

Chemical Engineering Economics

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Con. 9986-13.

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GX-12212

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any three questions out of remaining five questions.

1. Answer the following questions. (any four) :-
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|---|---|
| (a) Explain self insurance. | 5 |
| (b) What is break even point? | 5 |
| (c) How would you select profitability method for profitability evaluation? | 5 |
| (d) Explain nominal and effective interest rates. | 5 |
| (e) Explain different methods of finding material costs. | 5 |
| (f) Explain price discrimination. | 5 |
2. A plant is designed in which 204,000 kg per 24-h day of a water-caustic soda must be concentrated from 5 % to 40 % by weight. A single effect or a multiple effect evaporator will be used and a single effect evaporator of the required capacity requires an initial investment of ₹18,000. This same investment is required for each additional effect. The service life is estimated to be 10 years and the salvage value of each effect at the end of the service life is estimated to be ₹6000. Fixed charges minus depreciation amount to 20 % yearly, based on initial investment. Steam costs ₹1.32 / 1000 kg and administration, labor and miscellaneous costs are ₹40 per day, no matter how many evaporator effects are used. If X is the number of evaporator effects, 0.9X equals the number of kilograms of water evaporated per kilogram of steam for this type of evaporator. Assume that there are 300 operating days per year and an income tax rate of 35 %. If the minimum acceptable rate of return after taxes on any investment is 15 %, how many effects should be used? 20
3. Estimate the manufacturing cost, total product cost and direct cost and direct production cost under the following conditions. 20
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|--------------------------|---|
| Fixed capital investment | ₹2 × 10 ⁹ |
| Capacity of plant | 10 tonnes / day |
| Operational days | 300 (24 hour day) per year |
| Raw material cost | ₹3.6 × 10 ⁵ pa |
| Steam cost | ₹5 × 10 ⁵ pa |
| Electrical power | 0.5 KWH / kg product |
| Cost of power | ₹2.5 / Unit |
| Water | ₹3.5 × 10 ⁶ pa |
| Labor cost | 25 men per shift at ₹50 / hour |
| Patent charges | ₹2.50 / 100 kg product |
| Interest on loan | ₹2 × 10 ⁶ / pa |
| Plant overheads | 40 % of labor, supervision and maintenance. |

| TURN OVER

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4. (a) "NOW" is November 20, 2003. Three payments of ₹ 500 each are to be received every 2 years, starting 2 years from now. These payments are deposited in a bank where they will earn interest at 7 % per year. How large will the bank account be on November 20, 2011? 10
- (b) A property has an initial value of ₹ 50,000, service life of 20 years and final salvage value of ₹ 4000. It has been proposed to depreciate the property by the textbook declining balance method. Would this method be acceptable for income tax purposes if the laws do not permit annual depreciation rates greater than twice the minimum annual ~~rates~~ ^{rates} given by straight line method. 10
5. (a) The following data represents the ratios pertaining to XYZ chemical company for the year ending 31st March 2013. 10
- | | |
|----------------------------------|-------------|
| Annual sales | ₹ 40,00,000 |
| Sales to Net worth | 4 times |
| Current liabilities to net worth | 50 % |
| Total debt to net worth | 80 % |
| Cash ratio | 2.2 |
| Sales to inventory | 8 times |
| Fixed assets to net worth | 70 % |
- From the above information, prepare a balance sheet. 10
- (b) Explain different types of Growth strategies. 10
6. (a) A company has direct production costs equal to 50 % of total annual sales and fixed charges. Overhead and general expenses equal to ₹ 200,000. If management proposes to increase present annual sales of ₹ 800,000 by 30 % with a 20 % increase in fixed charges, overhead and general expenses. What annual sales is required to provide the same gross earnings as the present plant operation? 10
- (b) A cash flow consisting of ₹ 10,000 per year is received in one discrete amount at the end of each year for 10 years. Interest will be at 10 % per year compounded annually. Determine the present worth at time zero and the future worth at the end of 10 years of this cash flow. 10