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18BT731

Seventh Semester B.E. Degree Examination, July/August 2022 Process Equipment and Plant Design

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the various steps to be considered for design for biochemical process. (08 Marks)
- b. Explain the factors considered in making a feasibility survey. (06 Marks)
- c. Briefly explain the specifications and scale up in the design. (06 Marks)

OR

- 2 a. Explain the different types of process design available to design a process. (06 Marks)
- b. Explain the importance of process flow sheet and process flow diagrams in plant design. (14 Marks)

Module-2

- 3 a. Explain the factors affecting the investment and production cost. (10 Marks)
- b. A factory is producing 1000 bolts and nuts per hour on machine. Its material cost is Rs.375 and labor cost is Rs. 245. Direct expenses is Rs 80. Factory cost is 150% of the labor cost, office cost is 30% of total factory cost. If the selling price of each bolt and nut is 1.3. Calculate whether the management is going on loss or profit (gain) by what about?(10 Marks)

OR

- 4 a. Explain the different types of capital cost estimates. (10 Marks)
- b. A plant has a total capital investment of Rs.15 crores, producing a product of 3 million kg and the selling price Rs.4.2/kg. Working capital is 15% of total capital investment. Raw material cost is Rs.0.45/kg, labor cost is Rs 0.4/kg, utilities cost is Rs.0.25/kg, packing cost is Rs.0.04/kg and the distribution cost is 5% of the total product cost. Find :
 - i) Manufacturing cost per kg of product
 - ii) Total product cost per year
 - iii) Profit per kg of the product before the taxes. (10 Marks)

Module-3

- 5 a. Define cost index and scaling factor. How are these factors useful in the estimation of cost of equipment? (08 Marks)
- b. What do you understand by working capital? Explain the components of working capital. (08 Marks)
- c. Purchased cost of 50 litre glass lined jacketed reactor without drive is \$3000 in January 2000. Estimate the purchased cost of similar 100 litre glass lined jacketed reactor without drive in 2008 is 311 and for 2008 is 451, equipment versus capacity exponent is 0.41. (04 Marks)

OR

- 6 a. Explain the different components of total product cost. (10 Marks)
- b. Explain the methods, for estimating the capital investment. (10 Marks)

Module-4

- 7 a. Explain the different methods for determining depreciation. (10 Marks)
 b. A machine is purchased for Rs.1,00,000 and its estimated life is 5 years with negligible salvage value. Rate of interest on depreciation is found to be 6%. Calculate the rate of depreciation by straight line method, sum of year digit method and sinking fund method and compare the result. (10 Marks)

OR

- 8 a. Explain the types of depreciation. (06 Marks)
 b. Explain the different types of taxes. (06 Marks)
 c. A machine is purchased for Rs. 45000 and has a life of 20 years. A salvage value is Rs. 3000. Using sum – of – year digits method, calculate the annual depreciation charges for the first 6th, 16th and 20th year. (08 Marks)

Module-5

- 9 a. Explain the different methods of analysis of profitability. (10 Marks)
 b. Two machines have the following cost comparisons. If the money is worth 8%, which machine is more economical?

Item	Machine – A	Machine – B
1 st cost	Rs. 2,20,000	Rs. 1,50,000
Uniform maintenance cost/year	Rs. 30,000	Rs. 40,000
salvage value	Rs. 15,000	Rs. 4,000
Service life	3 years	2 years

(10 Marks)

OR

- 10 a. Explain the importance of replacement and alternative investments. (10 Marks)
 b. Define breakeven point. Explain with a neat diagram the break even chart. (10 Marks)
