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

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Internal Test: 2013-14

S.Y.B.Sc. : Semester - III (CBCS)

Subject : Mathematics US03CMTH02 Max. Marks : 30

Numerical Analysis

Date: 07/10/2013 Timing: 01.00 pm - 02.30pm

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. 6

[1] Initial approximations of root of an equation by Iterations method can be used for further appoximation by

[A] Aitken's Δ^2-Process [B] Bisection method

[C] False position method [D] none

[2] Initial approximation of $x^3 - x - 2 = 0$ can be chosen from

[A] [0,1] [B] [-1,0] [C] [1,2] [D] [-2,-1]

[3] $Ey_n - y_n =$

[A] Δy_n [B] ∇y_n [C] Δy_{n-1} [D] ∇y_{n-1}

[4] If $\Delta y_5 = 5$ and $y_6 = 11$ then $y_5 =$

[A] 16 [B] -16 [C] -6 [D] 6

[5] The divided differences are

[A] not dependent on their arguments
[B] symetrical in their arguments
[C] not symetrical in their arguments
[D] none

[6] 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 THREE of the following. 6

[1] Discuss the False Position method for approximation

[2] Find an interval containing an initial approximation of $2x^2 - x - 3 = 0$

[3] Prove that $\Delta = E - 1$

[4] Prove that $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$

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

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

[6] Show that the divided differences are symetrical in their arguments

Q: 3. State and prove the condition on $\phi(x)$ in Iteration method for convergence of a sequence of approximations. 6

OR

Q: 3. Find a real root of $x \sin x + \cos x = 0$, correct upto three decimal places, by Newton-Raphson method 6

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

[B] Locate and correct error in the following table of values 3

x	1	2	3	4	5	6	7	8
y	3010	3424	3802	4105	4472	4771	5051	5315

OR

Q: 4. Using Gauss's forward interpolation formula find $f(32)$, given that

$$f(25) = 0.2707,\ f(30) = 0.3027,\ f(35) = 0.3386,\ f(40) = 0.3794$$

6

Q: 5 [A] Using mathematical induction, in usual notations prove that

$$[x_0, x_1, x_2, x_3, ..., x_n] = \frac{1}{h^n . n!} \Delta^n y_0$$

3

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[B] Derive Newton's divided difference formula 3

OR

Q: 5. From the following table, find x correct upto two decimal places ,for which y is maximum and find the value of y 6

x	1.2	1.3	1.4	1.5	1.6
$y = f(x)$	0.9320	0.9636	0.9855	0.9975	0.9996