BE (CHEMICAL) – 5th SEMESTER (Third Year)

Second Sessional (16.01.2022)

(Mass Transfer 1)

Max. Marks: 25   Time: 60 minutes

I.   (a) Describe the constructional and operational difference between packed column and tray column. (Course outcome 4)   (6)
        (b)   Explain   with   the   help   of   diagrams: Venturi   Scrubber. (Course outcome 4)   (3)
II.   A Fiberboard sheet (1.5m×2m×15mm) is being dried by suspending it horizontally in a current of hot and dry air. The edges are insulated so that drying takes place only from the top and bottom surface. This dry fiberboard sheet weighing 16 Kg with initial moisture content of 30% dried to a final moisture content of 3%. There are two critical moisture values- Xc1= 0.197 and Xc2= 0.0997. A laboratory test gives a drying rate of 4.5 kg/m^{2}h in the constant rate period. In the first falling rate period, the drying flux is linear in the moisture content and in the second falling rate period, the drying flux varies as the square of the moisture content. The equilibrium moisture content is negligible. Calculate the drying time if the drying conditions are the same as in the laboratory test. (Course outcome 5)   (6)
III.   Explain Raoult's Law and with the help of it, prepare equilibrium diagram for a binary system of n-hexane and n-heptane at 1 atm with the help of data given below: (Course outcome 4)   (4)

Temperature (°C)	70	80	90	93
Vapor pressure (n-heptane), mm Hg	310	435	590	660
Vapor pressure (n-hexane), mm Hg	815	1115	1420	1520

IV.   (a)   Explain   Adiabatic   Saturation   temperature   and   derive   its   formula. (Course outcome 4)   (3)
        (b) The weather bureau reported a dry bulb temperature of ambient air as 29°C and relative humidity of 65.3%. The barometer read 750 mm Hg. Calculate the percent humidity of ambient air, if vapor pressure of water at 29°C is 30mm Hg. (Course outcome 4)   (3)