

(Based on remember)
Answer any five Questions.

GROUP—A

1) Indicate the correct answer in each of the following : (10)

(i) Excess pressure inside a liquid drop is

(a) $P = 2S \left(\frac{1}{r} + \frac{1}{R} \right)$, $S = S.T.$ of the liquid

(b) $P = S \left(\frac{1}{r} + \frac{1}{R} \right)$ (c) $P = \frac{2S}{r}$ (d) $P = \frac{4S}{r}$

(ii) Using Stokes theorem one can transform

(a) Volume integral to surface integral and vice-versa

(b) Line-integral to surface integral and vice-versa

(c) Line-integral to Volume integral and vice-versa

(d) Surface integral to surface integral over a closed surface.

(iii) For a liquid in stream line motion through a tube, which of the following statements is not correct :

(a) Viscous force is proportional to the surface area of the liquid layer.

(b) Viscous force is proportional to the velocity.

(c) Viscous force depends on the nature of the liquid.

(d) Viscous force is proportional to the velocity gradient.

(iv) Which of the following statements is not correct?

(a) Intensity of sound can also be defined as its loudness.

(b) Unit of Intensity is $J - S^{-1} - m^{-2}$

(c) Unit of Intensity expressed in logarithmic scale is bell.

(d) Unit of loudness is phon.

(v) Which of the following statements is not correct?

(a) Entropy change depends only on the initial and final state of the system and is independent of the path of transformation.

(b) Entropy change in a Carnot's cycle is Zero.

(c) The entropy of the universe increase in an irreversible cycle.

(d) Entropy increases in a reversible cycle.

(vi) In thermal conduction, steady state is defined as

(a) Every point of the bar is at same temperature.

(b) Temperature is independent of time and distances both.

(c) Temperature is different changes with time.

(d) Temperature is different at different points but does not change with time.

(vii) Colour of a thin film is due to

(a) Reflection of light from the film.

(b) Transmission of light from the film.

(c) Interference by division of amplitude

(d) Interference of monochromatic light by division of wavefront.

(viii) In Fresnel's diffraction

(a) The incident wave front is a plane wave front

(b) The source and screen both are at finite distance from the obstacle

(c) The source and screen both are at infinite distance from the obstacle

(d) Only the screen is at infinite distance from the obstacle.

(ix) For a given wavelength, the thickness of a quarter wave plate is

(a) $t = \frac{2\lambda}{\mu_0 - \mu_e}$

(b) $t = \frac{4\lambda}{\mu_0 - \mu_e}$

(c) $t = \frac{\lambda}{2(\mu_0 - \mu_e)}$

(d) $t = \frac{\lambda}{4(\mu_0 - \mu_e)}$

(x) Relation between electric intensity, polarization and displacement vectors is

(a) $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$

(b) $\vec{D} = \epsilon_0 \vec{P} + \vec{E}$

(c) $\vec{E} = \epsilon_0 \vec{D} + \vec{P}$

(d) $\vec{E} = \epsilon_0 \vec{P} + \vec{D}$

GROUP—B

- 2) Answer any *two* of the following questions : (5X2=10)
- (a) Using the Poiseuille's formula for flow of liquid through a capillary tube, write in brief, the experimental determination of co-efficient of viscosity of a liquid.
 - (b) Distinguish between Reversible and irreversible process.
 - (c) Define the term "Time of reverberation" and explain the cause of bad acoustic of building.
 - (d) Write in brief, the experimental determination of wavelength of sodium light using a Michelson's Interferometer.

GROUP—C

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

- 3) State and prove Stokes thermo. (2+8)
- 4) Discuss with theory the experimental determination of S.T of mercury by Quincke's method. (6+4)
- 5) Give the analytical explanation of Damped forced vibration. (4+6)
- 6) Derive an expression for efficiency of a Carnot's engine and hence show that temperature in absolute scale can not be negative. (9+1)
- 7) Discuss the porous-plug experiment and derive the expression for inversion temperature in Joule-Thomson expansion. (4+6)
- 8) Write necessary theory explain the formation of Newton's ring and hence discuss the shape of the fringes. Discuss in brief the experimental determination of wavelength of Na-light using Newton's ring. (7+3)
- 9) Derive the condition for maxima and minima for Fraunhofer diffraction at a single slit. (10)
- 10) Give the construction, theory and working of an attracted disc electrometer. (3+4+3)

GROUP—D

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

- 11) If \vec{r} is the position vector of a point find $\text{Div } \vec{r}$.
- 12) A plane diffraction grating has 4240 lines per cm. When a monochromatic light is normally incident on the grating, the second order principle maximum is observed at 30° . Calculate the wavelength of incident light.
- 13) For one mole of a real gas, the critical volume is $70 \times 10^{-6} \text{ m}^3$ and critical pressure is $12.8 \times 10^5 \text{ Nm}^{-2}$. Calculate the van der Waals' constants of the gas and hence the value of critical temperature.
- 14) At a pressure of 760 mm of Hg, the volume of air enclosed in a cylinder is 200 cc. On increasing the pressure an amount, equal to 1 mm of Hg, the volume of the gas decreases by 0.263 cc, temperature remaining constant. Calculate the Bulk modulus of elasticity of the gas.
- 15) Calculate the thickness of a quarter wave plate of quartz for sodium light of wavelength 5893 Å. The refractive indices of quartz for e-ray and o-ray are 1.5533 and 1.5442 respectively.