Exam.Code:0934
Sub. Code: 6650

2054

B.E. (Electrical and Electronics Engineering)

Fourth Semester

AS-401: Numerical Analysis

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Use of non-programmable calculator is allowed.

x-x-x

1. (a) Find the product of the numbers 3.7 and 52.378 both of which are correct to the given significant digits.

   (b) Explain the geometrical interpretation of the Newton-Raphson method.

   (c) Explain the difference between Lagrange's interpolation and Hermite's interpolation formulas.

   (d) Use Taylor's series method to solve the differential equation $\frac{dy}{dx} = -xy,\ y(0) = 1.$

   (e) Define Simpson's one-third rule and Simpson's three-eighth rule. $(5 \times 2 = 10)$

PART A

2. (a) Find the value of e^x using series expansion $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$ for $x = 0.5$ with an absolute error less than 0.005. (3)

   (b) Determine the number of terms required in the series for $\log(1 + x)$ to evaluate $\log(1.2)$ correct to six decimal places. (3)

   (c) Evaluate a real root of the equation $x - \cos(x) = 0$ using bisection method. (4)

3. (a) Find a root of the equation $x^3 + x^2 + x + 7 = 0$ correct to three decimal places by the secant method. (5)

   (b) Using Newton-Rapson method, find a root of the equation $e^x = x^3 + \cos(25x)$ correct to three decimal places which is near to 4.5. (5)

4. (a) Using Newton's divided difference formula, find the missing value from the table (5)

x :	1	2	4	5	6
y :	14	15	5	?	9

   (b) Find the Hermite's polynomial which fits the following data. (5)

x :	0	1	2
$f(x)$:	1	3	21
$f'(x)$:	0	3	36

PART B

5. (a) Apply the Householder's method to find the eigen values of the matrix (5)

$$\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$$

   (b) Solve the following equations: $27x + 6y - z = 85,\ x + y + 54z = 110,\ 6x + 15y + 2z = 72$ by Gauss-Seidel method. (5)

6. (a) Use Simpson's $1/3rd$ $\int_0^{0.6} e^{-x^2} dx$ by taking 7 ordinates. (5)

   (b) Evaluate $\int_0^1 \frac{1}{1+x} dx$ correct to three decimal places using Romberg's method. Hence find the value of $\log_e 2$. (5)

7. (a) Using Euler's method, find an approximate value of y corresponding to $x = 1$, given that $dy/dx = x + y$ and $y = 1$ when $x = 0$. (5)

   (b) Find the least square approximation of the second degree for the discrete data: (5)

x :	-2	-1	0	1	2
y :	15	1	1	3	19

x-x-x