

2017  
MCA  
Paper : 2.5

**COMPUTER ORIENTED NUMERICAL METHODS**

Full Marks : 75

Time : 3 hrs

The figures in the margin indicate full marks for the questions

1. **Answer the following questions:** 1 × 5 = 5

- a. Which of the following method is iterative to solve the solution of linear equation:
- (i) Gauss Elimination.
  - (ii) Jacobi
  - (iii) Gauss Jordan
  - (iv) None of these.
- b. If the distance between each  $x$  is not same in the interpolation, then which of the method is used to find the value of  $y$  at given point  $x$ .
- (i) Newton forward formula.
  - (ii) Lagrange's formula.
  - (iii) Newton central forward formula
  - (iv) None of these.
- c. Which of the following formula is not true with respect of interpolation?
- (i)  $E y_1 = y_{h+1}$
  - (ii)  $\nabla = E^{-1}$
  - (iii)  $\Delta = E - 1$
  - (iv) *none of these*

- d.  $\Delta^2 y_0 = ?$
- (i)  $y_2 - 2y_1 + y_0$
  - (ii)  $y_2 + 2y_1 - y_0$
  - (iii)  $y_2 - 2 - y_0$
  - (iv)  $y_2 + 2y_1 + y_0$
- e. Which of the following method is not to solve ordinary differential equation?
- (i) RK 2<sup>nd</sup> Order.
  - (ii) Trapezoidal
  - (iii) Predictor-Corrector.
  - (iv) Euler.

2. Answer the following questions: 2 × 5 = 10

- (a) Evaluate  $\Delta^2(ab^{cx})$
- (b) What do you mean by Newton's general interpolation formula.
- (c) Define operator  $E$  and  $\Delta$ . Show that  $E = 1 + \Delta$ .
- (d) Match the following:
 

A. Newton Raphson.	1. Integration.
B. Runge kutta	2. Root finding.
C. Gauss-Seidal	3. Ordinary differential equation.
D. Simpson's method	4. Solution of system of linear equations.

(e) Construct forward difference table for the following set of values:

X	-3	-2	-1	0	1	2
f(x)	-2	-4	-4	-2	2	8

3. Answer any six question of the following: 6 × 10 = 60

- (a) Given the equation,  
 $y'(x) = x + y$ , with  $y(0) = 1$ ,

Estimate  $y(0.4)$  using Milne-Simpson Predictor-Corrector method. Assume  $h = 0.25$ .

- (b) Use Simpson's  $\frac{1}{3}$  rules dividing the range into ten equal part's to show that ,

$$\int_0^1 \frac{\log(1+x^3)}{1+x^2} = 0.1730 .$$

- (c) Find the first two derivatives of  $f(x)$  at  $x = 1$  from the following table:

X	-2	-1	0	1	2	3	4
f(x)	104	17	0	-1	8	69	272

- (d) Given the following table find the value of  $e^{0.243}$  and  $e^{0.411}$ ,

X	0.1	0.2	0.3	0.4	0.5
f(x) = $e^x$	1.10517	1.2140	1.34986	1.49182	1.64872

- (e) Solve the following systems by using Gauss-Jordan elimination method.

$$5x_1 + 3x_2 + 7x_3 = 4 ,$$

$$x_1 + 5x_2 + 3x_3 = 2 ,$$

$$2x_1 + 2x_2 + 10x_3 = 5 ,$$

- (f) Give the following values of  $x$  &  $f(x)$  as:

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

Using Newton's interpolation formulae for unequal

intervals, find  $f(8)$  and  $f(15)$ .

- (g) A root of equation  $xe^x + 1 = 0$  lies in the interval (0.5, 1.0). Determine correct to three decimal places using regular falsi method.

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