Day: Wednesday

Date: 15/05/2019

S-2019-2584

Time: 02.30 PM TO 05.30 PM

Max. Marks: 60

N.B:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Use of steam table is allowed.
5) Assume suitable data if necessary.

Q.1 State Kelvin- Planck and Clausius statement of the second law of thermodynamics and prove that the violation of Kelvin-Planck statement result into violation of Clausius statement. **(10)**

OR

Q.1 Define equivalent evaporation and boiler efficiency. Explain heat balance sheet for boiler. **(10)**

Q.2 Find the theoretical C.O.P. for a CO_2 mactine working between the temperature range of 25^0c and -5^0c. The dryness traction of CO_2 gas during the suction stroke is 0.6. Following properties of CO_2 are given **(10)**

Temperature 0^0c	Liquid		Vapour		Latent heatKJ/kg
	Enthalpy KJ/Kg	Entropy KJ/kg k	Enthalpy KJ/Kg	Entropy KJ/kg k	
25	81.3	0.251	202.6	0.63	121.4
-5	-7.54	-0.042	237	0.84	245.3

OR

Q.2 Discuss following psychometric process with neat sketch. **(10)**
  i) Sensible cooling
  ii) Sensible heating
  iii) Humidification and dehumidification

Q.3 A two stage air compressor, with complete intecooling, delivers air to the mains at a pressure of 30 bar, the suction conditions being 1 bar and 27^0c. If both cylinders have the same stroke, find the ratio of the cylinder diameters for the efficiency of compression to be maximum. Assume the index of compression to be 1.3 **(10)**

OR

Q.3 What are the types of Rotary air compressor? Give comparsion between Reciprocating and Rotary air compressors. **(10)**

Q.4 Explain briefly the Diesel cycle with the help of P-V and T-S diagrams **(10)** and derive an expression for the ideal efficiency of a Diesel cycle.

OR

Q.4 Derive an expression for the ideal efficiency of dual combustion cycle, **(10)** using ideal air as the working fluid.

Q.5 What is the function of a carburetor in an S.I. engine? Briefly explain **(10)** with a neat sketch the operation of a simple float type carburetor.

OR

Q.5 What is the use of heat balance sheet of an engine? Mention the various **(10)** items to be determined to complete the heat balance sheet.

Q.6 What are the extended surfaces? Explain neat transfer through extended **(10)** surfaces. Explain effectiveness and efficiency of a fin.

OR

Q.6 Classify heat exchangers? Explain LMTD in detail. **(10)**
(Log means Temperature Difference).

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