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SE-6183

B. E. - II (Sem. - III) (ECC) Examination

May / June – 2011

Computational Methods Using 'C'

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. - II (Sem - III) (ECC)**

Name of the Subject :

☛ **Computational Methods Using 'C'**

☛Subject Code No. : **6 1 8 3** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.

(3) All symbols and abbreviations carry usual meaning.

(4) Make suitable assumption, if found necessary/clearly mention them.

(5) For all 'C' language programs, describe clearly input data & output data for the program.

1 (a) Answer the following. **10**

(i) Which methods are used for find solution of non-linear equations ?

(ii) Compare Newton-Raphson method with others methods.

(iii) Write the importance of interpolation.

(iv) What is condition to apply Newton's Forward Difference Interpolation and Newton's Backward Difference Interpolation ?

(v) Define Numerical Integration.

(b) Write the algorithm of Backward Difference table. **5**

(c) Explain Divided Difference. Also write Divided Difference table. **5**

2 (a) Explain Lagrangian Interpolation. 7

(b) Given the table of value as 8

x	2.5	3.0	4.5	4.75	6.0
$y(x)$	8.85	11.45	20.66	22.85	38.60

Find y(3.5). Use divided difference Interpolation.

OR

2 (a) The function $F(x)$ is given as follows : 7

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

Compute the Integral of $F(x)$ between $x=0.1$ and $x=1.0$. Use Simpon's $3/8^{th}$ rule.

(b) Derive Newton Forward differentiation formula. 8

3 (a) The distance (s) covered by a car in a given time (t) is given in the following table : 8

$Time(\min utes)$	10	12	16	17	22
$Dis\tan ce(km)$	12	15	20	22	32

Find the speed of the car at t=14 minutes.

(b) Write a 'C' program for trapezoidal Rule. 7

OR

3 (a) Write an algorithm of Newton Backward Interpolation. 8

(b) Explain Simpson's $1/3^{rd}$ method & derive formula.

4 (a) Answer the following questions in brief : **10**

(i) Compare the results obtain by Euler's method & Runge Kutta 4^{th} order methods.

(ii) Compare the computational conplexities between approaches Gauss Jordan and Gauss Elimination methods of solve S.L.E. ?

(iii) What is partial pivoting ? Why it is needed in solution of simultaneous linear equation ?

(iv) What are the prerequisite conditions to find an inverse of a matrix ?

(v) What is the degree of differential equation ? State mean value theorem also.

(b) (i) Give the steps for Crout's decomposition method. **8**

(ii) What is rank of matrix ? Explain it with example. **2**

5 (a) Given that one of the roots of the nonlinear equation $x^3 - 4x - 9 = 0$ lies between 2.625 and 3.0. Find the root correct to 4 significant digits using Newton Raphson method. **7**

(b) What is eigen value ? Find the eigen values of matrix **8**

$$A = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$$

OR

5 (a) Write C program for Newton Raphson method. **7**

(b) Solve the following system of equations accurate to four significant digits by applying Gauss Seidel Method : **8**

$$20x_1 + x_2 - 2x_3 = 17$$

$$3x_1 + 20x_2 - x_3 = -18$$

$$2x_1 - 3x_2 + 20x_3 = 25$$

6 (a) Solve the following system of equation by matrix inversion method : **7**

$$2x_1 - 2x_2 + 5x_3 = 13$$

$$2x_1 + 3x_2 + 4x_3 = 20$$

$$3x_1 - x_2 + 3x_3 = 10.$$

(b) Given $\frac{dy}{dx} = xy$ with $y(1) = 5$ find the solution correct to 3 decimal point in interval $[1,1.5]$ using step size = 0.1 by Runge Kutta 4^{th} order method. **8**

OR

6 (a) Write algorithm & C program for Runge Kutta 2^{nd} order method. **10**

(b) Using modified Euler's method, find the solution of the following differential equation

$$\frac{dy}{dx} = x + y^2$$

for $x = 1.1$, 1.2 and 1.3. Give that $y = 1$ when $x = 1$.