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

Internal Test: 2015-16

Subject : Mathematics US03CMTH02 Max. Marks : 25

Numerical Analysis

Date: 07/10/2015 Timing: 03.00 pm - 04.30 pm

Instructions : (1) This question paper contains 5 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] In usual notations, the formula $\xi = x_{i+1} - \dfrac{(\Delta x_i)^2}{\Delta^2 x_{i-1}}$ is used by the method of

[A] False position [B] Bisection [C] Iteration [D] Aitken's Δ^2-Process

[2] Which of the follwing is not true?

[A] $y_{n+4} = Ey_{n+3}$ [B] $y_{n+4} = E^2 y_{n+2}$ [C] $y_{n+4} = E^3 y_{n+1}$ [D] $y_{n+4} = E^{-2} y_{n-2}$

[3] For the given data

x	$x_0 = 6$	$x_1 = 8$	$x_2 = 10$	$x_3 = 12$
y	10	14	20	30

, $[x_2\ x_3] =$

[A] 5 [B] 10 [C] 20 [D] 40

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

[1] Find an interval containing an initial approximation of $x^3 - 4x + 1 = 0$

[2] Define : (i) mean operator (ii) shift operator

[3] If $y_1 = 4,\ y_3 = 12,\ y_4 = 19$ and $y_x = 7$ find x.

Q: 3 [A] State and prove the condition on $\phi(x)$ in Iteration method for convergence of a sequence of approximations. **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] Discuss the Aitken's Δ^2-Process for approximation of a real root of an equation. **3**

[B] Find a real root of $\cos x = 3x - 1$ by iteration method correct upto three decimal places **3**

Q: 4. Derive Gauss's Backward interpolation formula for equally spaced values of argument **6**

OR

Q: 4. The populations of a town were as under

Year(x)	1891	1901	1911	1921	1931
Population (in thousand)	46	66	81	93	101

Estimate the population for the year 1895 and 1925 **6**

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

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

Find first and second derivatives of y w.r.t. x when $x = 1.2$ **6**

OR

Q: 5 [A] Discuss the method of succesive apprximation for inverse interpolation. **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**