**Rajasthan Institute of Engineering & Technology, Jaipur.**

**Department of Mechanical Engineering**

**I Mid Term examination**

**Session: 2018-19**

**Semester: VII SET: A Branch: Mechanical Engineering**

**Subject: RAC (7ME2A)**

Time: 2 hrs. M.M.:20

**Instruction for students:**

1. No provision for supplementary answer book

Q.01 Write the mechanism of a simple vapor compression refrigeration system.

OR

Q.01 Explain Cascade refrigeration system with neat sketch.

Q.02 The capacity of a refrigerator is 200 TR when working between -60C and 250C. Determine the mass of ice produced per day from water at 250C. Also find the power required to drive the unit. Assume that the cycle operates on reverse Carnot cycle and the latent heat of ice is 335 KJ/Kg.

OR

Q.02 What is difference between a refrigerator and heat pump? Derive an expression for the performance factor for both if they are running on reversed Carnot cycle.

Q.03 A cold storage plant is required to store 20 tonnes of fish. The fish is supplied at a temperature of 300C

The specific heat of fish above freezing point is 2.93 KJ/KgK. The specific heat of fish below freezing point is 1.26KJ/KgK. The fish is stored in cold storage which is maintained at -80C. The freezing point of fish is -40C. The latent heat of fish is 235 KJ/Kg. Assume actual COP of the plant as 0.3 of the Carnot COP. If the plant requires 75KW to drive it, Find:

1. The capacity of the plant (b) Time taken to achieve cooling

OR

Q.03 Explain the effect of superheating in compressor and under cooling in vapour compression system. Show these on T-s and P-h diagrams

Q.04 What do you mean by Refrigeration? Define the unit of Refrigeration and coefficient of performance of a Refrigerator. Also state the II law of thermodynamics

OR

Q.04 In a refrigerator working on Bell-Coleman cycle, the air is drawn into the cylinder of the compressor from the cold chamber at a pressure of 1.03bar and temperature 12°C. After isentropic compression to 5.5 bar, the air is cooled at constant pressure to a temperature of 22°C. The polytropic expansion = constant then follows and the air expanded to 1.03 bar is passed to cold chamber. Determine:

(a) Work done per kg of air

(b) Refrigerating effect per kg of air flow

(c) C.O.P.

For air take γ=1.4 and =1.003KJ/kgK