Printed Pages : 2 Roll No. | | | | | | | | | | NCH802

B. TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

PLANT DESIGN AND PROJECT ENGINEERING

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Explain the following: **10 x 2 = 20**

(a) Name any four methods of calculating depreciation

(b) What is meant by capitalized cost? Where is it used?

(c) What do you mean by fixed costs and variable costs?

(d) Define annuity and its type.

(e) What do you mean by obsolescence?

(f) Define salvage value and scrap value.

(g) Define present worth and discount.

(h) A storage tank was priced at Rs.5000 in 1982 when the cost index was 460. What is its value today when the cost index is 800?

(i) What are the various safety and fire protective measures considered in plant design?

(j) What are the principal factors to be considered for plant layout?

SECTION – B

2. Attempt any five of the following questions: **5 x 10 = 50**

(a) What do you mean by pilot plant? What is importance of pilot plant in process development?

(b) Discuss in brief about the factors to be considered in Plant location and site selection.

(c) Discuss the types of cost indices available in the Chemical Engineering literature. Discuss the importance of these cost indices for cost estimation of chemical engineering equipment.

(d) Write a brief note on: "Importance of Process Economics to Chemical/ Petrochemical Engineers".

(e) Explain any two methods of depreciation in detail

(f) Discuss about the cash flow analysis.

(g) The annual direct production costs for a plant operating at 70 percent capacity are $280,000 while the sum of the annual fixed charges, overhead costs, and general expenses is $200,000. What is the break-even point in units of production per year if total annual sales are $560,000 and the product sells at $40 per unit? What were the annual gross earnings and net profit for this plant at 100 percent capacity in 1988 when corporate income taxes required a 15 percent tax on the first $50,000 of annual gross earnings, 25 percent on annual gross earnings of $50,000 to $75,000, 34 percent on annual gross earnings above $75,000, and 5 percent on gross earnings from $100,000 to $335,000?

(h) Give an optimization scheme, which may be followed for determination of optimum height and diameter of a sieve tray distillation coloumn?

SECTION – C

Attempt any two of the following questions: 2 x 15 = 30

3. A plant is producing 10,000 t/y of a product. The overall yield is 70 per cent, on a mass basis (kg of product per kg raw material). The raw material costs £10/t, and the product sells for £35/t. A process modification has been devised that will increase the yield to 75 per cent. The additional investment required is £35,000, and the additional operating costs are negligible. Is the modification worth making?

4. It is desired to $1000 to meet a financial obligation. This money can be borrowed from a loan agency at a monthly interest rate of 2 percent. Determine the following:

(i) The total amount of principal plus simple interest due after 2 years if no intermediate payments are made.

(ii) The total amount of principal plus compounded interest due after 2 years if no

(iii) intermediate payments are made.

(iv) The nominal interest rate when the interest is compounded monthly.

(v) The effective interest rate when the interest is compounded monthly.

5. Write short notes on the following :

(i) Pay-back time

(ii) Sensitivity analysis

(iii) Discounted cash flow (time value of money)

(iv) method of steepest ascent or descent

(v) Optimization