbf{0}$
(c) Curl $\vec{F}=\mathbf{0}$ (d) none of those
(ii) Using the relation between the elastic constants if $Y=3.4 \times 10^{10} \mathrm{~N}-\mathrm{m}^{-2}, \sigma=0.33$ then
(a) $K=3.3 \times 10^{10} \mathrm{~N}-\mathrm{m}^{-2}$
(b) $K=6.6 \times 10^{10} \mathrm{~N}-\mathrm{m}^{-2}$
(c) $K=33 \times 10^{10} \mathrm{~N}-\mathrm{m}^{-2}$
(d) $K=66 \times 10^{10} \mathrm{~N}-\mathrm{m}^{-2}$
(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) $\mathrm{J}-\mathrm{s}^{-1}-\mathrm{m}^{-2}$
(b) $\mathrm{W}-\mathrm{m}^{-2}$
(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 $\mu$ and the polarizing angle $\phi_{\mathrm{p}}$ of a refracting medium are related by
(a) $\mu=\cot \phi_{p}$
(b) $\mu=\boldsymbol{\operatorname { t a n }} \phi_{\mathrm{p}}$
(c) $\mu=\sin \phi_{p}$
(d) $\mu=\cos \phi_{\mathrm{p}}$
(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 $\boldsymbol{\theta}$ which is a fundamental quantities
(d) None of the above.
2) Answer any two of the following questions: ( $5 \times 2=10$ )
(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.
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. $\quad(2+3+5)$
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.

## GROUP-D

Answer any three of the following questions: (5X3=15)
11) Find the value of the constant $b$ for which the vector field $\vec{A}=x^{2} \hat{\imath}+(y-2 x y) \widehat{g}+$ $(x+b z) \widehat{k}$ is solenoidal.
12) How many orders will be visible if the wave length of the incident light is 5,000 and the number of lines in the grating is 2620 in one inch.
13) Two spherical soap bubbles of diameter 10 cmsand 6 cms 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 $\mathbf{3 0}$ dynes per cm ?
14) A reversible engine works between two temperature whose difference is 100 OUf 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 5893 AThe diameter of the $10^{\text {th }}$ dark ring is 0.50 cm . Find the radius of curvature of the lens.

