

Code No: RT31351

**R13**
**SET - 1**

**III B. Tech I Semester Supplementary Examinations, October/November - 2018**  
**THERMODYNAMICS AND REFRIGERATION SYSTEMS**  
 (Agricultural Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answering the question in **Part-A** is compulsory  
 3. Answer any **THREE** Questions from **Part-B**

**PART -A**

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|---|----|---|------|
| 1 | a) | State zeroth law of thermodynamics.                                     | [3M] |
|   | b) | What is the importance of heat balance sheet?                           | [4M] |
|   | c) | Define refrigerating capacity   | [3M] |
|   | d) | Define multistage compression.  | [4M] |
|   | e) | What are the desirable requirements of a Refrigerant - Absorption pair? | [4M] |
|   | f) | Define Relative humidity and specific humidity.                         | [4M] |

**PART -B**

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|---|----|---|-------|
| 2 | a) | Distinguish between:<br>i) Heat and Work ii) Closed system and open system<br>iii) Intensive and extensive properties   | [6M]  |
|   | b) | A gas undergoes a thermodynamic cycle consisting of three processes beginning at an initial state where $p_1 = 1 \text{ bar}$ , $V_1 = 1.5 \text{ m}^3$ and $U_1 = 512 \text{ kJ}$ . The processes are as follows:<br>i) Process 1-2: Compression with $pV = \text{Constant}$ to $p_2 = 2 \text{ bar}$ , $U_2 = 690 \text{ kJ}$<br>ii) Process 2-3: $W_{23} = 0$ , $Q_{23} = -150 \text{ kJ}$ , and<br>iii) Process 3-1: $W_{31} = +50 \text{ kJ}$ . Neglecting KE and PE changes, determine the heat reactions $Q_{12}$ and $Q_{31}$ . | [10M] |
| 3 | a) | 50 kg of water is at 313 K and enough ice at $-5^\circ\text{C}$ is mixed with water in an adiabatic vessel such that at the end of the process all the ice melts and water at $0^\circ\text{C}$ is obtained. Find the mass of ice required and the entropy change of water and ice. Given $C_p$ of water = 4.2 kJ/kgK, $C_p$ of ice = 2.1 kJ/kgK and latent heat of ice = 335 kJ/kg.  | [8M]  |
|   | b) | With neat sketches explain the working of a 4 stroke Petrol engine.   | [8M]  |
| 4 | a) | R12 saturated liquid at $35^\circ\text{C}$ is throttled to a pressure corresponding to a temperature of $5^\circ\text{C}$ . Determine the extent of flashing of the liquid into vapor.  | [6M]  |
|   | b) | Discuss the following:<br>i) Significance of clausius inequality ii) thermoelectric cooling   | [10M] |

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