



V.P. & R.P.T.P. Science College, V.V. Nagar

Internal Test: 2016-17

Subject : Mathematics

US03CMTH02

Max. Marks : 25

Numerical Analysis

Date: 05/10/2016

Timing: 03.00 pm - 04.30 pm

Q: 1. Answer the following by choosing correct answers from given choices. 3

- [1] Aitkin's Δ^2 -process is used for finding approximate
[A] derivative of a function [B] integral of a function
[C] root of an equation [D] none of this

- [2] $\delta_{\frac{7}{2}}$ is given by
[A] $y_4 - y_3$ [B] $y_3 - y_4$ [C] $y_7 - y_2$ [D] $y_2 - y_7$

- [3] For the given data
- | | | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| x | $x_0 = 3$ | $x_1 = 4$ | $x_2 = 5$ | $x_3 = 6$ | $x_4 = 7$ | $x_5 = 8$ |
| y | 5 | 8 | 11 | 15 | 23 | 30 |
- $[x_1 \ x_2 \ x_3] =$
[A] 1 [B] 2 [C] 3 [D] none

Q: 2. Answer any TWO of the following. 4

- [1] Find an interval containing an initial approximation of $\tan x = 1$
[2] If $E^{10}y_1 = 20$ then find $E^5y_6 + E^6y_5$
[3] If $y_1 = 4, y_3 = 12, y_4 = 19$ and $y_x = 7$ find x . Write the formula you use and also give it's name

Q: 3 [A] Let $x = \xi$ be a root of $f(x) = 0$ and I be an interval containing ξ . Also suppose $\phi(x)$ and $\phi'(x)$ are continuous in I , where $\phi(x)$ is defined by $x = \phi(x)$ which is equivalent to $f(x) = 0$. If $|\phi'(x)| < 1$ for all $x \in I$, then prove that the sequence of approximations $x_0, x_1, x_2, \dots, x_n$ defined by $x_{n+1} = \phi(x_n)$ converges to ξ , provided that the initial approximation x_0 is chosen in I 3

[B] Using Bisection method find a real root of the equation $x^3 - x - 4 = 0$ correct upto three decimal palaces 3

OR

Q: 3 [A] Discuss the False Position method for approximation 3

[B] Find a real root of $x^3 - 3x + 5 = 0$, correct upto three decimal places, by Newton-Raphson method 3

Q: 4. Derive Newton's Forward Difference interpolation formula for equally spaced values of argument 6

OR

Q: 4 [A] Derive Stirling's interpolation formula for equally spaced values of argument

3

[E] Find the cubic polynomial which takes the following values

$$y(0) = 1, y(1) = 0, y(2) = 1, y(3) = 10$$

Hence find the value of $y(4) - y(0.5)$

3

Q: 5. Obtain 1st and 2nd order numerical differentiation formula from Newton's forward difference formula

6

OR

Q: 5 [A] Using Langrange's interpolation formula express the following function as a sum of partial fractions

$$\frac{x^2 + x - 3}{x^3 - 2x^2 - x + 2}$$

3

[B] Given the set of tabulated points (x,y) which are (1, -3), (3, 9), (4, 30) and (6, 132) obtain the value of y when $x = 2$ using Newton's divided difference formula

3

