P P SAVANI UNIVERSITY

Sixth Semester of B. Tech. Examination
May 2022
SEME3071 I.C. Engine & RAC

19.05.2022, Thursday   Time: 09:00 a.m. To 11:30 a.m.   Maximum Marks: 60

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in same answer sheet.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	Define following terms	[05]
(i)	Isentropic compression	
(ii)	Adiabatic Process	
(iii)	Dalton'r law	
(iv)	Compression ratio	
(v)	Entropy	
(vi)	Enthalpy	

Q - 2 (a)	State the valve timing diagrams. What is the purpose of study of valve timing diagram?	[05]
Q - 2 (b)	What is lean and rich mixture? What is its purpose in IC Engine?	[05]

Q - 3 (a)	Write down the assumptions of air standard cycle.	[05]
Q - 3 (b)	What are the differences between otto cycle and diesel cycle?	[05]

Q - 4	What are the different methods of supercharging? Explain the effect of supercharging.	[05]

SECTION – II

Q - 1	Answer the Following: (MCQ/Short Question/Fill in the Blanks)	[05]
(i)	One ton of refrigeration	
(ii)	Define the terms (1) Wet bulb temperature (2) Dew – point temperature	
(iii)	What is meant by Bypass factor?	
(iv)	State the required properties for a good refrigerant in detail.	
(v)	What is C.O.P?	
(vi)	Distinguish between refrigerator and heat pump.	
(vii)	Define: Humidification and Dehumidification	

Q - 2 (a)	List out applications of refrigeration and explain ice plant with neat sketch.	[05]
Q - 2 (b)	Air at DBT 35°C and WBT 22°C is passed over the cooling coil at 40 m³ /min flow rate. The surface temperature of the coil is 5°C and the cooling capacity of the coil is 3.5 TR. Determine the DBT and WBT of air leaving the cooling coil, the bypass factor and the mass of water condensed at coil.	[05]

OR

Q - 2 (a)	Explain working of theoretical aqua ammonia vapour absorption refrigeration system with neat sketch. Also state few selection criteria for vapor absorption refrigeration system.	[05]
Q - 2 (b)	Explain with neat schematic diagram simple air refrigeration system also draws its T-s plot.	[05]
Q - 3 (a)	A vapour compression refrigeration system based on R-134a operates between the condenser and evaporator temperature of 40°C and 0°C respectively. The length of compression stroke and bore diameter are 10 and 12 cm respectively. The compressor runs	[05]

at 600 RPM with 85% volumetric efficiency. The refrigerant enters the compressor in dry saturated state and the liquid subcooling after condensation is 10°C. Use p-h chart and calculate: (i) Mass flow rate of refrigerant (ii) Power requirement (iii)cooling water required in the condenser and (iv) COP of the refrigeration system.

Q - 3 (b)   Compare the packaged air conditioning and central air conditioning systems.   [05]

<div align="center">OR</div>

Q - 3 (a)   Explain the heating and humidification process with schematic diagram and process on   [05]
             psychrometric chart.

Q - 3 (b)   Draw the schematic diagram and p-h diagram for simple vapour compression refrigeration [05]
             cycle.

Q - 4   Attempt any one/two.   [05]
 (i)   State the advantages and Disadvantages of air refrigeration.
 (ii)   Enlist the functions of the ducts.

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