



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

Internal Test: 2017-18

Subject : Mathematics

US03CMTH02

Max. Marks : 25

Numerical Analysis

Date: 09/10/2017

Timing: 03.00 pm - 04.30 pm

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

- [1] Mid-points of intervals are used for approximation of root of an equation while using the method of
[A] False position [B] Bisection [C] Iteration [D] Aitkin's Δ^2 -Process
- [2] $y_n - E^{-1}y_n =$
[A] Δy_{n+1} [B] ∇y_{n+1} [C] Δy_n [D] ∇y_n
- [3] The divided differences are
[A] not dependent on their arguments
[B] symmetrical in their arguments
[C] not symmetrical in their arguments
[D] none

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

- [1] Express $\sin x = 5(x + 2)$ in the form of $x = \phi(x)$, so that the necessary condition for applying the Iteration method is satisfied.
- [2] If $E^8 y_2 = 20$ and $E^4 y_5 = 10$ then find ∇y_{10}
- [3] Construct divided difference table for the following data

x	2	3	4	5
y	10	15	18	20

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

[B] Using Bisection method find a real root of the equation $x^3 - 4x - 9 = 0$ correct upto three decimal palaces 3

OR

Q: 3 [A] Find a real root of $x \sin x + \cos x = 0$, correct upto three decimal places, by Newton-Raphson method 3

[B] Solve $2x = \cos x + 3$ by Aitken's Δ^2 process correct upto three decimal places 3

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

OR

Q: 4 [A] Use Gauss's forward formula to find y for $x = 30$ given that

x	21	25	29	33	37
y	18.4708	17.8144	17.1070	16.3432	15.5154

3

[B] Let $y = g(x)$ be a function such that

$$g(20) = 2854, g(24) = 3162, g(28) = 3544, g(32) = 3992$$

Use Everett's formula to obtain $g(25)$.

3

Q: 5. Derive Newton's divided difference formula

6

OR

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

$$\frac{3x^2 + x + 1}{(x - 1)(x - 2)(x - 3)}$$

3

[B] Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ when $x = 5$ for the following data :

x	0	1	2	3	4	5
y	6.98	7.40	7.78	8.12	8.45	8.75

3

