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RM-7631

B. E. - IV (Sem. VIII) (Chemical) Examination

May / June – 2010

Chemical Engg. Plant Design & Economics

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 4 (Sem. 8) (Chemical)**

Name of the Subject :

☛ **Chemical Engg. Plant Design & Economics**

☛ Subject Code No. : **7 6 3 1** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.

(3) Write a neat legible handwriting.

(4) Answer each section separately/

(5) Use of Calculators is allowed.

SECTION - I

1 (a) Answer the following (any **five**) **10**

(i) List any **two** types of design.

(ii) List four journals in chemical engineering (international).

(iii) What is a combined detail flow diagram?

(iv) Explain time factor as a comparison of different processes.

(v) Explain ergonomic consideration as part of inplant physical and organizational considerations.

(b) Answer the following : **10**

(i) Discuss 'loss prevention' in detail.

(ii) What is Hazops study? Explain guide words.

2 Answer the following : (any **three**) 15

(a) Write specification sheet for a sieve tray column.

(b) Discuss fault-tree analysis.

(c) Explain flexible layout of space with respect to general safety checklist for identifying process hazards.

(d) Explain the following with respect to plant location

(i) community factors

(ii) Flood and fire protection.

3 Answer the following : **5×3=15**

(a) List ten factors in plant layout.

(b) List five equipment noise sources and their corresponding sound levels in dBA (at 3.0 ft)

(c) List five factors to be considered in selection of material handling equipment.

(d) Write short note on patents.

SECTION - II

4 (a) Answer the following : **1×6=6**

(i) What is break even point?

(ii) What is contingencies?

(iii) What is gross profit?

(iv) What is salvage value?

(v) What is profitability standards?

(vi) Plants overhead cost varies with

(a) Level of production/quantity

(b) Season to season

(c) May or may not change

(d) Does not change year to year.

(b) Methods of calculating depreciation. 4

(c) The original value of a piece of equipment is Rs. 22 lakhs, installed and ready for use. Its salvage value is expected to be Rs. 2 lakhs at the end of service life which is 10 years. Calculate book value of equipment at the end of 5 years using :

(i) Straight line method

(ii) Single declining balance method

(iii) Double declining balance method.

5 Attempt the following : (any **two**) **2×8=16**

(a) The annual variable production costs for a plant operating at 70% capacity are $280,000. The sum of annual fixed charges, over head costs, and general expenses is $200,000 and may be considered not to change with production rate, the total annual sales are $560,000 and the product sells for $4/kg. What is break even point in kilograms of product per year? What are the gross annual profit and net annual profit for this plant at 100 per cent capacity if the income tax rate is 35% of gross profit.

(b) For the case of nominal annual interest rate of 20% per year, determine

(i) The total amount to which $1 of initial principal would accumulate after 1 year with annual compounding and the effective annual interest rate.

(ii) The total amount to which $1 of initial principal would accumulate after 1 year with monthly compounding and the effective interest rate.

(iii) The total amount to which $1 of initial principal would accumulate after 1 year with daily compounding and the effective annual interest rate.

(c) Explain any **three** mathematical methods for profitability evaluation.

6 Answer the following : (any **three**) **6×3=18**

(i) Define :

(a) Simple interest

(b) Compound interest

(c) Continuous interest

(ii) Manufacturing costs

(iii) Tree diagram showing cash flow for industrial operations.

(iv) Optimization cycle time and production in batch plant for minimum cost per unit of production.
