

Code No: 54018

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year II Semester Examinations, May - 2015

NUMERICAL METHODS

(Common to ME, MCT, MIE, MIM)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1.a) By using Regula Falsi method, find a positive root of the equation $\tan x + \tanh x = 0$.

b) Solve $x^3 - 9x + 1 = 0$ for the root by the method of interval halving. [8+7]

2.a) Solve the following system by the Gauss-Jordan method
 $2x + y + z = 10$; $3x + 2y + 3z = 18$; $x + 4y + 9z = 16$.

b) Solve the system of equations using Gauss-Seidel method
 $2x - y = 7$; $-x + 2y - z = 1$; $-y + 2z = 1$. [8+7]

3.a) The following values of x and y are given

x	1	2	3	4
y	1	2	5	11

Find the cubic splines and evaluate $y(1.5)$.

b) From the following table, for what values of x , y is minimum and find the minimum value of y .

x	3	4	5	6	7	8
y	0.205	0.240	0.259	0.262	0.250	0.224

4.a) Obtain a relation of the form $y = ab^x$ for the following data by the method of least squares [7+8]

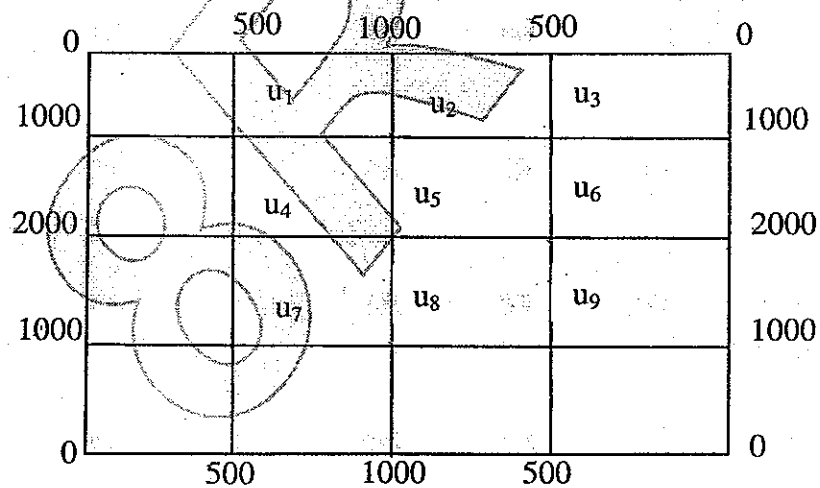
x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.4

b) Twenty five pairs of value of variates x and y led to the following results $N = 25$, $\sum x = 127$, $\sum y = 100$, $\sum x^2 = 760$, $\sum y^2 = 449$, $\sum xy = 500$. A subsequent scrutiny showed that two pairs of values were copied down as (8, 14) and (8, 6) instead of (8, 12) and (6, 8). Find correct value of correlation coefficient(r) and correct lines of regression. [7+8]

- 5.a) Compute $\int_0^4 e^x dx$ by Simpson's one-third rule with 10 subdivisions.
- b) The velocity v (km/min) of a moped which starts from rest, is given at fixed intervals of time t (min) as follows.

t	2	4	6	8	10	12	14	16	18	20
v	10	18	25	29	32	20	11	5	2	0

- Estimate approximately the distance covered in 20 minutes. [7+8]
6. Employ Taylor's method to obtain approximate value of $y(1.1)$ and $y(1.3)$. For the differential equation $y' = xy^{1/3}$, $y(1) = 1$. Compare the numerical solution obtained with exact solution. [15]
7. Find the largest Eigen value in modulus and the corresponding eigenvector of the matrix $\begin{bmatrix} -15 & 4 & 3 \\ 10 & -12 & 6 \\ 20 & -4 & 2 \end{bmatrix}$ using power method. [15]
8. Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as given below [15]



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