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Paper Code : BS-M401/M(CS) 401/M(CS)401 Numerical Methods(BS)
UPID : 004401

Time Allotted : 3 Hours   *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :   [1 x 10 = 10]

   (I)   What is the number of significant figures in 0.3409 ?

   (II)   What is the relation between shift operator and central difference operator?

   (III)   What is the advantage of Lagrange's interpolation?

   (IV)   What type of interval is used for Trapezoidal rule?

   (V)   Find an interval where the positive root of the equation x+lnx-2=0?

   (VI)   Find the inverse of the matrix $\begin{pmatrix} 1 & -1 & 1 \\ 1 & 1 & 1 \\ 1 & 2 & 4 \end{pmatrix}$?

   (VII)   What represents the Lagrange Interpolation formula for two points of interpolation?

   (VIII) What type of interval used for simpson's 1/3 rule?

   (IX)   Write one disadvantage of Bisection method?

   (X)   What is the order of truncation error in Euler's Method order?

   (XI)   What is the relation between forward difference operator and backward difference operator?

   (XII)   What represents the Lagrange Interpolation formula for two points of interpolation?

Group-B (Short Answer Type Question)

Answer any three of the following :   [5 x 3 = 15]

2. Find the absolute, relative and percentage error if 5/6 is approximated by .8333.   [5]

3. Find the missing terms from the following table: [5]

   x: 0 1 2 3 4 5
   $f(x)$: 0 — 8 15 — 35 .

4. From the given table find $f(x)$ and f(6)   [5]

   x: 0 1 2 3 4 5
   $f(x)$: 41 43 47 53 61 71 .

5. Derive the Lagrange's interpolation formulae.   [5]

6. Prove that $\mu^2 = 1 - \frac{1}{4}\delta^2$, where the notations have their usual meaning.   [5]

Group-C (Long Answer Type Question)

Answer any three of the following :   [15 x 3 = 45]

7. (a) Give a geometrical interpretation of Newton Raphson method   [7+8]
   (b) Find a root of the equation xsinx +cosx =0 using Newton Raphson method correct upto 5 places of decimal

8. Apply Lagrange's interpolation formula to find f(x), if f (1) =2, f (2) =4. f (3) =8, f(4) =16 and f(7) =128.   [7+8]
   Find f(2.5) using Newton forward difference formula for the given data

x	1	2	3	4	5	6
f(x)	0	1	8	27	64	125

9. [7+5+3]

If $\Delta r = \Delta h = 0.1$ find the Absolute error ,Relative error up to three significant errors in $V = \dfrac{1}{3}\pi r^2 h$

when r=2,h=3.

If 3.45234 be an approximate value of 3.45678 ,find the Absolute, Relative, Percentage errors.

Round off the following number upto four significant figures

(i)   170.570   (ii) 21753.

10. [5+5+5]

Prove that $\Delta + \nabla = \dfrac{\Delta}{\nabla} - \dfrac{\nabla}{\Delta}$

Prove that $\Delta - \nabla = \Delta \nabla$

Find the missing term of the following table

x	2	4	6	8	10
y	5.6	8.6	13.9	----	35.6

11. (a) Interpret Regula-Falsi method geometrically.   [5+5+5]
    (b) Compute a real root of the equation 3x-cosx-1=0 by bisection method correct to five significant figure.
    (c)

Find $\sqrt[3]{27}$ by Newton-Raphson method

*** END OF PAPER ***