Total No. of Questions : 4]

SEAT No. :

P4755

[Total No. of Pages : 2

[5822]-302
S.Y. B.Sc.
MATHEMATICS (Paper - II)
MT - 232(A) : Numerical Methods and its Applications
(2019 Pattern) (Credit System) (Semester - III) (23112 A)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any FIVE of the following : **[5 × 1 = 5]**

a) Define Absolute error

b) Find the root x_1 of $x^3-18 = 0$ by Newton - Raphson method with $x_0 = 2.5$.

c) Simplify E^2x^3 take $h = 1$

d) Evaluate $\Delta\ (a^{5x-7})$ take $h = 1$

e) Evaluate $\int_0^1 x^2 dx$ by Trapezoidal rule take $h = 0.5$

f) Write Runge-Kutta second order formula to solve $\frac{dy}{dx} = f(x, y)$ with $y(x_0) = y_0$

g) Write the formula for $y_1^{(n+1)}$ in Modified Euler's method

Q2) a) Attempt any ONE of the following : **[5]**

i) Explain Newton-Raphson method

ii) Derive Lagrange's interpolation formula

b) Attempt any ONE of the following : **[5]**

i) Evaluate $\int_4^{5.2} \log_e x\ dx$ by Simpson's $\frac{3}{8}$ rule take $h = 0.2$

P.T.O.

ii) Find y (0.1) using Runge-Kutta second order method given that $\frac{dy}{dx}=x+y$ with $y(0)=1$ and $h=0.1$

Q3) a) Attempt any ONE of the following : **[5]**

i) Explain Taylor's series method to solve initial value problem.

ii) Explain Euler's method to solve $\frac{dy}{dx}=f(x,y), y(x_0)=y_0$

b) Attempt any ONE of the following : **[5]**

i) Find $\sqrt{10}$ by Newton-Raphson method (Two iterations)

ii) Find log 3.7 using Lagrange's interpolation formula from the following table

x	3	3.5	4
log x	1.0986	1.2527	1.3863

Q4) a) Attempt any ONE of the following : **[5]**

i) Write the rules for round-off number to the significant figures.

ii) Derive the formula for $\frac{dy}{dx}$ at $x=x_0$ in terms of forward difference operator Δ.

b) Attempt any ONE of the following : **[5]**

i) Find $\sqrt[3]{18}$ by bisection method lies between 2 and 3. Perform three iterations.

ii) Find y when x = 1 by Runge-Kutta fourth order method given $\frac{dy}{dx}=\frac{y-x}{y+x}, y(0)=1$

□□□