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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14BT2020** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DOWNSTREAM PROCESSING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A lab scale fermentation of a slurry with a solids content of 24.6 g/lit on a filter surface area of 5cm2 at apressure drop of 500 mm of Hg gave the following data. The filtrate had a viscosity of 1 cP.  **Vol.of the Filtrate V (cm3) Time t (s)**  30 6  40 10  50 16  60 23  70 31  Calculate the specific resistance of the cake (α) and the resistance of the filter medium (rm)  (Given ∆P=500 mm Hg =1.333×102 kg ms-2, 1cp =0.01 g cm-1 s-1) | CO1 | 20 |
| (OR) | | | | |
| 2. | a. | Calculate the specific resistance of the cake (α) and the resistance of the filter medium (rm) on the basis of the following experimental data for a constant pressure filtration of a suspension of incompressible solids of concentration 30 kg/m3 on a filter medium area of 1 m2. The pressure drop was 2 bar = 2× 105 kg/m S2. The viscosity of the filtrate (η) is 1.1× 10-3 kg/ms  **Vol.of the Filtrate V (m3) Time t (s)**  2×10-3 23  4×10-3 60  6×10-3 114  8×10-3 184  10×10-3 270 | CO1 | 20 |
|  |  |  |  |  |
| 3. | a. | Explain the mechanism of solid liqid separation with (a) suitable diagram (b) with the theory of batch filtration. | CO1 | 12 |
|  | b. | Demonstrate continuous filtration mechanism with suitable diagram. | CO1 | 8 |
| (OR) | | | | |
| 4. | a. | Define adsorption process with its advantages, characteristic and examples of different solid adsorbents. | CO1 | 10 |
|  | b. | Explain different adsorption isotherms with suitable equation, figure and examples. | CO1 | 10 |
| 5. | a. | The lab scale experimental data for the adsorption of an antibiotic on activated carbon are as follows. The solute concentration in the feed (S in mg/cm-3) are 0.3, 0.12, 0.040, 0.018, 0.006 and 0.001 and the corresponding amount of solute adsorbed on the activated carbon (Ca in mg/g) are 0.15, 0.12, 0.095, 0.08, 0.06 and 0.045 respectively. Find out to which adsorption isotherm the data fit and develop the equation for that isotherm. | CO2 | 20 |
| (OR) | | | | |
| 6. | a. | The partition coefficient value of an organic acid in organic solvent water system is 2.7  (a) Calculate the volume of organic solvent required to extract 99% of the acid from 50 ml of aquous solution.  (b) How many extractions with 50 ml of organic solvent would be required to extract 99% of the acid? | CO2 | 20 |
| 7. | a. | Enumerate the process and derive equation for Continous Extraction Process. | CO2 | 20 |
| (OR) | | | | |
| 8. | a. | Contrast Microfiltration with Ultrafiltration using diagram. | CO3 | 10 |
|  | b. | Infer on membrane separation processes with suitable equations. | CO3 | 10 |
|  |  | **Compulsory** |  |  |
| 9. | a. | Sketch with a brief account on principle and process of Freeze Drying. | CO3 | 10 |
|  | b. | Discuss Physical, chemical and mechanical methods of cell disruption techniques with further classification and examples. | CO3 | 10 |