

No Preview
Available

Total No. of Question : [4]

Registration No. :

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Programme Name : Bachelor of Chemical Engineering
Regular T.Y.B.Tech. ESE (A.Y. 2023-24) Sem.V Nov.2023
V SEMESTER (2021 BATCH)
201CHL301-Mass Transfer Operations-I

Duration : [11:00 AM - 01:00 PM]

Date : 20 Nov, 2023

Day : Monday

Marks : 50

Instructions :

1.Read questions carefully.

(Q1) All Questions are compulsory [20.0]

(1.1) What do you mean by direct, indirect mass transfer operation? Give details of each operation with industrial applications. [6.0]

CO :- C301.1

Blooms Taxonomy :- Apply

(1.2) Brief about local(F) and (K) type of mass transfer coefficient with equations like $F_L, F_G, K_G, K_C, K_L, K_Y, K_X$ [7.0]

CO :- C301.2

Blooms Taxonomy :- Apply

(1.3) What is importance of driving force line and operating line in cascades, explain with suitable diagram [7.0]

CO :- C301.3

Blooms Taxonomy :- Analyze

(Q2) All Questions are compulsory [10.0]

(2.1) Give details about criteria for choosing solvent in absorption [4.0]

CO :- C301.4

Blooms Taxonomy :- Analyze

OR [2.1 / 2.2]

(2.2) Explain Absorption factor and Stripping factor [4.0]

CO :- C301.4

Blooms Taxonomy :- Analyze

(2.3) [6.0]

CS₂- N₂ mixture containing 7% CS₂ is to be absorbed by using oil. The gas mixture is entered at 24° C and 1 atm. pressure at a rate of 0.4 m³/s The content of CS₂ brought down to 0.5 %. The oil enters free of CS₂ Determine 1)minimum L/G ratio 2) If L/G ratio 1.5 times the minimum determine number of stages
Given data; Vapour pressure of CS₂ = 346 mm of Hg, Molecular weight of oil=180

CO :- C301.4

Blooms Taxonomy :- Analyze

OR [2.3 / 2.4]

- (2.4) Derive an equation for design of packed tower and explain meaning of NTU,HTU, HETP [6.0]

CO :- C301.4

Blooms Taxonomy :- Analyze

(Q3) All Questions are compulsory [10.0]

- (3.1) What are the various adsorbents used? Give details with its application? [3.0]

CO :- C301.5

Blooms Taxonomy :- Analyze

OR [3.1 / 3.2]

- (3.2) Give details about different adsorption isotherms. [3.0]

CO :- C301.5

Blooms Taxonomy :- Analyze

- (3.3) 500 kg/min of dry air at 20° C and carrying 5 kg of water vapour/hr. in. is to be dehumidified with silica gel to 0.001 kg of water vapour/kg of dry air [7.0]
The operation has to be carried out isothermally and counter currently with 2.5 kg/min. of dry silica gel. How many theoretical stages are required and what will be the water content in the silica gel leaving the last stage?

kg. of water vapour/ kg of dry silica gel, X	0	0.05	0.10	0.15	0.20
kg of water vapour/ kg of dry air, Y	0	0.0018	0.0036	0.0050	0.0062

CO :- C301.5

Blooms Taxonomy :- Analyze

OR [3.3 / 3.4]

- (3.4) What are the various steps involved for design of height of fixed bed adsorber by using break through curve. [7.0]

CO :- C301.5

Blooms Taxonomy :- Analyze

(Q4) Attempt any two out of three questions [10.0]

- (4.1) Brief about simultaneous mass transfer with reaction by examples. [5.0]

CO :- C301.6

Blooms Taxonomy :- Understand

(4.2) Brief about slow regime and fast regime with diagram.

[5.0]

CO :- C301.6

Blooms Taxonomy :- Understand

(4.3) Which contacting equipments used for absorption with reaction? Explain any one with neat sketch. [5.0]

CO :- C301.6

Blooms Taxonomy :- Understand
