Enrolment No./Seat No_____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE- SEMESTER–VI EXAMINATION – WINTER 2025**

**Subject Code:3160507 Date:25-11-2025**

**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.**

| | | | **Marks** |
|---|---|---|---|
| **Q.1** | **(a)** | Mention membrane pore size which is used in RO, MF, UF, and NF individually. | **03** |
| | **(b)** | Define: the Separation factor, Permeability | **04** |
| | **(c)** | List out the principal characteristics of novel separation techniques. | **07** |
| **Q.2** | **(a)** | Discuss the drawbacks of conventional separation processes. | **03** |
| | **(b)** | Explain the working principle and industrial applications of reverse osmosis in membrane separation processes. | **04** |
| | **(c)** | Explain the concept and working principle of a membrane bioreactor. | **07** |
| | | **OR** | |
| | **(c)** | Describe the principle and its applications of hybrid distillation-pervaporation systems. | **07** |
| **Q.3** | **(a)** | Enlist major areas of application in advance separation processes. | **03** |
| | **(b)** | State four advantages of reverse osmosis. | **04** |
| | **(c)** | Describe in brief a spiral wound membrane module. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain Equilibrium & rate-governed separation. | **03** |
| | **(b)** | State four applications of microfiltration. | **04** |
| | **(c)** | Explain the concept and working of a membrane reactor. | **07** |
| **Q.4** | **(a)** | Discuss the Principle of chromatographic separation. | **03** |
| | **(b)** | Enlist different factors affecting the electrophoresis process. | **04** |
| | **(c)** | Describe the manufacturing of ETBE by reactive distillation process and compare it with the conventional process. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Write the applications of electrophoresis. | **03** |
| | **(b)** | Explain Paper Chromatography. | **04** |
| | **(c)** | With the help of a detailed flow diagram explain the ROSE process for deasphalting. | **07** |
| **Q.5** | **(a)** | List the advantages and disadvantages of reactive catalytic distillation. | **03** |
| | **(b)** | Discuss Properties of Super Critical Fluid Solvents. | **04** |
| | **(c)** | Discuss the concept and working of the Short Path Distillation Unit. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Discuss the properties of the supercritical fluid solvents and Discuss why $CO_2$ is used as the most preferred supercritical fluid solvent. | **03** |
| | **(b)** | Discuss with neat sketch: BALE and KATMAX packing for reactive and catalytic distillation. | **04** |
| | **(c)** | Discuss the Hydrothermal oxidation. | **07** |