Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCCH 4306

Sixth Semester (Back/Special) Examination – 2013

MASS TRANSFER – II

BRANCH : CHEM

QUESTION CODE : E326

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.
Assume suitable notations and any missing wherever necessary.

1. Answer the following questions : 2×10
   (a) Define selectivity.
   (b) What is meant by constant underflow extraction operation ?
   (c) Why are horizontal baffles provided in mechanically agitated liquid-liquid extractors ?
   (d) What is a coalescer ?
   (e) What are the advantages of continuous drying over the batch drying ?
   (f) What is adsorption hysteresis ?
   (g) Name some popular adsorbents.
   (h) What should be the properties of a good adsorbent ?
   (i) What do you mean by constant drying conditions ?
   (j) What is unbound moisture ?

2. With suitable diagrams, derive the equation for mass of extract for a single stage liquid-liquid extraction operation. 10
3. With suitable notations and plots, derive the mathematical expressions for the single stage leaching operation. 10
4. 360 kg/hr of oil seed is to be extracted in a counter current cascade with ether to recover oil. The ether which has been partially purified contains 3% oil. The fresh oil seed contain 22 % oil and are to be extracted to a composition of 1.3 % oil (on solvent free basis). 260 kg of solvent is to be used. 10

P.T.O.

Calculate :

(i) % of oil entering with the oil seed is recovered in the extract

(ii) number of equilibrium stages for this operation.

Data :

Conc. (kg oil/kg solution)	0	0.1	0.2	0.3	0.4	0.5	0.6
kg solution/kg exhausted oil seed	0.29	0.37	0.44	0.51	0.61	0.71	0.87

5. With neat diagrams discuss the construction and operation of the following equipments : 5×2

(i) Rotocel

(ii) Kennedy extractor

6. A slab with wet weight of 6 kg originally contains 60% moisture (wet basis). The slab is 700 by 1000 by 80 mm thick. The equilibrium moisture content is 7% of the total weight when in contact with air of 20°C and 20% humidity. The drying rate is given below for contact with air of the above quality at a definite velocity. Drying is from two larger sides only. How long will it take to dry the slab to 10% moisture content (wet basis) ? 10

Data :

Wet slab, kg	9.1	7.2	5.3	4.2	3.3	2.8	2.5
Drying rate	4.9	4.9	4.4	3.9	3.4	2.0	1.0

7. Discuss in detail the construction and operation of rotary drum drier with a neat diagram. 10

8. Write short notes on any **two** of the following : 5 ×2

(a) Shanks system

(b) Ion exchange

(c) Drying rate curve

(d) Equilateral triangular diagram.
