

GUJARAT TECHNOLOGICAL UNIVERSITY**DIPLOMA ENGINEERING – SEMESTER – 6(NEW) • EXAMINATION – SUMMER 2018****Subject Code: 3360502****Date: 01-May-2018****Subject Name: Chemical Engineering Plant Economics****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make Suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of programmable & Communication aids are strictly prohibited.
5. Use of only simple calculator is permitted in Mathematics.
6. English version is authentic.

- Q.1** Answer any seven out of ten. **14**
1. Write objectives of chemical engineering plant project.
 2. List logical evolution stages for plant project.
 3. List types of quantitative flow diagrams.
 4. List types of engineering flow diagrams.
 5. Write advantages of scale models.
 6. What do you understand by zone selection?
 7. Write general equation for optimum design with two variables.
 8. Define: (i) Service life (ii) Salvage value
 9. Define: nominal pipe size (NPS) for piping.
 10. List types of cost indexes.
- Q.2** (a) Write a short note on The Role of chemical Engineer. **03**
- OR
- (a) Write a short note on Chemical engineering design. **03**
- (b) Write a short note on shifts and operating time schedules in chemical industry. **03**
- OR
- (b) Explain block type flow diagram. **03**
- (c) Discuss legal phases to be considered in plant design. **04**
- OR
- (c) Justify the statement-“Plant design not only must be technically satisfactory but also must be economically viable.” **04**
- (d) Write a short note on specification sheets. **04**
- OR
- (d) Discuss standard equipment vs. special equipment. **04**
- Q.3** (a) Write a short note on selection of size reduction equipment. **03**
- OR
- (a) Write a short note on selection of pumps. **03**
- (b) Write a short note on piping design problems. **03**
- OR
- (b) Write a short note on Types of insulation. **03**
- (c) Explain methods of plant layout. **04**
- OR
- (c) List out principles of plant layout. Discuss any two in detail. **04**

- (d) The capital cost of 9 million tones per annum refinery is estimated at Rs. 320 crores in 2010 when cost index is 250. What would have been cost of 6 million tones per annum refinery in 2005 when cost index was 200? **04**
- OR
- (d) The original value of a piece of equipment is Rs. 22000, completely installed and ready for use. Its salvage value is estimated to be Rs. 2000 at the end of service life estimated to be 10 years. Determine the book value of the equipment at the end of 5 years using **04**
- (i) straight-line method.
- (ii) Declining balance method.
- Q.4** (a) Write a short note on Working capital investment. **03**
- OR
- (a) Explain “Six-tenth factor rule. **03**
- (b) The following equation shows the effect of the variables X and Y on total cost for a particular operation, **04**
- $$C_T = 2.5X + \frac{12500}{XY} + 1.75Y + 10$$
- Determine :
- Optimum values of X and Y
 - Minimum total cost
- OR
- (b) State methods for determining depreciation. Explain straight line method in detail. **04**
- (c) A plant produces a pharmaceutical product at the rate of p kg. per day. The variable cost per kg of the product of the product have been found to be Rs. $(47.73 + 0.1p^{1.2})$. The total daily fixed charges are Rs. 1750 and all other expanses are constant at Rs. 7325 per day. If the selling price of the product per kg. is Rs. 173, determine the daily profit at a production schedule giving minimum cost per kg. of the product. **07**
- Q.5** (a) Write a short note on Break-even chart. **04**
- (b) Write a short note on optimum economic design. **04**
- (c) Explain rate of return on investment. **03**
- (d) Discuss Factors governing selection of insulation. **03**
