

F.Y.B.SC. SEM – II (2014 COURSE) : WINTER - 2017

SUBJECT : PHYSICS: KINETIC THEORY AND THERMODYNAMICS

Day : Friday  
Date : 27/10/2017

Time : 03.00 PM TO 05.00 PM  
Max. Marks : 40.

**W-2017-0600**

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate full marks.
- 3) Use of electronic calculator/ log table is allowed.

**Q.1** Attempt any **TWO** of the following: (10)

- a) Draw block diagram of a Otto engine and explain its components.
- b) Define critical constants of a gas and explain drawbacks of Van der Waal's equation of state.
- c) 1 Kg of water is converted to steam at 373°K at the same temperature. The volume of water increases to 1671 times its original volume on boiling. Calculate the change in the internal energy of the system, if latent heat of vaporization is 50 cal/g.

**Q.2** Attempt any **TWO** of the following: (10)

- a) Using 'temperature-entropy' diagram. Obtain the efficiency for the Carnot's engine.
- b) 10 gm of water at 10°C is mixed with equal amount of water at 77°C. Calculate the resultant increase in entropy.
- c) Draw circuit diagram of platinum resistance thermometer measurement and explain its working.

**Q.3** Attempt any **TWO** of the following: (10)

- a) The Van der Waal's constant **a** and **b** for N<sub>2</sub> are 1.39 atm-lit<sup>2</sup>/ mole<sup>2</sup> and 0.0039 lit/mole respectively. Calculate the values of critical constant and Boyle's temperature. (Given: R = 0.082 atm-lit/mol °K).
- b) Derive an expression for the work done during isothermal change.
- c) Calculate the change in entropy when 16 gm of ice at 0°C is converted into water at the same temperature. (Latent heat of ice = 80 cal/g).

**Q.4** Attempt any **FIVE** of the following: (10)

- a) State the law of correspondence of states.
- b) At what temperature Fahrenheit thermometer reads thrice centigrade thermometer.
- c) What are the two corrections to the equation of state of an idea gas?
- d) Draw the critical temperature isotherm and explain.
- e) State the concept of entropy in thermodynamic system.
- f) State the different strokes of Diesel engine.
- g) State the importance of indicator diagram.

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