

B.E. CHEMICAL ENGINEERING FOURTH YEAR SECOND SEMESTER - 2022
 4th Year, 2nd Semester
CHEMICAL PROJECT ENGINEERING & ECONOMICS

Time: 4 Hours

Full Marks: 70

Answer Q1 any One from the rest**Q1. Depreciation****[8+8+5+5+7+7=40]**

- a) Compare the following four methods of computing depreciation with respect to specific application and requirement of supporting data.
 - i. Straight Line Method
 - ii. Declining Balance Method
 - iii. Sum of the years digits Method
 - iv. Sinking Fund Method
- b) Highlight one advantage and one disadvantage of each of the methods mentioned in Q1 a).
- c) A company has purchased an equipment whose first cost is Rs. 2,50,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of its lifetime is Rs. 50,000. Determine the depreciation charge and book value at the end of 7th year using the straight-line method of depreciation.
- d) A company has purchased a double-pipe heat exchanger whose first cost is Rs. 2,00,000 with an estimated life of nine years. The estimated salvage value of the heat exchanger at the end of its lifetime is Rs. 40,000. Determine the depreciation charge and book value at the end of 6th year using the declining balance method of depreciation by assuming $K = 0.2$.
- e) A company has purchased a Muffle Furnace whose first cost is Rs. 1,50,000 with an estimated life of eight years. The estimated salvage value of the furnace at the end of its lifetime is Rs. 20,000. Determine the depreciation charge and book value at the end of 5th year using the sum-of-the-years-digits method of depreciation.
- f) A company has purchased a peristaltic pump whose first cost is Rs. 1,50,000 with an estimated life of ten years. The estimated salvage value of the pump at the end of its lifetime is Rs. 20,000. Determine the depreciation charge at the end of 6th and book value at the end of 8th year using the sinking fund method of depreciation with an interest rate of 13% compounded annually.

Q2. Inventory**[6+4+8+4+8=30]**

- a) Why should we at all have an *Inventory* ready, during the design stage of a plant as a part of a green-field project. Give couple of reasons.
- b) Enumerate four (4) cost elements which do affect the overall cost of economy.
- c) Starting with EOQ and EPQ Models, derive the expressions of optimal order quantity in terms of production rate or delivery rate, annual demand, procurement cost (per order), cost of the individual item (cost per unit) and carrying cost per unit carried.

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- d) Differentiate Economic Order Quantity [EOQ] Model and Economic Production Quantity [EPQ] Model with respect to application and requirement of data.
- e) One MSME produces 3,00,000 oil seals each year to satisfy the requirement of their client. They order the metal for the bushing in lot of 50,000 units. It cost them INR 5000 to place the order. The unit cost of bushing is INR 25 and the estimated carrying cost is 20% of unit cost. Find out the economic order quantity? What percentage of increases or decrease in order quantity is required so that the ordered quantity is Economic order quantity ?

Q3. *Break-Even Analysis*

[6+12+12=30]

- a) Explain: Break-Even Chart; Margin of Safety; Profit/Volume Ratio.
- b) Beta Associates has the following details: Fixed cost = Rs. 60, 00,000; Variable cost per unit = Rs. 350; Selling price per unit = Rs. 550. Find (I) The break-even sales quantity, (II) The break-even sales, (III) If the actual production quantity is 70,000. Find (i) contribution and (ii) margin of safety by all methods.
- c) Consider the following data of a company: Sales = Rs. 60,000; Fixed cost = Rs. 6500; Variable cost = Rs. 19,250; Find the following: (I) Contribution (II) Profit (III) BEP (IV) M.S.