

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 : $10 \times 1 = 10$

- 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 Δ 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

xiii) The degree of interpolation polynomial of a function whose values are known at 8 points is

- a) 5 b) 6
- c) 7 d) 8.

xiv) The number of significant digits in 0.00303 is

- a) 6 b) 5
- c) 3 d) 2.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Find the missing terms of the following table :

$X :$	45	50	55	60	65
$f(X) :$	3	?	2	?	4

3. Solve the system of equation by LU method :

$$3x + 4y + 7z = 8$$

$$x + 2y + 3z = 6$$

$$x + 5y + 9z = 9$$

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.
 $\frac{dy}{dx} = x^2 + y^2$, with $x_0 = 1$, $y_0 = 0$ 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 :

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

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

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

$$7 + 8$$

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