H.T.No.

Code No: MA1902   **GEC-R14**

M. Tech I Semester Regular/Suppl. Examinations, January 2017
COMPUTATIONAL METHODS IN ENGINEERING
(Common to Structural Engineering & Machine Drawing)

Time: 3 Hours   **Max. Marks: 60**

Note: Answer any **FIVE** questions. All Questions carry equal Marks.

5 × 12 = 60M

1. Solve the following system of equations by Relaxation method:

   3x+9y-2z=11;

   4x+2y+13z=24;

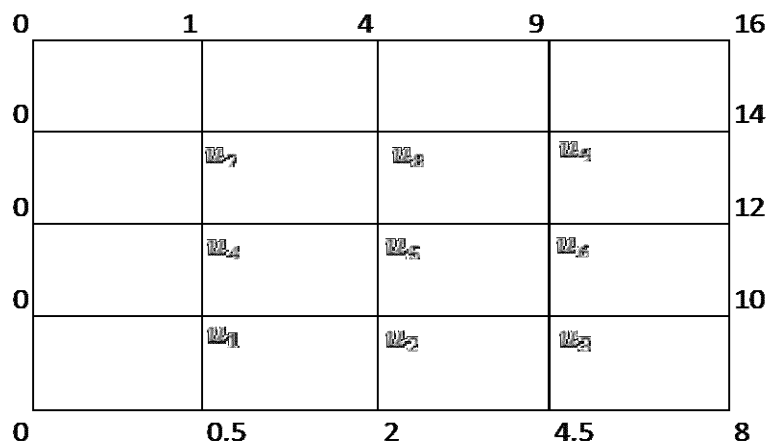   4x-4y+3z= -8 (12M)

2. Solve the following systems by Newton-Raphson method.

   $x^2 + y^2 = 1, y = x^3$

3. Solve the boundary value problems $y^{11} - 64y + 10 = 0, y(0) = y(1) = 0$ by shooting method.

4. Solve the Laplace's equation $\nabla^2 u = 0$ in the domain of the following figure.

5. Solve the partial differential equation

   $$\frac{\partial u}{\partial t} = \frac{\partial^2 4}{\partial x^2}$$

   Subject to the conditions u(x,0)=$sin\pi x, 0 \le x \le 1; u(0,t) = u(1,t) = 0$, using Crank-Nicholson method.

6. Calculate the coefficient of correlation between the marks obtained by a batch of 100 students in Accountancy and statistics as given below:

Marks in	Marks in Accountancy					
Statistics	20-30	30-40	40-50	50-60	60-70	Total
15-25	5	9	3	-	-	17
25-35	-	10	25	2	-	37
35-45	-	1	12	2	-	15
45-55	-	-	4	16	5	25
55-65	-	-	-	4	2	6
Total	5	20	44	24	7	100

7. Use penality (Big-M) method to solve the following LP problem:

Min z= $3x_1 - x_2$

Subject to $\quad 2x_1 + x_2 \geq 2$

$\quad x_1 + 3x_2 \leq 3$

$\quad x_2 \geq 4$

and $\quad x_1 + x_2 \geq 0$

8. Use Branch-and-Bound technique to solve the following problem.

Max z= $7x_1 + 9x_2$

Subject to

$\quad -x_1 + 3x_2 \leq 6$

$\quad 7x_1 + x_2 \leq 35$

and $\quad 0 \leq x_2, x_2 \geq 7$

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