



SF-6581

B. E. - II (Sem. IV) (TP & TT) Examination

May / June - 2011

Computational Methods Using 'C'  
(Old Scheme)

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशांकेव निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="checkbox"/> B. E. - 2 (Sem. 4) (TP & TT)	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="checkbox"/> Computational Methods Using 'C'	<input type="text"/>
Subject Code No. : <input type="text"/> 6 <input type="text"/> 5 <input type="text"/> 8 <input type="text"/> 1	<input type="text"/>
Section No. (1, 2,.....): <input type="text"/> Nil	<input type="text"/>
	Student's Signature

(2) Figures to the right indicate full marks.

### SECTION - I

- 1 (a) Answer the following objective questions : 10
- Extrapolation is defined as \_\_\_\_\_.
  - State the relationship between the function and third forward difference.
  - What are the leading differences in difference table ?
  - $y_n - y_{n-1} = \delta y$  \_\_\_\_\_
  - Define averaging operator.
  - Gauss's backward interpolation formula employees backward differences. True or False.
  - What is the criteria for selection of Bessel's formula ?
  - State the Newtons backward interpolation formula.
  - In difference table, the first entry is called as \_\_\_\_\_.
  - Defined interpolation.
- (b) Derive Newton's forward interpolation formula and state its applications. 10

- 2 (a) Find the inverse of matrix : 5

$$A = \begin{bmatrix} 5 & -2 & 4 \\ -2 & 1 & 1 \\ 4 & 1 & 1 \end{bmatrix}$$

- (b) In a density gradient column, the floats of known densities occupy the heights as follows : 10

Height (cms) :	10	20	30	40
Density (g/cc) :	1.37	1.285	1.18	1.125

Determine the densities of polymers which occupy the heights  $A = 6$  cm and  $B = 38$  cms.

**OR**

- 2 (a) Derive the formula for Newton-Raphson method with its geometrical representation. 7
- (b) Given the following table of values of  $x$  and  $y$ . 8

$x$	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$y$	1.00	1.0247	1.0488	1.0723	1.0954	1.1180	1.1401

Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at (i)  $x=1$  (ii)  $x=1.15$

- 3 Attempt any **three** of the following : 15
- (a) Derive the stirlings formula and state its location in difference table.
- (b) Explain minor of matrix and rank of matrix.
- (c) Given the values :

$x$	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

Evaluate  $f(9)$  using Newton's divided difference formula.

(d) Given the table :

x	310	320	330	340	350	360
y	2.4914	2.5052	2.5185	2.5315	2.5441	2.5563

Find the value of  $y$  at  $x=337.5$  by using Bessel's formula.

- 4 (a) Answer the following objective questions : 10
- (i) \_\_\_\_\_ is the extension used for C program file.
  - (ii) clrscr ( ) is present in \_\_\_\_\_.
  - (iii) \_\_\_\_\_ is used to execute the program.
  - (iv) \_\_\_\_\_ is used to come out of the loop.
  - (v) \_\_\_\_\_ is used do compile the program.
  - (vi) Give the formula for percentage error.
  - (vii) False-position method is also known as \_\_\_\_\_.
  - (viii) Simpson's  $\frac{3}{8}$  rule can be obtained by putting  $n =$  \_\_\_\_\_ in the integration formula.
  - (ix) For the values given at the end of the table, the derivatives can be found out using \_\_\_\_\_ formula.
  - (x) Euler's method is used to solve \_\_\_\_\_ equations.
- (b) Write a program to find the roots of equation using Bisection method. 10
- 5 (a) Write a program to implement interpolation using Newton's forward difference formula. 10
- (b) Write a program to integrate the given values using trapezoidal rule for integration. 5
- OR**
- 5 (a) Write a program to implement interpolation using Bessel's difference formula. 8
- (b) Write a program to implement interpolation using Lagrange's method. 7

6 Attempt any **three** of the following :

15

(a) Solve  $y' = x + y^2$ ,  $y(0) = 1$  using Picard's method and compute  $y(0, 1)$  (2 approximation)

(b) Using Secant method, find the root of the equation :

$$8x^3 + 12x^2 + 10x - 7 = 0.$$

(c) Evaluate  $I = \int_0^1 \frac{dx}{1+x}$  correct upto three decimal places by

trapezoidal and Simpson's rule with  $h = 0.125$ .

(d) Classify the following equations :

(i) 
$$\frac{\partial^2 u}{\partial t^2} = c^2 \cdot \frac{\partial^2 u}{\partial x^2}$$

(ii) 
$$x^2 \frac{\partial^2 u}{\partial x^2} + (1 - y^2) \frac{\partial^2 u}{\partial y^2} = 0.$$

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