

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII • EXAMINATION – WINTER • 2014

Subject Code: 170503**Date: 04-12-2014****Subject Name: Plant Design and Project Engineering****Time: 10:30 am - 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.

- Q.1 (a)** State and discuss the factors to be considered in selection of the location of a chemical process plant with special reference to soda-ash plant in Gujarat. **07**
- (b)** Enlist various methods for estimating capital investment and discuss any one method. **07**
- Q.2 (a)** Discuss the method for evaluation of total product cost showing the individual components. **07**
- (b)** State the advantages of standard equipment over special equipment. What are the different types of flow diagrams? **05+02**
- OR**
- (b)** Illustrate briefly the principle of piping layout. State various pipe fittings and pipe supports, mentioning their special functions, if any. **07**
- Q.3 (a)** Explain 'sixth-tenth factor rule' and 'cost indices'. **04+03**
- A heat exchanger of area 10 m² costed Rs 50,000 in 2009. What is the estimated cost of a 15 m² heat exchanger in 2014? Assume that the cost index in 2009 was 270 and in 2014 it is 320. Equipment cost-vs-capacity exponent is 0.6.
- (b)** State and explain the factors affecting investment and production cost. **07**
- OR**
- Q.3 (a)** A proposed manufacturing plant requires an initial fixed capital investment of \$ 900,000 and \$ 100,000 of working capital. It is estimated that the annual income will be \$ 800,000 and the annual expenses including depreciation will be \$ 520,000 before income taxes. A minimum annual return of 15% before income tax is required before the investment would be worthwhile. Income taxes amount to 34 percent of all pre-tax profits. Determine the annual percent return on total investment before and after income taxes. **07**
- (b)** What is the difference between depreciation and amortization? State and briefly explain various methods of determining depreciation **02+05**
- Q.4 (a)** Define/Explain the following terms in context with plant design and project engineering (Any seven): **07**
- (i) capitalized cost (ii) compound interest (iii) payback period (iv) contingency (v) break even point (vi) equity (vii) battery limit (viii) critical path (ix) salvage value
- (b)** State various methods of profitability evaluation and explain the principle of each method in brief. **07**
- OR**
- Q.4 (a)** The original value of a piece of equipment is \$22,000, completely installed and ready for use. Its salvage value is estimated to be \$2000 at the end of a service life estimated to be 10 years. Determine the asset (or book) value of the equipment at the end of 5 years using straight line and textbook declining balance method. **07**
- (b)** Discuss the practical factors in alternative investment and replacement studies. **07**

- Q.5 (a)** State and explain various factors for techno-economic feasibility survey of a Chemical process plant. **07**
- (b)** Define pilot plant. What are the importances of laboratory development of pilot plant? **02+05**

OR

- Q.5 (a)** Write a note on PERT and CPM, mentioning their role in scheduling of projects. **07**
- (b)** A project as been defined to contain the following list of activities, along with their required times for completion: **07**

Activity	Time (days)	Immediate predecessor
A	1	--
B	4	A
C	3	A
D	7	A
E	6	B
F	2	C,D
G	7	E,F
H	9	D
I	4	G,H

Draw the network diagram, show early start and early finish time for each activity, and determine the critical path.
