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SF-7635

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

May / June – 2011

CAD in Chemical Engineering

Time : Hours] [Total Marks :

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) (Chem.)**

Name of the Subject :

☛ **CAD in Chemical Engineering**

☛ Subject Code No. : **7 6 3 5** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Assume suitable data wherever necessary and clearly mention it.

(3) Use of non-programmable calculator is permitted.

(4) Figures to the right indicate full marks.

(5) Symbols used have conventional meaning.

1 (a) Answer the following : **5×2=10**

(i) What is optimisation ?

(ii) Explain in brief exploratory move.

(iii) Explain local optimal point.

(iv) What is process simulation ?

(v) Explain fundamental rule for region elimination.

(b) Write down algorithm for Hookes Jeeves method. 8

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

(i) Minimise function $f(x) = \exp\left\{(x-0.2)^2/2\right\}$ by using bounding phase method. Use $x^{(0)} = 0$, $\Delta = 1$ and $k = 1$.

(ii) Minimise function $f(x) = e^x - x^3$ by point estimation method.

(iii) Minimise $f(x) = x^2 + \frac{54}{x}$ by using gradient based bisection method.

3 Solve the following : (any **two**) **8×2=16**

(i) Find inverse of Matrix :

$$A = \begin{bmatrix} 3 & 1 & 1 \\ 2 & -3 & -2 \\ 7 & 2 & -5 \end{bmatrix}$$

(ii) Solve the following equations by Gauss Jordan method.

$2x - 3y + z = 1$

$x + 4y + 5z = 25$

$3x - 4y + z = 2$

(iii) Write an algorithm of Simplex search method.

4 (a) State necessary and sufficiency condition for extrima of unconstrained single variable optimization. **5**

(b) What is transpose of a matrix ? Explain with one example. **5**

(c) Volume v of a gas at differential pressure p is measured and given as below :

p	v
0.1	1.001
0.2	1.008
0.3	1.027
0.4	1.064
0.5	1.125
0.6	1.216
0.7	1.343
0.8	1.512
0.9	1.729
1.0	2.0

Develop relationship between p and v.

5 Answer any **two** : **8×2=16**

(a) Develop an algorithm to solve non-linear equations by secant method.

(b) From the following data :

x	1.8	2.0	2.2	2.4	2.6
y	2.9	3.6	4.4	5.5	6.7

Find x when $y = 5$.

(c) The head of water $H(ft)$ and the quantity of water $(Q)\, ft^3$ flowing per second are related by the law $Q = CH^n$. Find the best values of C and n for the following data :

H	1.2	1.4	1.6	1.8	2.0	2.4
Q	4.2	6.1	8.5	11.5	14.9	23.5

6 Answer any **two** : **8×2=16**

(a) Minimise a simple quadratic function $f(x) = x^2 - x$ for the range $(-3, 3)$ using secant method.

(b) Find the real root of the equation $f(x) = xe^x - 2$.

(c) Given the following data find $y(7)$ using Newton's Backward difference interpolation method :

x	1	2	3	4	5	6	8
y	1	8	27	64	125	216	512