Ref No.- EX/PH/CSE/T/112A/2017(S)

B.CSE SUPPLEMENTARY EXAMINATION, 2017

(1st Year, 1st Semester)

Subject: PHYSICS –I Time: Three hours Full Marks: 100

Answer any **five** questions

1. (a) Explain the operation of a Carnot engine and deduce its expression for the thermal efficiency.

(b) A reversible engine converts 1/6 th of heat input into work. If the temperature of the sink is reduced by 62°C, its efficiency is doubled. Find the temperature of the source and the sink. 14+6

2. (a) State the fundamental postulates of the kinetic theory of gases and deduce the expression of pressure of gas.

(b) Calculate the r.m.s speed of gas molecules. At what temperature, pressure remaining constant, will the r.m.s velocity of a gas be double its value at 0^0 C? 14+6

3. (a) Discuss briefly the wave nature of matter and outline de Broglie theory of matter waves.

(b) Calculate the de Broglie Wavelength of an electron whose Kinetic energy is 50 eV. 14+6

4. (a) What are continuous and characteristic X-rays? Discuss their origin.
(b) An X-ray tube is operated at 40 Kilovolts. Find out the short wavelength limit of Continuous Spectra.

14+6

5. (a)What is Compton effect? Derive the expression for the change in wavelength of scattered X-rays.
(b) A photon recoils back after striking an electron at rest. What is the change in the wavelength of the Photon.

14+6

6. (a) Explain Van der Waals' equation of state of a real gas and obtain expression for the critical Constants in terms of Vander Waal's constants.
(b) What conclusions were obtained from Andrew's experiment with CO_2?

7. Write Short Notes on (Any **Two**) 10x2

(a) 1st law of Thermodynamics.

(b) Maxwell's law of velocity distribution

(c) Maxwell's thermodynamic relations

(d) Bohr atomic model