



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/BCA/SEM-4/BM-401/2013**

**2013**

**STATISTICS, NUMERICAL METHODS &  
ALGORITHMS**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) Newton-Raphson method is also known as method of

- |                  |                   |
|------------------|-------------------|
| a) straight line | b) tangent        |
| c) normal        | d) none of these. |

ii) Order of the term *h* in the error term of trapezoidal rule is of order

- |      |       |
|------|-------|
| a) 1 | b) 2  |
| c) 3 | d) 4. |



iii) The value of  $\Delta^2 (ax^2 + bx + c)$  is

- a)  $2an + b$
- b)  $2an$
- c)  $2an^2$
- d) none of these.

iv) The number of significant digits in 1.00234 is

- a) 3
- b) 4
- c) 5
- d) 6.

v) If  $y_0 = 2, y_1 = 4, y_2 = 8, y_4 = 32$ , then  $y_3$  is equal to

- a) 5
- b) 6
- c) 15
- d) none of these.

vi) Which of the following methods is an iterative method ?

- a) Gauss Elimination method
- b) Gauss-Jordan method
- c) Gauss-Jacobi method
- d) Crout's method.

vii) The order of convergence of Newton-Raphson methods is

- a) 1
- b) 2
- c) 2
- d) 4.



viii) The relation between shift operator  $E$  and forward difference operator  $\Delta$  is given by

- a)  $\Delta = 1 + E$                       b)  $E = 1 + \Delta$   
 c)  $E = \Delta$                               d)  $E = \Delta + 2$ .

ix) The first order of forward difference of a constant function is

- a) 0    b) 1  
 c) 4    d) 3.

x) Lagrange's interpolation formula is used for

- a) Equally space point      b) Unequally space point  
 c) Both (a) & (b)                      d) None of these.

xi) The equation  $x^x + x - 1 = 0$  is a

- a) algebraic equation  
 b) transcendental equation  
 c) both (a) & (b)  
 d) none of these.

xii) Order of  $h$  in the error expression of Simpson's 1/3rd rule is

- a) 2    b) 4  
 c) 3    d) 5





4. Find the real root of equation  $x^3 - x - 1 = 0$  by the method of bisection.
5. Compute by Newton-Raphson method the positive root of equation  $3x^2 + 2x = 9$  correct to four significant figures.
6. Compute the value of  $y$  at  $x = 1.3$  using Runge-Kutta method of fourth order by solving the differential equation.

$$\frac{dy}{dx} = x^2 + y^2, \text{ with } x_0 = 1, y_0 = 0 \text{ and step size } h = 0.3.$$

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Use Newton's divided difference formula to find  $f(8)$

and  $f(15)$  from the following table :

$x :$	4	5	7	10	11	13
$f(x) :$	48	100	294	900	1210	2028

- b) Find the value of fifth root of 255.  $7 + 8$



8. a) From Gauss-Legendre quadrature formula establish trapezoidal rule of integration.

b) By using Simpson's one third rule calculate

$$\int_0^1 (x^3 - x) dx. \text{ Compute relative error.} \quad 7 + 8$$

9. a) Solve the system of equation by Inverse Matrix method :

$$x + y + z = 3$$

$$2x - y + 3z = 16$$

$$3x + y - z = -3.$$

b) Find by Taylor's series method the value of  $y$  at  $x = 0.1$  and  $x = 0.2$  to 5 places of decimal from  $\frac{dy}{dx} = x^2 y - 1, y(0) = 1.$  7 + 8

10. a) Compute  $y(0.2)$  from the equation  $\frac{dy}{dx} = x - y, y(0) = 1$  taking  $h = 0.1$  by Runge-Kutta method correct to four decimal places.

b) Solve by Gauss elimination method.

$$x - y - z = 1$$

$$2x - 3y + z = 1$$

$$3x + y - z = 2. \quad 7 + 8$$



11. a) Find a real root of the equation  $f(x) = \log x - \cos x$  using bisection method up to 3 decimal places.

b) Solve the system of equation by Gauss elimination method :

$$x + 3y + 2z = 5$$

$$2x - y + z = -1$$

$$x + 2y + 3z = 2$$

7 + 8

