` **Subject Code: R10107/R10** | Set No - 1 |

I B.Tech I Semester Supplementary Examinations Nov./Dec. - 2015
MATHEMATICAL METHODS
(Common to CSE, EEE, CE, EIE, AE, BT & MM)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
✱ ✱ ✱ ✱ ✱

1. (a) Solve the system of equations x+3y+2z =0 , 2x-y+z =0 , 3x-5y+4z =0 , x+17y+4z = 0

   (b) Find the Rank of the matrix $\begin{bmatrix} 0 & 1 & 2 & 2 \\ 1 & 1 & 2 & 3 \\ 2 & 2 & 2 & 3 \\ 2 & 3 & 3 & 3 \end{bmatrix}$ using Normal form.

                                                                       [8+7]

2. (a) Find the Eigen values and Eigen vectors of the Matrix $\begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$

   (b) Verify Cayley- Hamilton Theorem for the matrix $\begin{bmatrix} 1 & -2 & 2 \\ 1 & -2 & 3 \\ 0 & -1 & 2 \end{bmatrix}$ Hence find A^4 and A^{-1}

                                                                       [7+8]

3.   Find the Rank, signature and index of the quadratic form
       $2x^2 + y^2 - 3z^2 + 12xy - 4xz - 8yz$ by reducing into canonical form

                                                                       [15]

4. (a) Solve the equation x-cosx = 0 using Bisection Method
   (b) Solve the equation x^3-8x- 4 = 0 using Iteration Method

                                                                       [8+7]

5. (a) Find y(1.6) from the following table

x	1	1.4	1.8	2.2
y	3.49	4.82	5.96	6.5

   (b) Find y(10) if y(5) = 12,y(6)=13,y(9)=14,y(11)=16

                                                                       [7+8]

6. (a) Compute the first derivative for the following data at x = -3 and x =0

X	-3	-2	-1	0	1	2	3
Y	-33	-12	-3	0	3	12	33

   (b) Evaluate $\int_4^{5.2} \log x\,dx$ using (i) Trapezoidal rule (ii) Simpson 1/3 rule

                                                                       [7+8]

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7. (a) Evaluate y(0.1), y(0.2) by Taylor's Series method given that $y^1 = x + y^2$, y(0)=1

   (b) Evaluate y(0.25), y(0.5) by RK method given that $y^1 = x^2 + y^2$, y(0)=1

   [7+8]

8. (a) Derive Normal Equations to fit the straight line y = ax + b

   (b) Fit the curve $y = a + bx + cx^2$ for the following data

X	1	2	3	4	5	6
Y	2.98	4.26	5.21	6.10	6.80	7.50

   [7+8]

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