

I B.TECH – EXAMINATIONS, JUNE - 2011
NUMERICAL METHODS
(AERONAUTICAL ENGINEERING)

Time: 3hours

Max.Marks:80

Answer any FIVE questions
All questions carry equal marks

- - -

- 1.a) Explain about Newton-Raphson Method.
 b) Find a double root of the equation $f(x) = x^3 - x^2 - x + 1 = 0$.
 c) Given that the equation $x^{2.2} = 69$ has a root between 5 and 8. Use the method of Regula Falsi. [16]

- 2.a) Using Newton's forward difference formula find the sum $S_n = 1^3 + 2^3 + 3^3 + \dots + n^3$.

- b) Using Gauss-Backward formula find the value of $\sqrt{12516}$ given that $\sqrt{12500} = 111.8033$; $\sqrt{12510} = 111.8482$; $\sqrt{12520} = 111.8928$; $\sqrt{12530} = 111.9375$. [8+8]

- 3.a) Fit the curve $y = ax^b$ to the data

x	1	2	3	4	5	6
y	1200	900	600	200	110	50

- b) Fit a second degree polynomial to the data [8+8]

x	0	1	2	3	4	5	6
y	14	18	23	29	36	40	46

4. Fit a normal cubic B-spline, 's', to the data -2, -1, 0, 1, 2. Show also that 's' is unique if s(t) is prescribed. [16]

- 5.a) A rod is rotating in a plane. The following table gives the angle θ through which the rod has turned for various values of the time 't' in seconds. Find the angular velocity of the rod when $\tau = 0.6$

x	0	0.2	0.4	0.6	0.8	1.0	1.2
y	0	0.122	0.493	1.123	2.022	3.200	4.666

- b) Compute the value of $\int_0^1 \frac{dx}{1+x^2}$ by using the Trapezoidal rule with $h = 0.125$. [8+8]

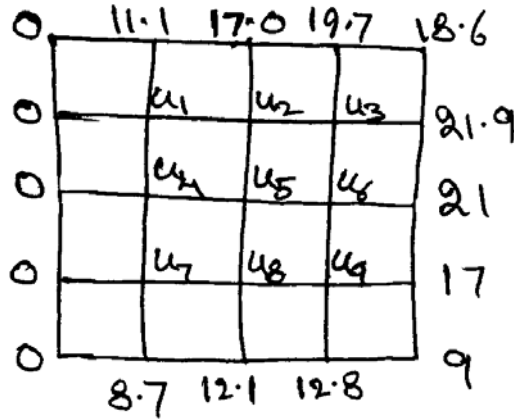
- 6.a) Find the rank of $\begin{bmatrix} 2 & -1 & 3 & 2 \\ 1 & 4 & -2 & 5 \\ 5 & 2 & 4 & 1 \\ 1 & -1 & 2 & -1 \end{bmatrix}$.

- b) Solve $x + 3y + 8z = 4$; $x + 4y + 3z = -2$; $x + 3y + 4z = 1$ by LU-decomposition method. [8+8]

7. Use Milne's Predictor-Corrector Method to find $y(0.3)$, given that

$$y' = \frac{1}{x+y}, \quad y(0) = 1, \quad h = 0.1. \quad [16]$$

8. Solve the Laplace equation $\nabla^2 u = 0$ at the interior points of the square given in figure [16]



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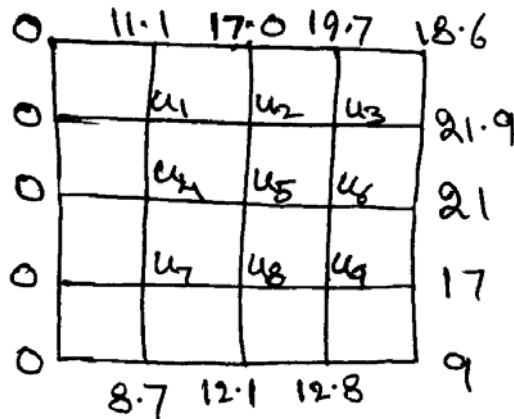
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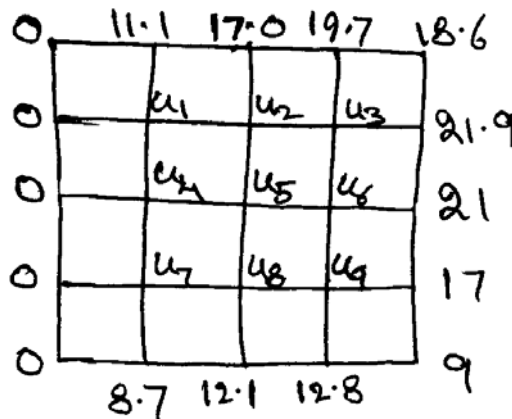
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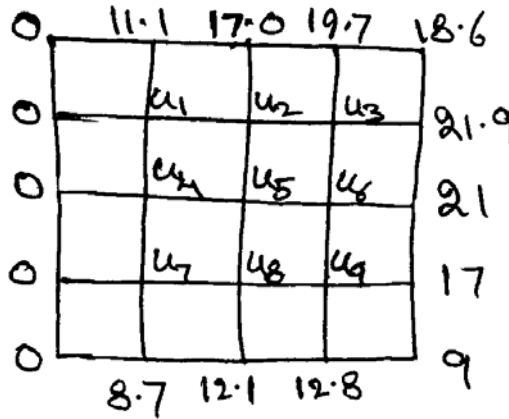
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