7/10/2017

VCD   F.Y. B.Sc.   PHYSICS-II   ATKT SEM-I 2017-18 75 MARKS   2 1/2HRS.

Note: i) All the questions are compulsory.
       ii) Figures to the right indicate full marks.
       iii) Use of non programmable calculator is allowed.

Q.1) A) Attempt any one.
                                                                    [8 Marks]
   a) Write a note on 'Cardinal points' of a system of lenses: State significance of cardinal points.
   b) What is wedge –shaped film? Explain the formation of interference fringes in a wedge-shaped film formed by a liquid of R. I. μ . Derive an expression for the fringe width.

Q.1) B) Attempt any one:
                                                                    [7 Marks]
   a) What is Newton's ring . Explain with the necessary theory the formation of Newton's rings in reflected light. Hence show that the radius of nth dark ring is proportional to square root of a natural no.
   b) Write a short note on Spherical aberration

Q.1) C) Attempt any one.
                                                                    [5 Marks]
   a) Discuss Construction and working of Huygen's eyepiece
   b) Describe the Schuster's method.

Q.2) A) Attempt any one.   [8 Marks]

   a) Describe construction and working of He-Ne laser. Draw energy level diagram.
   b) With the help of neat diagram explain how the communication system is based on optical fibre? Write the advantages and Disadvantages of optical fibres in modern communication.

                                                                    [7 Marks]

Q.2) B) Attempt any one.
   a) Give a brief account of application of laser.
   b) What is numerical aperture (NA) of an optrical fibre? Derive necessary expression for NA.

                                                                    [5 Marks]

Q.2) C) Attempt any one.
   a) Explain the following process with the help of neat label diagram.
      1. Spontaneous emission   2. Stimulated emission
   b) Write a note on graded – index optical fibre..

                                                                    [8 Marks]

Q.3) A) Attempt any one.
   a) Derive Van der Waals equation explaining every step
   b) Derive the relation between p,V,T in an adiabatic interaction for an ideal gas.
                                                                    (P.T.O)

Q.3) B) Attempt any one. [7 Marks]

   a) With neat and label diagram explain Andrews experiment on Carbon Dioxide

   b) Show that $C_p - C_v = R$ for perfect gas.

Q.3) C) Attempt any one. [5 Marks]

   a) Find the equation of the curve passing through maxima and minima of Van der Waals isothermals.

   b) State and explain zeroth law of thermodynamics

Q.4) Attempt any three [15 Marks]

   a) Explain the phenomenon of refraction through a thin lens. Derive an expression for the focal length of lens. [Lens maker formula]

   b) Write a short note on lens defect: Coma

   c) Describe construction and working of Ruby –laser with the help of neat diagram.

   d) Describe the structure of a step-index optical fibre. Explain the propagation of light through it.

   e) Van der Waals constants for a gas are given by, $a = 8.74 \times 10^{-3}$ Nm mol^{-2} and $b = 2.3 \times 10^{-6}$ m^3/mol. Find the critical constants of the gas . R= 8.4 JK^{-1}mol^{-1}

   f) Show that for a Simple compressible system , work done by a system is given by

$$\int_{V_1}^{V_2} p\,dV$$

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