****

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**UNIVERSITY**

Reg.No.\_\_\_\_\_\_\_\_\_\_\_\_

**End Semester Examination – Nov/Dec - 2016**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code:** | **12BT203/BT236/09BT206** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **MassTransfes Mass Transfer Operations** | **Max.Marks** | **100** |

**(Extra ordinary graph allowed)**

|  |  |  |
| --- | --- | --- |
| **Q. No.** | **Answer All Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | Give the driving force in Mass transfer operations. | (1) |
| 2. | Write the Fick’s law equations. | (1) |
| 3. | Give your suggestion how to separate the same boiling point components? | (1) |
| 4. | State the minimum reflux ratio. | (1) |
| 5. | Hyper sorption refers to ------------- process. | (1) |
| 6. | Draw a batch process absorption block diagram. | (1) |
| 7. | List out different types of packing methods. | (1) |
| 8. | Name the different types of industrial adsorbents. | (1) |
| 9. | Mention any one method used to separate the compounds from medicinal plants. | (1) |
| 10. | Define Extraction and leaching. | (1) |

|  |  |  |
| --- | --- | --- |
| **PART B(5 X 3= 15 MARKS)** | | |
| 11 | Differentiate between the diffusion and eddy diffusion. | (3) |
| 12 | Write the significance of relative volatility (Alpha). | (3) |
| 13 | Mention the merit and demerit of packing methods in absorption column. | (3) |
| 14 | Distinguish between Physical and chemical adsorption. | (3) |
| 15 | What are parameters consider for selection of solvents. | (3) |

|  |  |  |
| --- | --- | --- |
| **PART C(5 X 15= 75 MARKS)** | | |
| 16. | Obtain an expression for mass flux under steady state diffusion of A through a stagnant gas Film B | 15 |
| (OR) | | |
| 17. | Oxygen (A) is diffusing through carbon monoxide (B) under steady-state conditions, with the Carbon mono oxide non diffusing. The total pr is 1x105 N/m2 and the temperature 0ºC.The partial pressure of oxygen at two plane 2.0mm apart is respectively, 13000and 6500 N/m2 .The diffusivity for the mixture is 1.87x10-5m2 /sec .Calculate the rate of diffusion of oxygen in kmol/sec through each square meter of the two planes.(R=8314 N.m/kmol.K ) | 15 |
| 18. | Explain how the numbers of stages are determined using Mc Cabe Thiele method for a specified reflux ration with neat sketch. | 15 |
| (OR) | | |
| 19. | A mixture of benzene and toluene containing 40 mole percent of benzene is to be separated to give a product of 90 mole percent of benzene at top and a bottom product with not more than 10 mole percent benzene. Using an average value of 2.4 for the volatility of benzene relative to toluene, calculate the minimum reflux ratio, if the feed is liquid and at its boiling point .Also calculate the number of theoretical plates required at total reflux and location of feed plate. | 15 |
| 20. | Explain the design of absorption column with neat sketch. | 15 |
| (OR) | | |
| 21. | Ammonia – air mixture containing 2 % by volume Ammonia at 25 °C and 1 atmosphere is to be scrubbed with water in a sieve plate tower packed with 1.27cm Rasching rings. The water and gas rates are 1170 kg/hr m2 each’ based on empty tower cross section. Estimate the height of the tower required if 98% of the ammonia in the entering gas is to be absorbed. The equilibrium relationship is given by the following equation.  Ye = 0.746x, the height of transfer unit may be taken as equal to 2 metre.  Where ye= mole fraction of ammonia in air.  X= mole fraction of ammonia in solution with water. | 15 |
| 22. | Derive and explain the single stage and second stage cross current adsorption process with suitable sketch. | 15 |
| (OR) | | |
| 23. | A solution a washed raw can sugar is colored by the presence of impurities. It is to be decolurised by the treatment with an adsorptiv carbon in a contact filtration plant. The data for an equilibrium isotherm is given below. The original solution has a colour concentration of 9.6 measured on an arbitrary scale and it is desired to reduce the color to 0.96.Calculate the necessary dosage of fresh carbon per 2000kg solution for a single stage process.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Kg carbon /  kg solution | 0 | 0.001 | 0.004 | 0.008 | 0.02 | 0.04 | | Equilibrium color | 9.6 | 8.6 | 6.3 | 4.3 | 1.7 | 0.7 | | 15 |
| 24. | .Explain with neat sketches, different equipments used for liquid – liquid extraction. | 15 |
| (OR) | | |
| 25. | Discuss about the industrial solvent extraction equipments with neat sketch. | 15 |

ALL THE BEST