Total No. of Questions : 3]

SEAT No. :

P5140

[Total No. of Pages : 2

[5823]-304

S.Y. B.Sc. (Computer Science)

MATHEMATICS

MTC - 232 : NUMERICAL TECHNIQUES

(2019 Pattern) (Semester - III) (23222)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Non-programmable scientific calculator is allowed.*

Q1) Attempt any five of the following. **[5×2=10]**

a) State the trapezoidal rule for numerical integration.

b) Given that, $y' = x^2 + y^2$ with $y(0) = 1$. Find $y(0.1)$ by Euler's Method.

c) Prove that, $(1+\Delta)(1-\nabla) = 1$ by usual notation.

d) Find relative error of the number 5/7 whose approximate value is 0.714.

e) Write the Newton-Raphson formula for square root of any real number.

f) Given that, $y(10) = 130, y(20) = 180, y(30) = 200, y(40) = 275,$ $y(50) = 450.$ Prepare Newton's Backward difference table.

g) Write Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule for numerical integration.

Q2) Attempt any three of the following. **[3×5=15]**

a) Derive divided difference interpolation formula.

b) Evaluate $\int_1^7 (1 + \log x)\, dx$ by using Simpson's $\left(\frac{3}{8}\right)^{th}$ rule (Take $h = 1$).

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c) Given that, $y(1)=2$, $y(2)=4$, $y(3)=8$, $y(4)=16$, $y(5)=32$. Obtain $y(1.5)$ by using Newton Forward interpolation formula.

d) Find real root of equation $x^3-4x-9=0$ in the interval [2, 3] correct upto 2 decimal places by using Regula - Falsi method.

e) Given that $y(1)=0$, $y(3)=1$, $y(4)=48$, $y(6)=180$, $y(10)=900$. Obtain $f(5)$ by using Lagrange's interpolation formula.

Q3) Attempt any one of the following. **[1×10=10]**

a) Given that, $\frac{dy}{dx}=1+xy^2, y(0)=1, h=0.1$. Find $y(0.1), y(0.2)$ by using Runge - Kutta method of fourth order.

b) i) Find the real root of the equation $x\cdot\sin x+\cos x=0$ correct to three decimal places using Newton - Raphson method (Take $x_0=2.5$)

ii) Given that, $y'=x^2+y, y(0)=1$. Obtain $y(0.1)$ by using Euler's Modified Method.