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

Internal Test: 2019-20

Subject : Mathematics US03CMTH21 Max. Marks : 25

Numerical Methods

Date: 05/10/2019 Timing: 03.00 pm - 04.15 pm

Instruction : The symbols used in the paper have their usual meaning, unless specified.

Q: 1. Answer the following by choosing correct answers from given choices. **5**

[1] Initial approximations of root of an equation obtained by Iteration method can be used for further appoximation while using the method of
[A] Aitken's Δ^2-Process [B] Bisection [C] False position [D] none

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

[3] If $y_5 = 4$, and $y_{15} = 10$ then $E^5 y_{10} =$
[A] 5 [B] 10 [C] 15 [D] 20

[4] For the given data

x	$x_0 = 2$	$x_1 = 6$	$x_2 = 10$	$x_3 = 14$
y	15	20	32	50

$[x_1\ x_2] =$
[A] 1 [B] 2 [C] 3 [D] none

[5] Which of the following method can be used to evaluate a numerical integral?
[A] Picard's Method [B] Euler's Method
[C] Runge-Kutta method [D] Romberg's Method

Q: 2. Discuss the False Position method for approximation **5**

OR

Q: 2. Find a real root of $2x = \cos x + 3$ by iteration method correct upto three decimal places **5**

Q: 3. Derive Newton's Forward Difference interpolation formula for equally spaced values of arguments. **5**

OR

Q: 3. By using Gauss's backward interpolation formula find a cubic polynomial $f(x)$ given that

$$f(1) = -1,\ f(2) = 11,\ f(3) = 35,\ f(4) = 77,\ \text{and}\ ,f(5) = 143$$

Hence find $f(0)$ and $f(6)$ **5**

Q: 4. Obtain 1^{st} and 2^{nd} order numerical differentiation formula from Newton's forward difference formula **5**

OR

Q: 4. Tabulate $y = x^3$ for $x = 2, 3, 4, 5$ and calculate $\sqrt[3]{10}$ correct upto three decimal places **5**

Q: 5. Using Newton's forward difference formula, find the general formula for numerical integration and hence derive Simpson's $\frac{3}{8}$-rule **5**

OR

Q: 5. Use Picard's method to approximate y when $x = 0.25$, given that $y(0) = 0$ and $\frac{dy}{dx} = \frac{x^2}{y^2+1}$ correct upto three decimal places **5**