



UF-6183

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

May / June - 2012

Computational Methods Using 'C'

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृशावेव निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी.  
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,.....): Nil

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Assume suitable data wherever necessary.

(4) For all 'C' language programs, describe clearly input data and output data.

(5) All symbols and abbreviations carry usual meaning.

1 (a) Answer the following :

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(i) Write down types of Nonlinear equations.

(ii) Which are the other name of false position method.

(iii) Define Interpolation and extrapolation.

(iv) What is the use of Lagrangian Interpolation ?

(v) Why numerical differentiation is required ?

(b) (i) Explain forward difference.

5

(ii) Write algorithm of divided difference table.

5

2 (a) Given that one of the roots of the non linear equation. 7

$x^3 - 2x - 5 = 0$  lies in the interval (1.75, 2.5). Find the root correct to four significant digits using false position method.

(b) Write an algorithm of Newton-Raphson method.

8

OR

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[Contd...

- 2 (a) Given the table of values as 7

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

Find.  $y(4.25)$

- (b) Write an 'C' program of Bisection method. 8
- 3 (a) Derive the formula of numerical differentiation for function tabulated at equal interval. 8
- (b) The function F(x) is given as follows : 7

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

Compute the integral of F(x) between x=0 and x=1.0 using Trapezoidal method.

**OR**

- 3 (a) Write 'C' program for Simpson's  $\frac{1}{3}$ <sup>rd</sup> rule. 5
- (b) Given the following table. 7

x	0.50	0.75	1.00	1.25	1.50
y=F(x)	0.13	0.42	1.00	1.95	2.35

Find  $F'(0.75)$

- 4 (a) Answer the following question in brief : 8
- (i) What is eigen vector ? What is its importance ?
- (ii) What do you mean by ordinary differential equations ? Give examples.
- (iii) Compare the result obtained by Euler's method and Runge Kutta order four methods.
- (iv) Explain boundary value problem.
- (b) Explain Gauss Elimination method to solve simultaneous 5 linear equations. 5
- (c) Use 4<sup>th</sup> order Range Kutta method to solve following 7 equation to find y in interval  $0.8 \leq x \leq 0.9$  by taking  $h = 0.025$

$Dy/dx = y^2 - 100 \text{ Exp} [-100(x-1)^2]$ , take  $y(0.8) = 4.9491$

5 (a) Write algorithm for  $LU$  decomposition method to solve simultaneous linear equations. 7

(b) Solve the following system of equations 8

$$8x_1 - 6x_2 + 2x_3 = 0$$

$$-6x_1 + 7x_2 - 4x_3 = 0$$

$$2x_1 - 4x_2 + 3x_3 = 0$$

For the largest eigen value and its associated eigen vector using power method.

OR

5 (a) Solve the following system of equations using Gauss-Seidel method : 8

$$5x_1 + 2x_2 + x_3 = 12$$

$$x_1 + 4x_2 + 2x_3 = 15$$

$$x_1 + 2x_2 + 5x_3 = 20$$

(b) Write algorithm to find solution of simultaneous linear equations using Gauss Jordan method. 7

6 (a) Derive expression for Runge Kutta 4<sup>th</sup> order method. Also write C program. 8

(b) Given  $dy/dx=xy$  with  $y(1)=5$ , find the solution in the interval  $(1,1.5)$  using step size  $h=0.1$  using Runge Kutta 2<sup>nd</sup> order method. 7

OR

6 (a) Given  $dy/dx=xy$  with  $y(1)=5$ , find the solution in the interval  $(1,1.5)$  using step size  $h=0.1$  using modified Euler's method. 8

(b) Given differential equation  $y''-xy'-y=0$  with the condition  $(y(0)=1$  and  $y'(0) = 0$ , use Taylor series method to determine the value of  $y(0.1)$ .