

APPLIED THERMODYNAMICS

(Code : MET-503)

Full Marks : 70

Time : 3 hours

Answer any five questions

Figures in the right-hand margin indicate marks

- 1. (a) Define Mechanical efficiency in case of an I.C. engine. 2
- (b) What are the parameters available for evaluating the performance of an I.C. engine? Explain in brief. 5
- (c) An engine uses 7 kg of fuel per hour of calorific value 30,000 kJ/kg. If the BHP of the engine is 25 kW and mechanical efficiency 85%, calculate (i) Indicated thermal efficiency (ii) Brake thermal efficiency and (iii) specific fuel consumption in kg/BHP/hr. 7

- 2. (a) Mention four industrial used of compressed air. 2
- (b) With schematic diagram explain the principle of operation of an air compressor. 5
- (c) Derive the work done by a single stage Reciprocating Air Compressor without clearance volume. 7
- 3. (a) What do you mean by refrigeration? 2
- (b) Describe different components of a simple vapour compression refrigeration system. 5
- (c) Determine the size of the cylinder for a double acting air compressor of 50 kW indicated power, in which air is drawn in at 1 bar and 15°C and compressed according to the law $PV^{1.2} = \text{constant}$ to 6 bar. The compressor runs at 100 rpm with average piston speed of 150 m/min. Neglect clearance. 7
- 4. (a) What are the chemical formulae of refrigerants R-11, R-12, R-21 and R-22? 2

(Turn Over)

(3)

- (b) Write down the differences between a vapour absorption and vapour compression refrigeration system. 5
- (c) With neat sketch describe a practical vapour absorption refrigeration system. 7
- 5. (a) Define Psychrometry. 2
- (b) What do you mean by dew point temperature? Explain how it is different from wet bulb temperature. 5
- (c) Draw a psychrometric chart and show various psychrometric processes on it. 7
- 6. (a) What are the factors affecting the comfort of a human body? 2
- (b) Define DBT and WBT. Explain how Relative Humidity (RH) can be measured from sling psychrometer. http://www.sctevtonline.com 5
- (c) Describe the psychrometric process 'cooling and humidification'. Explain how it is obtained and in what environmental condition it is adopted. 7

(4)

- 7. (a) What is the use of Air filter and blower in air-conditioning system? 2
- (b) Classify air-conditioning systems. 5
- (c) Describe summer air-conditioning system with schematic diagram. 7

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