Code No: **R41031** **R10** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, Mar/April - 2016

REFRIGERATION & AIR CONDITIONING

(Mechanical Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
Refrigeration table is permitted
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1 a) In a Bell-Coleman cycle working between pressures of 1 and 6 bar., and temperatures at the beginning of compression and expansion of 8^{o}C and 35^{o}C, air flow rate is 30 kg/ min. If the compression and expansion indices in the polytrophic process are 1.3 and 1.35 respectively. Determine i) COP, ii) tonnage of the plant, iii) determine the heat transfer rates per kg of air during each process. [8]

b) Explain the working principle of Regenerative air refrigeration system with the help of configuration diagram and temperature-entropy diagram. [7]

2 a) What is the effect of sub cooling and super heating in vapor compression process and show it in T-S and h-s diagram? [7]

b) The temperature of water entering and leaving the condenser for 20T ice plant is 20^{o}C and 27^{o}C and temperature of brine in the evaporator is -15^{o}C. Before entering the expansion valve, ammonia is cooled to 20^{o}C and ammonia enters the compressor dry saturated. Calculate for one tonne of refrigeration the power expended, the amount of cooling water in the condenser and the COP of the plant. [8]

3 a) How condensers and evaporators are classified and explain any one of the condenser and evaporators with the help of neat sketch? [8]

b) Name three refrigerants that are suitable for ice plants giving their relative merits and demerits. [7]

4 a) Explain the working principle of practical ammonia absorption refrigeration system with the help of neat sketch. [8]

b) Explain the working principle of three fluid absorption refrigeration system with a neat sketch. [7]

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5 a) What are the merits and demerits of steam jet refrigeration system and name few applications? [8]
b) Explain what is principle of thermo electric refrigerator. [7]

6 a) An air-conditioned auditorium is to be maintained at 27°C DBT and 60% RH. The ambient condition is 40°C DBT and 30°C WBT. The total sensible heat load is 100 000 kJ/h and total latent heat load is 40 000 kJ/h. 60% of the return air is re-circulated and mixed with 40% of make-up air after cooling coil. The condition of air leaving the cooling coil is at 18°C. Determine i) RSHF, ii) The condition of air entering the auditorium, iii) The amount of make-up air, iv) ADP and v) BPF of cooling coil. [8]
b) For hot and dry weather conditions show the arrangement of summer air-conditioning system and represent the processes on psychometric chart. [7]

7 a) How air conditioning systems are classified? Write short notes on comfort air conditioning and industrial air conditioning [8]
b) What are different latent heat loads that are to be considered in the design of air conditioners? [7]

8 a) What is function of a fan in an air-conditioning system and how are they classified with brief explanation? [8]
b) What is a heat pump and briefly explain about different heat pump circuits. [7]