



GIET UNIVERSITY, GUNUPUR – 765022
M. Tech. (Third Semester) Examinations, December – 2022
MPECH3014 – Membrane Technologies for Water and Wastewater Treatment
(Chemical Engineering)

Time: 3 hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A

(2 x 10 = 20 Marks)

Q.1. Answer all questions

	CO#	Blooms Level
a. What is sedimentation?	CO1	1
b. What is the importance of chemical potential in mass transfer?	CO1	2
c. Write the classification of membrane separation process based on their driving forces.	CO2	1
d. Differentiate between isotropic and anisotropic membrane.	CO1	2
e. What do you mean by Molecular Weight Cut Off? What is its value for UF?	CO3	3
f. Write the factors affecting the performance of NF membrane.	CO2	1
g. What are limitations of continuous feed-and-bleed ultrafiltration?	CO3	2
h. What is osmosis? Can it be used to separate a liquid mixture?	CO3	3
i. Differentiate reverse osmosis and Nano filtration .	CO4	2
j. Write advantages of membrane separation process.	CO1	1

PART – B

(10 x 5 = 50 Marks)

Answer ANY FIVE questions

	Marks	CO#	Blooms Level
2. a. What is the importance of Membrane modules in advance separation process?	3	CO1	1
b. Discuss about the area of industrial application of membrane separation process.	7	CO1	2
3.a. List out the different driving force of transport of species.	6	CO1	2
b. Discuss about the different membrane modules with diagram	4	CO2	3
4.a Design the solution diffusion model for RO/NF where the solute flux through the membrane is considered in realistic situation.	4	CO3	4
b. Estimate membrane area and electrical-energy requirements for an electro dialysis process to reduce the salt (NaCl) content of 24,000 m ³ /day of brackish water from 1,500 mg/L to 300 mg/L with a 50% conversion. Assume each membrane has a surface area of 0.5 m ² and each stack contains 300 cell pairs. A reasonable current density is 5 mA/cm ² , and the current efficiency is 0.8 (80%).	6	CO3	2
$F = 96520, Q = 0.139 \frac{m^3}{sec}$			
5.a Design the Kedem-Katchalsky equation for Ultra Filtration in case of imperfect retention of the solutes by the membrane by a reflection coefficient.	8	CO2	4
b. Explain about the basic principle of pervaporation and industrial application.	2	CO2	3
6. a. Discuss the two main geometries by which Synthetic membranes are fabricated.	3	CO3	2
b. Discus about the mechanism of fouling in bio-processing.	7	CO3	3
7.a. What are the different steps for Preparation of Composite Membranes?	4	CO4	2

b.	Derive the expression for yield of solute in multi stage continuous fed and bleed Tangential Flow Filtration.	6	CO4	3
8. a.	Discuss about the Membranes for Gas and Vapor Separation.	4	CO4	2
b.	What are the different sources of chemical attachment of flocculants on membrane surfaces? Explain it.	6	CO4	4

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