KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

03 JUL 2023

Level : B.E.
Year : III
Time : 2 hrs. 30 mins

Course : CHEG 310
Semester : II
F.M. : 40

SECTION "B"

[4Q × 5 = 20 marks]

Attempt *ANY FOUR* questions.

1. What are reboilers? Draw schematics of any two reboiler & write briefly about them. How scaling affects this equipment? [1+3+1]

2. Explain the different stages of drying using a drying curve diagram? Calculate, how much product at 10% wet basis moisture would you obtain from drying 3500 kg of apple slices with 89% moisture content? How much water would be removed during the drying process? [2+3]

3. Explain principle of membrane separation process with the help of diagram. How MSP differs from a 'media' based cake filtration method? Explain types of flow thru membrane with diagram? [2+2+1]

4. How simple distillation differs from Fractional distillation, compare these. *(working of both equipment & diagram is required)*. Name any two types of trays used in column, with schematic diagram. [4+1]

5. Write how centrifuge filtration works, *(explain briefly taking any equipment of choice that works on this principle along with diagram)*. Calculate how long does it take for a fat globule to float up to the surface of milk (i) in normal conditions and (ii) if centrifuge equipment is used to speedup the process? [1+4]
Assume, the diameter of fat globule, $d = 2\mu m$, density of milk, $\rho_f = 1032\ kg/m^3$, density of fat, $\rho_p = 926\ kg/m^3$, Viscosity of milk , $\Pi = 1.42 \times 10^{-3}\ kg/ms$, $r = 20cm$, & $N = 5000\ rpm$

SECTION "C"

[5 Q. × 4 = 20 marks]

Attempt *ANY FIVE* questions.

6. What is standard screw conveyor? Cement is to be transported by a standard screw horizontal conveyor. Assume, $\rho_s = 2000 kg/m^3$, Speed of the screw shaft is 35 rpm & diameter of 25cm. with given $C_{fs} = 0.125$. Calculate throughput capacity Q ? [1+3]

7. What is NRV? Mention the use of pressure relief valve in industry? Explain how pressure relief valve is different from vacuum relief valve? [1+1+2]

8. Explain the working of jet ejector with diagram? How jet mixer differs from jet ejector? [2+2]

9. Explain the working of cyclone separator with schematic diagram? Test on a reverse flow gas cyclone give the results shown in the table below: Calculate the grade efficiency of each fraction? [2+2]

Size range (μm)	0-5	5-10	10-15	15-20	20-25	25-30
Feed size analysis, m (g)	10	15	25	30	15	5
Course product size analysis,mc (g)	0.1	3.53	18	27.3	14.63	5

10. Explain 'CV' with respect to mixing operation? Define segregation and explain any two mechanisms leading to segregation *(with diagram)*. Mention few reasons for segregation? [1+2+1]

11. Explain the working of jaw crusher along with diagram. How does a 'Dodge' type of jaw crusher differ from that of a 'Blake type'? [2+2]