

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

Internal Test : 2014-15

Subject : Mathematics

US03CMTH02

Max. Marks : 25

Numerical Analysis

Date: 13/10/2014

Timing: 02.00 pm - 03.30pm

- Instructions : (1) This question paper contains FIVE QUESTIONS
 (2) The figures to the right side indicate full marks of the corresponding question/s
 (3) The symbols used in the paper have their usual meaning, unless specified.

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 $x^3 - 4x + 1 = 0$
 [2] If $E^8 y_2 = 20$ and $E^4 y_5 = 10$ then find ∇y_{10}
 [3] Using Langrage's interpolation formula, find the form of the function $y(x)$ from the following table

x	1	3	4
y	2	4	8



Q: 3 [A] Using the Newton-Raphson method, establish the iterative formula

$$x_{n+1} = \frac{1}{3} \left[2x_n + \frac{N}{x_n^2} \right]$$

to calculate the cube root of N **3**

- [B] Find a real root of $2x = \cos x + 3$ by iteration method correct upto three decimal places **3**

OR

Q: 3 [A] Describe Bisection method for approximation of a real root of an equation 3

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

Q: 4 [A] In usual notations prove : $\mu = \sqrt{1 + \frac{1}{4}\delta^2}$ 3

[B] Locate and correct error in the following table of values

x	2.5	3.0	3.5	4.0	4.5	5.0	5.5
y	4.32	4.83	5.27	5.47	6.26	6.79	7.23



OR

Q: 4 [A] Derive Stirling's interpolation formula for equally spaced values of argument 3

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

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

Hence find the value of $y(4) - y(0.5)$ 3

Q: 5. Derive Newton's divided difference formula 6

OR

Q: 5. The following table of values of x and y is given :

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ when $x = 6$ 6