

ADMISSION NUMBER											

**School of Basic Sciences**  
**Bachelor of Science Honours in Mathematics**  
**Mid Term Examination - Mar 2024**

**Duration : 90 Minutes**  
**Max Marks : 50**

**Sem VI - C1UC602B - Numerical Analysis and Operation Research**

General Instructions

*Answer to the specific question asked*

*Draw neat, labelled diagrams wherever necessary*

*Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Write the Newton's forward interpolation formula in the pre defined terms, where we want to start my estimated polynomial formula from  $y_1$  in place of  $y_0$ . K2 (2)
- 2) Explain the geometrical interpretation of Bisection method. K1 (3)
- 3) Establish the relationship between shifting operator (E) and forward difference operator ( $\Delta$ ). K2 (4)
- 4) Find the solution of the system of equations: K2 (6)  
 $45x+2y+3z=58, -3x+22y+2z=47, 5x+y+20z=67$   
 Perform 3 iterations, using the Gauss-Seidel iteration method.
- 5) Using Newton's backward difference formula, construct an interpolating polynomial of degree 3 for the data: K3 (6)  
 $f(-0.75) = -0.0718125, f(-0.5) = -0.02475, f(-0.25) = 0.3349375, f(0) = 1.10100.$   
 Hence find  $f\left(-\frac{1}{3}\right)$ .
- 6) Derive the Newton's divided differences interpolation formula. K3 (9)
- 7) Evaluate  $\int_0^{2\pi} \sin x \, dx$  by trapezoidal method with 8 equal intervals. K4 (8)
- 8) By subdividing the interval into four equal Parts, Integrate the function  $f(x) = \frac{\sin x}{x}$  between  $x=0$  and  $x=0.8$  by (a) Trapezoidal Rule (b) Simpson's 1/3 Rule. K4 (12)

**OR**

Compute  $\int_{0.2}^{1.4} (\sin x - \log_e x + e^x) \, dx$  by Simpson's 3/8 rule. K4 (12)