

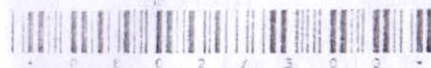
(b) A company has fixed cost of \$ 3,00,000/year. At 75 percent of capacity, the variable cost is \$ 8,00,000 and the sales realization is \$ 1,500,000. On a single break-even chart, show the effect of increasing and decreasing the selling price per unit by 10%. What is the break-even point of (a) the selling price as is (b) the selling price increased by 10% (c) the selling price decreased by 10% and (d) extra profit when the selling price is decreased by 10% percent, permitting capacity production as opposed to the present rate at the present selling price ?

(c) A plant produce refrigerators at the rate of P units per year. The variable cost per refrigerator have been found to be \$ $47.73 + 0.1 P^{1.2}$. The total daily fixed charges are \$ 1750 and all other expense are constant at \$ 7325 per day. If the selling price per refrigerator is \$ 173. Determine :

- The daily profit of a production schedule giving the minimum cost per refrigerator
- The daily profit at a production schedule giving the maximum daily profit
- The production schedule at the break even point.

5 Attempt any two parts of the following : $10 \times 2 = 20$

- Discuss different steps involved in optimum design of distillation column.
- Preparation of techno-economic feasibility report of fertilizer industry.
- Discuss the mathematical methods for profitability evaluation.



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0802

Roll No.

B. Tech.

(SEM. VII) EXAMINATION, 2008-09
PROCESS ENGINEERING COSTINGS
"PLANT DESIGN"

Time : 3 Hours]

[Total Marks : 100

Note : (1) Attempt all questions.

(2) All questions carry equal marks.

(3) Be precise in your answer.

1 Attempt any four parts of the following : $5 \times 4 = 20$

- Discuss different plant location factors.
- Present a list of items that should be considered in making a project development.
- Present a specification sheet for a packed-bed column.
- Write note on HAZOPS study.
- Identify some of the principal events leading to spillage and leakage in chemical plant.
- Present a list of items that should be considered in comparison of different processes.



2 Attempt any two parts of the following : $10 \times 2 = 20$

- (a) An asset with an original cost of \$ 10,000 and no salvage value has a depreciation charge of \$ 2381 during its second year of service when depreciated by the sum of digits method. What is its expected useful life ?
- (b) A heat exchanger has been designed for use in a chemical process. A standard type of heat exchanger with a negligible scrap value cost \$ 40,000 and will have a useful life of 6 years. Another proposed heat exchanger of equivalent design capacity costs \$ 68,000 but will have a useful life of 10 years and a scrap value of \$ 8,000. Assuming an effective compound interest rate of 8% per year, determine which heat exchanger is cheaper by comparing the capitalized costs.
- (c) An original loan of \$ 2,000 was made at 6% simple interest per year for 4 years. At the end of this time, no interest had been paid and the loan was extended for 6 more years at a new, effective compound interest rate of 8 percent per year. What is the total amount owed at the end of the 10 years if no intermediate payments are made ?



3 Attempt any two parts of the following : $10 \times 2 = 20$

(a) Two machines have the following costs :

	A	B
First cost \$	1,00,000	2,50,000
Salvage value \$	11,000	15,000
Uniform end of year expense \$ per year	30,000	20,000
Irregular expense end first year	10,000	-
Irregular expense end third year	-	25,000
Life of machine years	2	5

Compare the machines on the following basis :

- (a) Present value for some common denominator of the service live with money worth 8% per year.
- (b) Present value basis 4 years with money worth 8% per year.
- (c) Uniform annual amount with money worth 8% per year
- (d) Capitalization cost with money worth 8% per year.
- (b) Write notes on :
- (i) Sensitive analysis in project profitability
- (ii) Working capital investment
- (c) Discuss in detail the costs involved in total product cost for a typical chemical process plant.
- 4 Attempt any two parts of the following :
- (a) A pressure vessel is to be made from a cylinder of diameter X meters capped with a hemisphere at each end. The cost for the cylindrical section is $1800X^{0.5}$ \$/m of length and the cost for one hemispherical end is $1400X^{2.4}$ \$. The vessel is to hold 40 m^3 . Find the optimum dimensions and cost.

