

Code: 9A03604

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2017

REFRIGERATION & AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

Use of steam tables, P-H charts and Psychrometric charts are permitted in the examination hall.

- 1 (a) List out the advantages and disadvantages of liquid gas refrigeration and mention few specific fields of applications.
(b) What is the difference between direct and indirect refrigeration system? Explain the advantages of one over the other?
- 2 (a) State the functions of the following parts of a simple vapour compression system:
(i) Compressor. (ii) Condenser. (iii) Expansion valve. (iv) Evaporator.
(b) A heat pump using NH_3 as the Refrigerant operates between saturation temperature of 6°C and 38°C . The refrigerant is compressed isentropically from dry saturated and there is a 6°K of under cooling in the condenser. Calculate (i) C.O.P. (ii) The mass flow of refrigerant / kW power input. (iii) The heat available per kilowatt power input.
- 3 (a) Can water be a good refrigerant for domestic unit? Explain.
(b) How designation system is used for refrigerants? Designate any two refrigerants.
- 4 (a) How is refrigeration achieved in an absorption system?
(b) Explain the following accessories: (i) Analyzer. (ii) Heat exchanger.
- 5 (a) What is the principle of a steam jet refrigeration system?
(b) Write short note on the systems of refrigeration.
- 6 20 m³ of air per minute at 30°C and 60% RH is cooled to 22°C DBT maintaining specific humidity constant. Find the following:
(a) Heat removed from air.
(b) R.H. of cooled air.
(c) WBT of the cooled air.
Take air pressure = 1 bar.
- 7 (a) Describe a centrifugal fan with the help of a neat sketch.
(b) What do you understand by a geometrically similar fan? Discuss the various fan similarity laws.
- 8 An air-conditioned space is maintained at 27°C DBT and 50% RH. The ambient conditions are 40°C DBT and 27°C WBT. The space has a sensible heat gain of 14 kW. Air is supplied to the space at 7°C saturated. Calculate: (i) mass of moist air supplied to the space in kg/h. (ii) Latent heat gain of space in kW. (iii) Cooling load of air washer in kW if 30% of the air supplied to the space is fresh, the remainder being recirculated.
