

**F.Y.B.SC. SEM – II (2014 COURSE) : SUMMER - 2018**  
**SUBJECT : PHYSICS: KINETIC THEORY AND THERMODYNAMICS**

Day : **Monday**  
Date : **16/04/2018**

**S-2018-0692**

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

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**N.B.:**

- 1) All questions are **COMPULSORY**.
  - 2) Figures to the **RIGHT** indicate full marks.
  - 3) Use of electronic calculator/ log table is allowed.
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**Q.1** Attempt any **TWO** of the following: **(10)**

- a) Define critical constants of a gas and explain drawbacks of Van der Waal's equation of state.
- b) A quantity of air at 27°C and atmospheric pressure is suddenly compressed to  $1/5^{\text{th}}$  of its original volume. Find the final pressure and temperature.  
(Given  $\gamma = 1.4$ )
- c) Draw block diagram of a diesel engine and explain its components.

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

- a) "Entropy of the universe remains constant during reversible cyclic process." comment.
- b) The expansion ratio of a diesel engine is 15 and to start with the compression stroke, it contains air at 15 atm and 510°K. Calculate the pressure and temperature at the end of the stroke. (Given  $\gamma = 1.4$ ).
- c) Draw circuit diagram of platinum resistance thermometer measurement and explain its working.

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

- a) Derive an expression for critical pressure and critical temperature in terms of Van der Waal's constant 'a' and 'b'.
- b) Derive an expression for the work done during an adiabatic process.
- 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) Explain in short the principle of thermocouple.
- b) State the concept of entropy in thermodynamic system.
- c) What is meant by coefficient of performance?
- d) What are isochoric and isobaric processes? Give one example.
- e) What is critical isotherm of a gas?
- f) State the importance of indicator diagram.
- g) Calculate the theoretical values of coefficient of critical constants.

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