

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023****Subject Code:3160507****Date:13-12-2023****Subject Name: Advanced Separation Processes****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Explain concept and working of ultrafiltration. **03**
(b) Discuss in detail the de-caffination process. **04**
(c) Explain the various aspect of reactive and catalytic distillation over the conventional distillation **07**
- Q.2** (a) Discuss various membrane materials for Reverse Osmosis (RO). **03**
(b) Discuss with neat sketch: BALE and KATMAX packing for reactive and catalytic distillation **04**
(c) Discuss principle of Pressure Swing Adsorption (PSA) with its commercial applications in detail. **07**
- OR**
- (c) Explain the working principle of pervaporation and describe hybrid process for the production of absolute alcohol. **07**
- Q.3** (a) Discuss various applications of Melt Crystallization in brief. **03**
(b) Explain concept and working of membrane reactor. **04**
(c) Discuss about the various types of contacting devices use in Catalytic Distillation. **07**
- OR**
- Q.3** (a) Explain concept and working of nanofiltration. **03**
(b) Write advantages and limitations of membrane separation processes over conventional separation processes. **04**
(c) Explain the concept and working of a membrane reactor. **07**
- Q.4** (a) Describe in brief a spiral wound membrane module. **03**
(b) Discuss the phase equilibrium diagram of melt crystallization. **04**
(c) Discuss various separation techniques used in chemical industry and their advantages with example. **07**
- OR**
- Q.4** (a) Classify the membrane process based on driving force. **03**
(b) Discuss in brief the essential properties of a good supercritical solvent. **04**
(c) Discuss in details various operating parameters for the evaluation of performance of membrane process. **07**
- OR**
- Q.5** (a) Draw a neat sketch of a cross-flow membrane process. **03**
(b) State industrial application of membrane distillation. **04**
(c) Discuss in detail various engineering problems associated with usage of membranes. **07**
- OR**
- Q.5** (a) Write the advantages and disadvantages of pressure swing distillation over extractive distillation. **03**
(b) Write short note on Membrane cleaning. **04**
(c) With the help of a detailed flowsheet explain the ROSE process for deasphalting by propane using supercritical extraction. Also list the advantages. **07**
