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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.

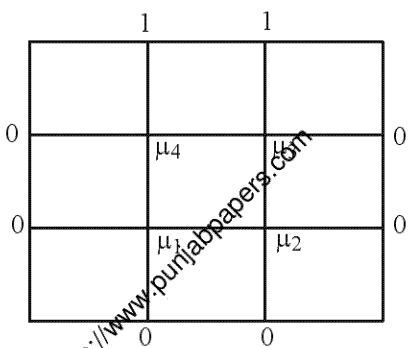


Fig.1

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.