

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 5 – EXAMINATION – SUMMER 2026

Subject Code: 3150506

Date: 02/06/2026

Subject Name: Chemical Process Plant Design & Economics

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) Summarize the six-tenths factor rule and discuss its role in estimating equipment cost. **03**
 - (b) Differentiate continuous process vis a vis batch process **04**
 - (c) The original value of a heat exchanger is ₹5,00,00,000 completely installed and ready for use. Determine the asset value of the equipment at the end of 5 years using straight line and double declining balance method having the service life of 10 years and ₹50,000 salvage value. **07**
- Q.2**
- (a) Discuss types of flow diagrams in brief. **03**
 - (b) Differentiate between Standard and Special equipment **04**
 - (c) A reactor of volume 50m^3 had a cost of ₹5,00,00,000 in 2020. What is the estimated cost of 80m^3 reactor in 2026? Assume that cost index in 2020 was 600 and in 2026 is 750. Equipment cost vs. capacity factor is 0.58 (The reactor is used for the same product manufacturing) **07**
- OR
- Q.2**
- (c) Describe the cash flow in an industrial operation and represent it using a tree diagram. **07**
- Q.3**
- (a) Outline the concept of plant overhead cost and explain its major elements in a manufacturing system **03**
 - (b) Apply the concept of a specification sheet to prepare key details required for a distillation column used in an industrial process **04**
 - (c) With suitable example discuss about various factors to be considered in selection of location of a chemical production plant. **07**
- OR
- Q.3**
- (a) List and discuss principles of plant layout. **03**
 - (b) Discuss selection criteria for size reduction equipment **04**
 - (c) Enlist the factors to be considered on total product cost estimation **07**
- Q.4**
- (a) Describe the concept of break-even point and illustrate it with a suitable diagram. **03**
 - (b) Define: - Book Value, Salvage Value, Market Value, Service life. **04**
 - (c) Discuss with figure, cumulative cash position for an industrial operation neglecting time value of money. **07**

OR

Q.4	(a) Summarize the concept of pipe fittings and discuss their types and functions in piping systems.	03
	(b) Apply the concept of alternative investments in the chemical industry by selecting suitable investment options and explaining how they can be utilized to enhance returns and manage risk.	04
	(c) Define “Pilot Plant”. Discuss about its importance in chemical Industries	07
Q.5	(a) Differentiate between Process Water and Boiler Feed Water.	03
	(b) Describe the concept of the Critical Path Method in detail and outline its key components and significance in project management.	04
	(c) Enlist various methods of Profitability analysis .Explain any two methods in detail	07
	OR	
Q.5	(a) Write a brief note on PERT techniques used for Inventory control	03
	(b) Discuss planning of project schedule by ‘BAR CHART’ in detail	04
	(c) Apply the concept of a feasibility survey to evaluate a proposed project and determine the technical factors that must be considered for its successful implementation.	07
