

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020

Subject Code:3153616

Date:03/02/2021

Subject Name:Elements of Plant Design & Economics

Time:10:30 AM TO 12:30 PM

Total Marks: 56

Instructions:

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) Discuss in details about Project Engineering.	03
	(b) Discuss the various approaches of project implementation.	04
	(c) Explain the various types of design in details.	07
Q.2	(a) Write a note on SWOT analysis.	03
	(b) Explain the significance of plant design.	04
	(c) Discuss in detail about preliminary feasibility report.	07
Q.3	(a) Write down the importance of laboratory development pilot plant.	03
	(b) Discuss the selection criteria for selection of process equipment.	04
	(c) Explain the types of flow diagram in details.	07
Q.4	(a) Write a short note on: Scale up design.	03
	(b) Discuss the importance of break-even point	04
	(c) Discuss briefly about factors affecting in plant location.	07
Q.5	(a) Write down the principles of plant layout.	03
	(b) Discuss the types of depreciation.	04
	(c) Determination of depreciation by straight-line and declining-balance methods. 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:	07
	(a) Straight-line method.	
	(b) Textbook declining-balance method.	
	(c) Double declining-balance (200 percent) method (i.e., the declining-balance method using a fixed-percentage factor giving a depreciation rate equivalent to twice the minimum rate with the straight-line method).	
Q.6	(a) Write a short note on steam as a utility.	03
	(b) Explain the following terms: Cash flow for industrial operations,	04
	(c) Explain the following terms: (i) Profitability (ii) Depreciation value (iii) Salvage value	07
Q.7	(a) Write a note on: optimization and feasibility of plant design.	03
	(b) Discuss the various safety factors for plant design.	04
	(c) Determination of rate of return on investment-consideration of income-tax effects. 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	07

\$800,000 and the annual expenses including depreciation will be \$520,000 before income taxes. A minimum annual return of 15 percent before income taxes is required before the investment will be worthwhile. Income taxes amount to 34 percent of all pre-tax profits.

Determine the following:

- (a) The annual percent return on the total initial investment before income taxes.
- (b) The annual percent return on the total initial investment after income taxes.
- (c) The annual percent return on the total initial investment before income taxes based on capital recovery with minimum profit.
- (d) The annual percent return on the average investment before income taxes assuming straight-line depreciation and zero salvage value.

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| Q.8 | (a) Write a note on rate of return. | 03 |
| | (b) Discuss the factors affecting investment and production costs. | 04 |
| | (c) Explain the CPM & PERT Methods with suitable examples. | 07 |