



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

Rollno.....

End Semester Examination, December 2024
B.Sc.(H) Mathematics – V Semester
NUMERICAL ANALYSIS (BSMA301A)

Time: 2.5 hrs.

Max Marks: **50**

Note: *All Questions are compulsory. Marks are indicated against each question.*

PART-A

Q.1

- (a) State Newton's backward interpolation formula. [CO-1] [L- 1] **2**
- (b) Define the absolute error and relative error in $\sqrt{6}+\sqrt{7}+\sqrt{8}$ correct to 4 significant digits. [CO-1] [L- 1] **2**
- (c) State Simpson's $\frac{1}{3}$ rd Rule [CO-1] [L- 1] **2**
- (d) Identify $\sqrt{30}$ by secant Method [CO-1] [L- 1] **2**
- (e) Define Inherent errors, Rounding errors, and Truncation errors. [CO-1] [L- 1] **2**
- (f) Identify by Newton's iteration method: $1/31$ [CO-1] [L- 1] **2**
- (g) What is the difference between initial and boundary value problem [CO-1] [L-1] **2**

2x5

PART-B

Q.2 Apply Picard's process of successive approximations, obtain a solution up to the fifth approximation of the equation $dy/dx = y + x$, such that $y=1$ when $x=0$. Check your answer by finding the exact solution. [CO-5] [L- 3] **10**

OR

Find by Taylor's series method, the value of y at $x=0.1 \wedge x=0.2$ to five places of decimals from $dy/dx = x^2 y - 1$, $y(0)=1$ [CO-4] [L- 1] **10**

Q.3 Apply Runge –Kutta fourth order method to find an approximate value of y when $x=0.2$ given that $dy/dx = x + y \wedge y=1$ when $x=0$ [CO-3] [L- 3] **10**

OR

Analyze $\int_0^6 \frac{dx}{1+x^2}$ by using

(i) Trapezoidal rule

(ii) Simpson's 1/3 rule

(iii) Simpson's 3/8 rule

(iv) Weddle rule and compare the results with its actual value

[CO-3] [L- 4] **10**

Q.4 Solve by Jacobi's iteration method, the equations

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

[CO-2] [L- 3] **10**

OR

Find the missing term in the following table using interpolation:

X	0	1	2	3	4
Y	1	3	9		81

[CO- 3] [L-1] **10**

Q.5 Illustrate the root of the equation $\cos x = x e^x$ using the bisection method correct to four decimal places.

[CO-2] [L- 2] **10**

OR

Solve the integral $\int_0^1 \frac{x^2}{1+x^3} dx$ using Simpson's 1/3 rd rule. Compare the error with the exact value.

[CO- 5] [L- 3] **10**