Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Aerospace Engg.) (2012 Onwards)/B.Tech.(ANE) (Sem.–4)

NUMERICAL ANALYSIS

Subject Code : ANE-204

M.Code : 60512

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

(a) Find the absolute error if X = 0.00545828 is truncated to three decimal digits.

(b) What is the order of convergence in Newton-Raphson method?

(c) Find a double root of the equation $x^3 - 5x^2 + 8x - 4 = 0$ which is near 1.8.

(d) What is Lagrange's interpolation formula?

(e) Find y'(0) from the following table :

x :	0	1	2	3	4	5
y :	4	8	15	7	6	2

(f) Solve the equations $x + y = 2$ and $2x + 3y = 5$ using Gauss elimination method.

(g) What is the difference between direct and iterative method of solving simultaneous linear equations method?

(h) if $\frac{dy}{dx} = x + y, y(0) = 1, and\ y^{(1)} = 1 + x + x^2/2$ then what is the value of $y^{(2)}(x)$ using Picard's method?

(i) Write Milne's corrector formula.

(j) What is the standard 5-point formula to solve the Laplace equation $U_{xx} + U_{yy} = 0$?

SECTION-B

2. If $r = h(4h^5 - 5)$, find the percentage error in r at h = 1 if the error in h is 0.04.

3. Apply iteration method to find the negative root of the equation $x^3 - 2x + 5 = 0$ correct to four decimal places.

4. Find f(22) from the Gauss forward formula :

x :	20	25	30	35	40	45
$f(x)$:	354	332	291	260	231	204

5. Find the maximum and minimum value of y from the following table :

x :	-2	-1	0	1	2	3	4
y :	2	-0.25	0	-0.25	2	15.75	56

6. Apply factorization method to solve the equations :

$3x + 2y + 7z = 4$; $2x + 3y + z = 5$; $3x + 4y + z = 7$.

SECTION-C

Q7. Using Runge Kutta method of order 4, find y for $x = 0.1, 0.2, 0.3$ given that

$\frac{dy}{dx} = xy + y^2, y(0) = 1$. Continue the solution at x = 0.4 using Milne's method.

Q8. Find the largest eigen value and the corresponding eigen vector of the matrix, $\begin{pmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{pmatrix}$. Take $[1\ 0\ 0]^t$ as initial eigen vector.

Q9. Solve the Laplace equation $u_{xx} + u_{yy} = 0$ in the domain of the following figure by Jacobi's method.

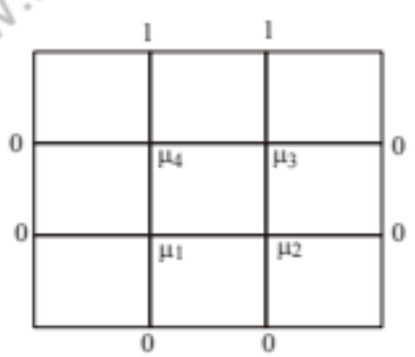

Fig.1

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.