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RN-6183

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

May / June – 2010

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. 2 (Sem. 3) (ECC)**

Name of the Subject :

☛ **Computational Methods Using 'C'**

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

Seat No. :

Student's Signature

(2) Attempt all the questions.

(3) Figures to the **right** indicate **full** marks.

(4) All symbols and abbreviations carry **usual** meaning.

(5) Make **suitable** assumption, if found **necessary** and **clearly** mention them.

(6) Use of scientific calculator (82/83-fx, 82/83-Ms, 100-fx and 100-Ms or equivalent) of other companies is allowed.

SECTION - I

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

(1) Give the name of direct and iterative methods to solve simultaneous linear equations.

(2) Write down the advantages and disadvantages of Newton-Raphson method to solve non-linear equations.

(3) Define non-homogenous and homogenous system of linear equations.

(4) Write down mean value theorm.

(5) Write down steps and equation of modified Euler's method. How we can get higher precision ?

(b) Given $\frac{dy}{dx} = xy$ with $y(1) = 5$. Find the solution correct to 3 decimal position in the interval [1,1.5] using step size h=0.1. Use Runge-Kutta 4th order method. **6**

(c) Write down the algorithm of Euler's method. **4**

2 (a) Write a C-program to find solution of non-linear equation using bisection method. **7**

(b) Find root of $e^x + \cos x = 25$ upto 3 decimal place using secant method. **8**

OR

2 (a) Write an algorithm to find root of non-linear equation using regula-falsi method. **7**

(b) Using the Bisection method obtain a root correct upto 3 decimal places of following equation : **8**

$$x^3 + 6x^2 + 11x + 6 = 0$$

3 (a) Solve the following system of linear equations using Gauss-elimination method : **7**

$$2x_1 + 8x_2 + 2x_3 = 14$$
$$x_1 + 6x_2 - x_3 = 13$$
$$2x_1 - x_2 + 2x_3 = 15$$

(b) Explain the steps for LU decomposition method to solve simultaneous linear equation. **8**

OR

3 (a) Write an algorithm of Gauss-Jordon method. **7**

(b) Solve the following system of equation using matrix inversion method : **8**

$$2x_1 - 2x_2 + 5x_3 = 13$$
$$2x_1 + 3x_2 + 4x_3 = 20$$
$$3x_1 - x_2 + 3x_3 = 10$$

SECTION - II

4 (a) Answer the following questions : **12**

(1) Define symmetric matrix and skew symmetric matrix with example.

(2) Explain what is divide differences ?

(3) List the problems encountered in numerical integration.

(4) Explain what is numerical differentiation ?

(5) Explain round-off errors.

(6) List various Newton's Cotes integration methods.

(b) Write an algorithm to compute derivative using Newton's method for the function tabulated at unequal intervals. Use Newton's forward difference interpolation formula. **8**

5 (a) Derive Newton's forward difference interpolation formula. **8**

(b) Find the Eigen value of matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$. **7**

OR

5 (a) Write the C program for Lagrangian interpolation. **7**

(b) Find $y(x)$ for the table given below. Take x=4.25. Use Newton's backward difference interpolation formula : **8**

x	2.5	3.0	3.5	4.0	4.5
$y(x)$	9.75	12.45	15.70	19.52	23.75

6 (a) Derive the formula for numerical integration using Simpson's 3/8th rule. **8**

(b) For the function $y=f(x)$ given in the table below compute the integral of $f(x)$ between $x=0$ and $x=1.0$. Use Trapezoidal rule : **7**

x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$y = f(x)$	1	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0

OR

6 (a) Write an algorithm for Simpson's 3/8th rule for tabulated functions and for known functions. **8**

(b) Evaluate the following integrations using Trapezoidal rule. Take $n=4$ **7**

$$I = \int_1^2 e^{-2x}$$