

Total No. of Questions: [03]

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PRN No.	
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Paper Code	U 34-261A(EESE)
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MAY 2022-ENDSEM EXAM
T.Y. B. TECH. (MECHANICAL) (SEMESTER - II)
COURSE NAME: REFRIGERATION AND AIR-
CONDITIONING
COURSE CODE: MEUA32181A
(PATTERN 2020)

Time: [1 Hr]

[Max. Marks: 30]

Instructions to candidates:

- 1) **Figures to the right indicate full marks.**
- 2) **'a' part of every question is compulsory.**
- 3) **Use of scientific calculator is allowed.**
- 4) **Use suitable data where ever required.**
- 4) **Use of Psychrometric chart is allowed.**

Q.1 a) When dehumidification of air necessary and how it is achieved. [4]
Represent on psychometric chart.

b) Air enters a window air conditioner at 1 atm, 30 C and 80 % RH at a rate of 10 m³/min and it leaves at saturated at 14 C. A part of moisture which condenses during the process is also removed at 14 C. Determine rate of heat and moisture removal from air. [6]

OR

b) 25 kg of air at 25 C DBT and 61% RH is mixed with 5 kg of air at 5C DBT and 30 % RH. Calculate condition of mixed air. [6]

Q2 a) What are the different factors which must be considered for evaluation cooling load of a multiplex cinema hall? [4]

b) An air conditioned auditorium is to be maintained at 27°C dry bulb temperature and 60% relative humidity. The ambient condition is 40°C dry bulb temperature and 30°C wet bulb temperature. The total sensible heat load is 100 000 kJ/h and the total latent heat load is 40 000 kJ/h, 50% of the return air is recirculated and mixed with 50% of make-up air after the cooling coil. The condition of air leaving the cooling coil is at [6]

18°C.

Determine: 1. Room sensible heat factor: 2. The condition of air entering the auditorium. Show the processes on the psychrometric chart.

OR

b) An air conditioned hall is to be maintained at 27°C dry bulb temperature and 21°C wet bulb temperature. It has a sensible heat load of 46.5 KW and latent heat load of 17.5 W. The air supplied from outside atmosphere at 38°C dry bulb temperature and 27°C wet bulb temperature is 25 m³/min, directly into the room through ventilation and infiltration. Outside air to be conditioned is passed through the cooling coil whose apparatus dew point is 15°C. The quantity of recirculated air from the hall is 50%. This quantity is mixed with the conditioned air after the cooling coil. Determine: Room Sensible Heat Factor. [6]

Q.3 a) Illustrate central air conditioning system used for Information and Technology company. [4]

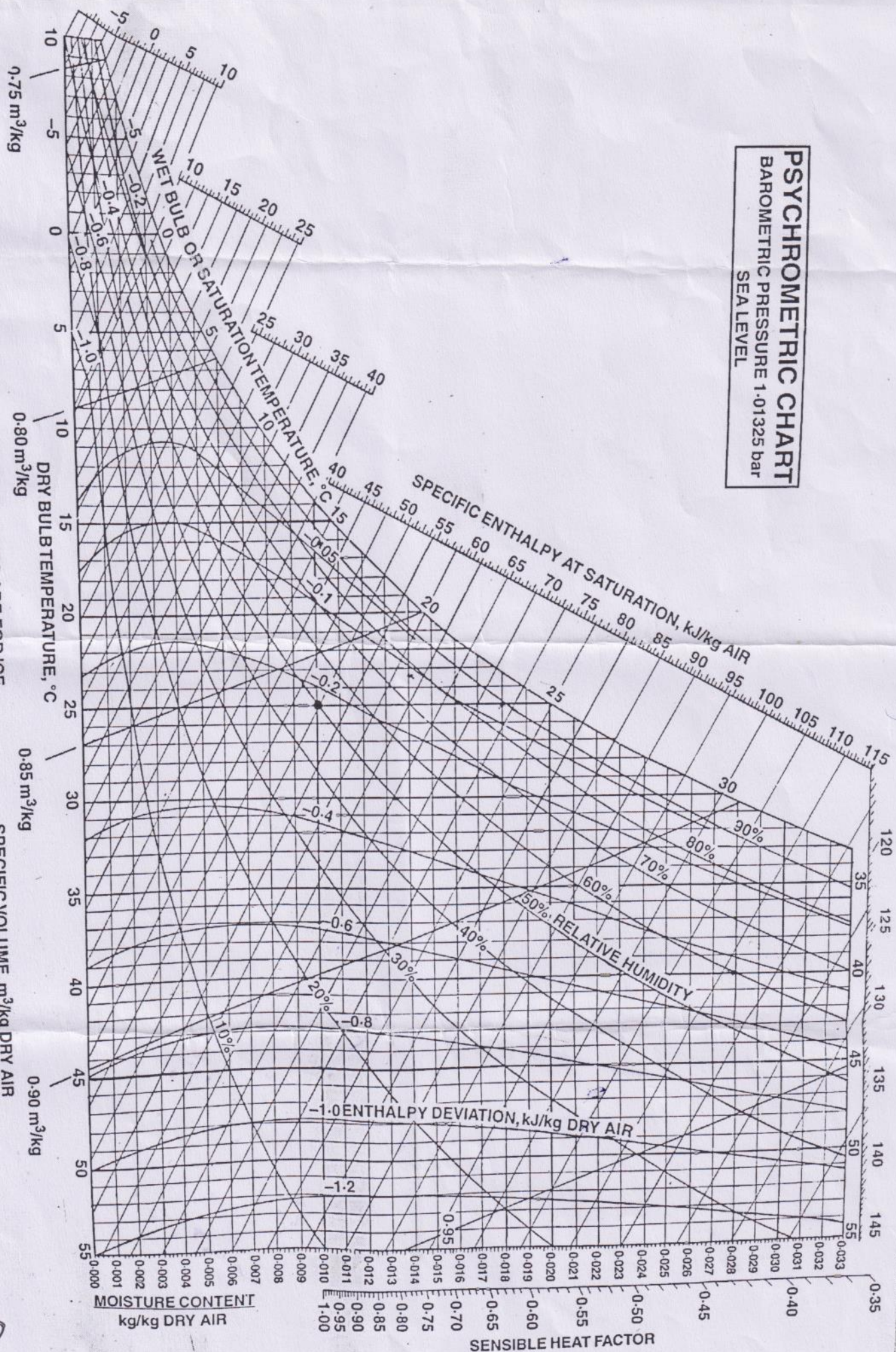
b) A rectangular duct of 500 mm X 350 mm size carries 1.25 m³/s of air having density of 1.15 kg/m³. Determine the equivalent diameter of circular duct if i) quantity of air carried in both cases is same, ii) velocity of air in both cases is same, and iii) if $f = 0.001$, find pressure loss per in mm of water column for 100 m length of duct. [6]

OR

b) The main supply duct of an air conditioning system is 70 cm * 50 cm in cross section and carries 250 m³/min of standard air. It branches into two ducts of cross section 50 cm * 40 cm and 60 cm * 40 cm. If mean velocity of air in the larger branch is 400 m/min find, [6]
i) Mean velocity in main duct and smaller branch
ii) Velocity pressure in mm of WC of main and smaller duct

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PSYCHROMETRIC CHART
 BAROMETRIC PRESSURE 1.01325 bar
 SEA LEVEL



BELOW 0 °C PROPERTIES AND ENTHALPY DEVIATION LINES ARE FOR ICE