CBCS SCHEME

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18BT731

Seventh Semester B.E. Degree Examination, June/July 2024
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. Elaborate on the different types of process designs. **(08 Marks)**

b. Enumerate the various steps involved in designing a project. **(12 Marks)**

OR

2 a. Discuss on the various factors to be considered in the selection of a plant location. **(12 Marks)**

b. Feasibility survey is important in examining technical and economic factors. Justify. **(08 Marks)**

Module-2

3 a. Explain the different components of estimating the manufacturing cost. **(10 Marks)**

b. A factory is producing 1000 enzyme soaps per hour. Its material cost is Rs.575. The labour cost is Rs.395 and the direct expense is Rs.240. The factory-on-cost is 150% of the total labour cost and the office-on-cost is 30% of the total factory cost. If the selling price of each soap is Rs.8, estimate whether manufacturer is making profit or loss. **(10 Marks)**

OR

4 a. Define the total capital investment. Discuss the various components of fixed capital investment. **(12 Marks)**

b. Evaluate the cost in the year 1984 for a rotary drum filter which is 10 m long and 4m in diameter. The cost of a similar filter was Rs.50,000 per 100 m^2 of peripheral area in the year 1974. Data: Cost index in the year 1974 = 151; Cost index in the year 1984 = 182. **(08 Marks)**

Module-3

5 a. Estimate the total product cost of a product including all the cost components. **(10 Marks)**

b. The delivered equipment cost is Rs.1,00,000. Estimate the fixed capital investment by percentage of delivered equipment cost. Given data:

Components:
Purchased equipment (delivered), E = Rs.1,00,000
Purchased equipment installation, 39% E
Instrumentation installed, 28% E
Piping (installed), 31% E
Electrical (installed) 10% E
Building (including services), 22% E
Yard improvements, 10% E
Service facilities (installed), 55% E
Land, (6%E)
Total direct plant cost, D
Engineering and supervision, 32%E
Construction expenses, 34%E
Total direct and indirect cost (D + I)
Contractor's fee, 5% (D + I)
Contingency, 10% (D + I) **(10 Marks)**

OR

6 a. Distinguish between the unit-cost estimate and percentage of delivered equipment cost methods of estimation of capital investments. **(12 Marks)**

b. Discuss on the cost components of working capital investment. **(08 Marks)**

Module-4

7 a. Compare between the straight-line method and declining balance method of depreciation cost estimation. **(08 Marks)**

b. A piece of equipment having a negligible scrap value is estimated to have a service life of 12 years. The original cost of the equipment was Rs.2,40,000. Calculate:

(i) The depreciation charge for fifth year if double declining balance method is used.

(ii) The depreciation charge for fifth year if sum-of-years-digits depreciation is used.

(iii) The percent of the original investment paid-off in the first half of the service life using DDBM.

(iv) The percent of the original investment paid-off in the first half of the service life using SYDM. **(12 Marks)**

OR

8 a. Elaborate on the various taxes levied by the Indian Government. **(08 Marks)**

b. A project can produce 10000 units per year at 100% capacity. The variable cost per unit is Rs.3 at 100% capacity, fixed cost is Rs.12,000 per year. Find the break-even point and value, if the selling price is Rs.5/unit. Now the manufacturer finds that he can sell only 80% at Rs.5/unit. How much should he charge for additional unit, if he brings production upto 100% capacity and increase profits after taxes by an additional amount of Rs.2000. Use tax rate at 20%. **(12 Marks)**

Module-5

9 a. Differentiate between rate of return on investment method and payout period method of profitability analysis. **(08 Marks)**

b. A project is expected to have cash flow after all expenses and boxes for the five years as given in the table. The initial fixed capital investment is Rs.10,00,000 and the working capital is 15% of the fixed capital investment.

Time, yrs	0 – 1	1 – 2	2 – 3	3 – 4	4 – 5
Cash flow, Rs.	2,00,000	2,70,000	3,30,000	4,00,000	4,75,000

Find the rate of return on investment and payout period without interest using straight-line depreciation. **(12 Marks)**

OR

10 a. Define nominal and effective interest rate. Express effective interest rate in terms of nominal interest rate for annual and continuous compounding. **(08 Marks)**

b. The following table gives the comparative data of two alternatives for a certain process. Using the present worth analysis recommend which of the two is more economical if the money worth is 20%.

Item	New Process	Old Process
I – cost, Rs.	10000	6000
Salvage Value, Rs.	2000	800
Annual Disbursement, Rs./yr	2500	1250
By Product cost, Rs./yr	2000	1500
Service Life, years	5	4

(12 Marks)

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