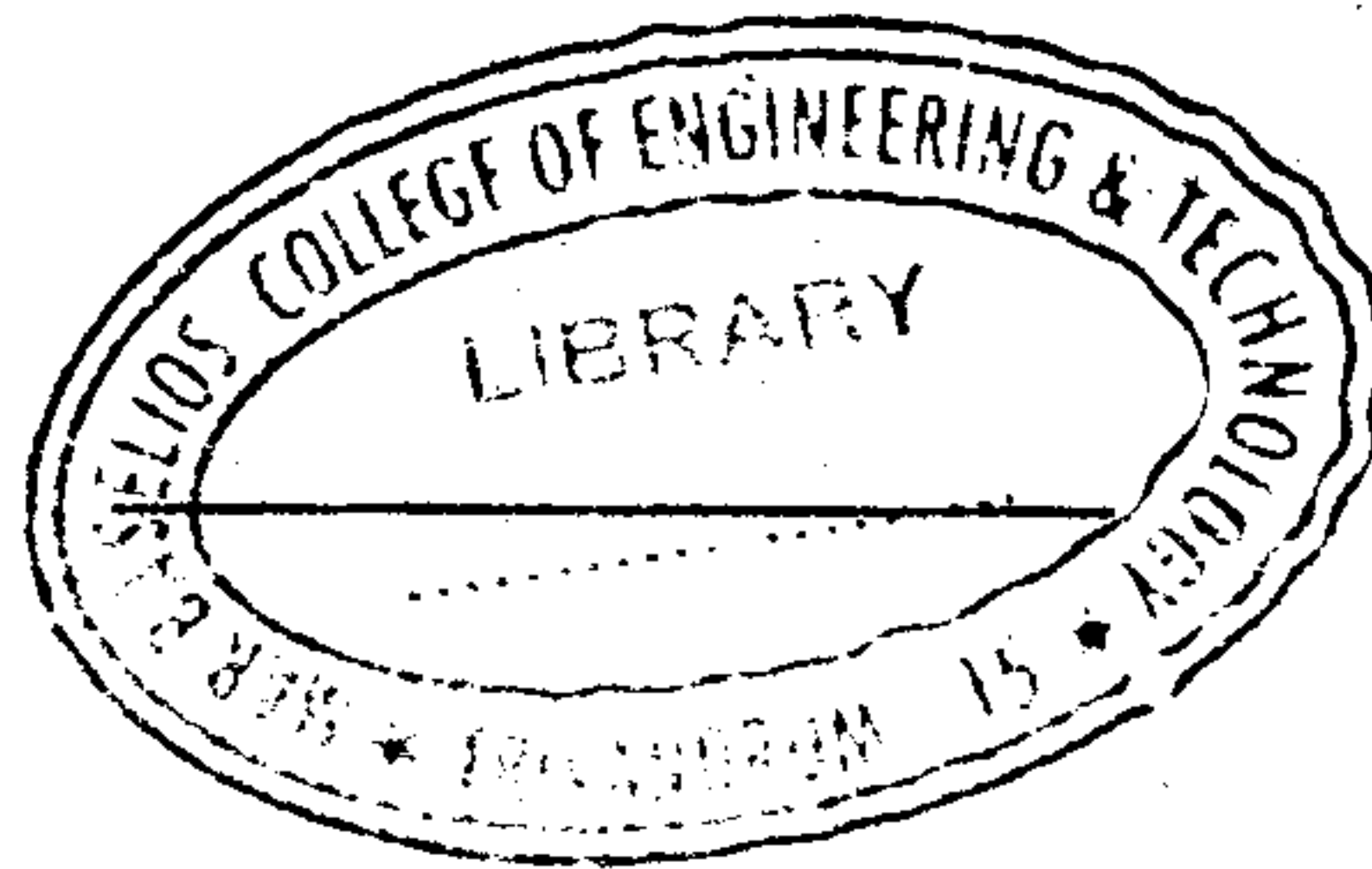


Module – II

13. The following data relate to a steam ejector refrigeration system: Condition of the motive steam = 7 bar, dry saturated, Temperature of water in the flash chamber = 4.5°C , Temperature at which the make-up water is supplied = 18°C , the pressure at which condenser is operated = 0.058 bar, Nozzle efficiency = 88%, Entrainment efficiency = 65%, Compression efficiency = 80%, The quality of steam and flash vapour at the beginning of compression = 0.92. Determine the following: (i) Mass of motive steam required per kg of flash vapour, (ii) The quality of vapour flashed from the flash chamber, (iii) Refrigerating effect per kg of flash vapour, (iv) Mass of motive steam required per hour per tonne of refrigeration, (v) Volume of vapour removed from the flash chamber per hour per tonne of refrigeration, and (vi) The coefficient of performance of the system.
14. Discuss briefly the following systems of lubrication:
- Splash lubrication system and
 - Pressure lubrication system.

Module - III

15. Atmospheric air at a pressure of 760 mm Hg has temperature of 32°C and a percentage saturation as determined from a psychrometric chart of 52%. Calculate: (i) The partial pressure of the vapour and the dry air, (ii) The specific humidity, (iii) The dew point, and (iv) The density of the mixture.
16. 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 10^5 kJ/h and total latent heat is 4×10^4 kJ/h. 60% of return air is recirculated and mixed with 40% of make-up air after the cooling coil. The condition of air leaving the cooling coil is at 17°C . Determine: (i) Room sensible heat factor, (ii) Condition of air entering the auditorium, (iii) Amount of make-up air, (iv) Apparatus dew point and (v) By-pass factor of the cooling coil.



(3 × 20 = 60 Marks)

7. Give the comparison between vapour absorption and vapour compression systems.
8. Derive an expression for specific humidity and show that it is function of vapour pressure and barometric pressure of air.
9. Sketch 'comfort chart' and show on it the 'comfort zone'.
10. State the factors which should be taken into consideration while selecting a system of air-conditioning.

(10 × 4 = 40 Marks)

PART – B

Module – I

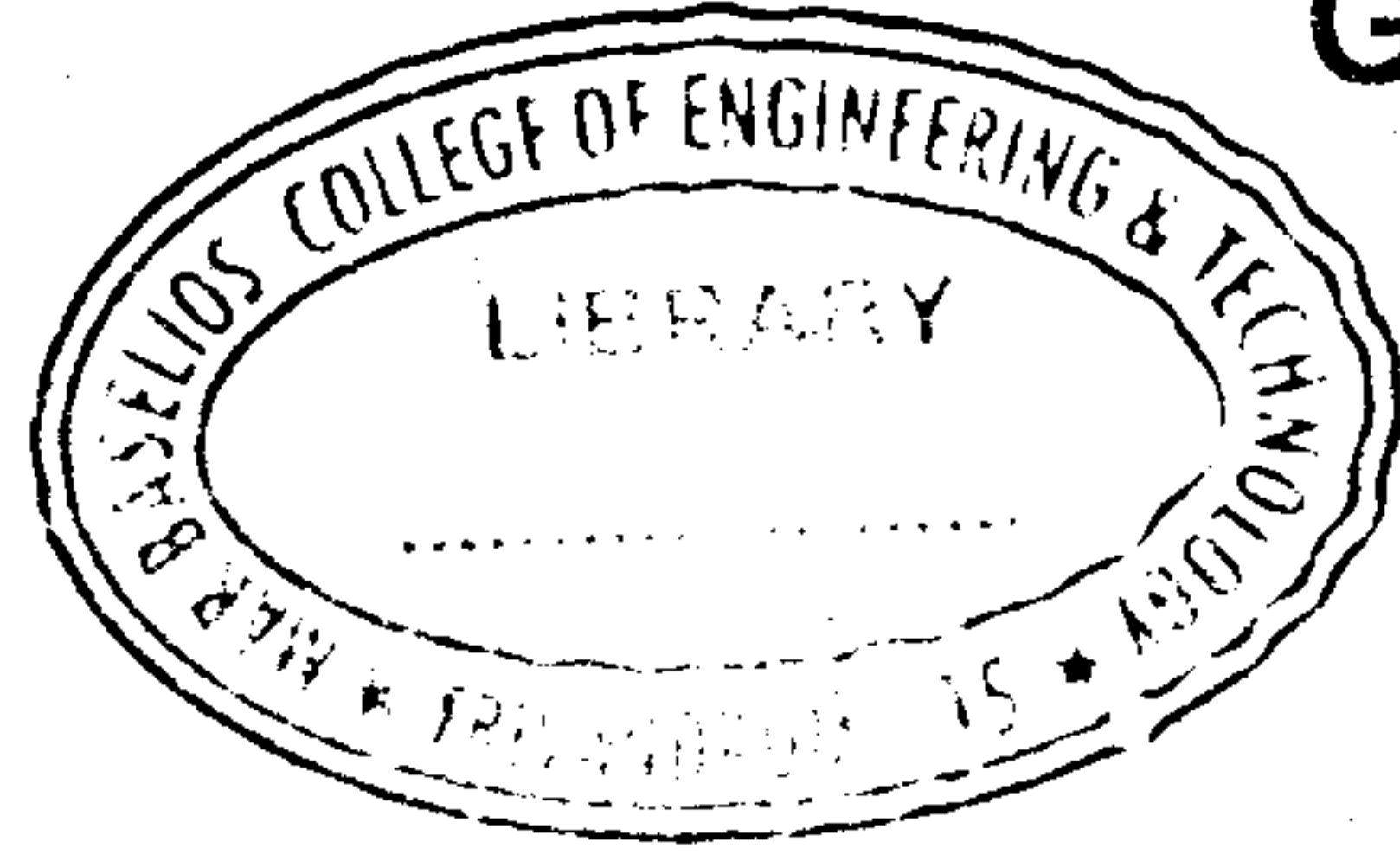
11. An ammonia vapour compression refrigerator has a single stage, single acting reciprocating compressor which has a bore of 127 mm, a stroke of 152 mm and a speed of 240 rpm. The pressure in the evaporator is 1.588 bar and that in the condenser is 13.89 bar. The volumetric efficiency of the compressor is 80% and its mechanical efficiency is 90%. The vapour is dry saturated on leaving the evaporator and the liquid leaves the condenser at 32°C. Calculate the mass flow rate of refrigerant and the power ideally required to drive the compressor.
12. A single compressor system using R-12 as refrigerant has three evaporators of capacities 18 tonnes, 27 tonnes and 9 tonnes of refrigeration. The temperatures in the three evaporators are to be maintained at -5°C, 0°C and 7°C respectively. The system is provided with multiple expansion valves and back pressure valves. The condenser pressure is 9.61 bar. The liquid refrigerant leaving the condenser is sub-cooled at 30°C. The vapours leaving the evaporators are dry and saturated. Assume isentropic compression, determine the following:
 - (i) Mass of refrigerant flowing through each evaporator.
 - (ii) Power required to drive the compressor.
 - (iii) Coefficient of performance of the system.

(Pages : 3)

G – 3444

Reg. No. :

Name :



Seventh Semester B.Tech. Degree Examination, June 2019

08.704 : REFRIGERATION AND AIR CONDITIONING (M)

(2008 Scheme)

Time : 3 Hours

Max. Marks : 100

Instructions:

- (1) Use of Psychometric chart and refrigeration tables are Permitted.
- (2) Answer **all** question from Part A. Each carries **4** marks. And one full question from each Module of Part B. Each carries **20** marks.

PART – A

1. Define the figure of merit related to thermoelectric refrigeration system and explain its effect on C.O.P of the system.
2. Describe briefly the methods used for the liquefaction of hydrogen and helium.
3. What is the function of flash intercooler provided in a compound vapour compression refrigeration system?
4. Write a short noted on 'Pressure Enthalphy (p-h) chart'.
5. Name three refrigerants that are commonly used in commercial refrigerators. Discuss their relative merits and demerits.
6. Derive an expression for finding out the mass of motive steam required per kg of water vapour produced.

P.T.O.