I B. Tech II Semester Supplementary Examinations, Dec - 2016
MATHEMATICAL METHODS
(Common to ECE, IT, ME, CHEM, BME, EComE, PCE, PT & MM)

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

Answer any **FIVE** Questions
All Questions carry equal marks
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1. a) Determine whether the following equations will have a non-trivial solution. If so, solve them.
    4x+2y+z+3w=0, 6x+2y+4z+7w=0, 2x+y+w=0

    b) Find the rank of the matrix using Echelon form $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & 2 & 0 \end{bmatrix}$

    [8+7]

2. a) Prove that the Eigen values of diagonal matrix are just diagonal elements.

    b) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$, hence compute A^4 and A^{-1}

    [7+8]

3. Reduce the quadratic form $6x^2+3y^2+3z^2-4xy+4xz-2yz$ into a sum of squares by orthogonal transformation   [15]

4. a) Find the root of the equation $x = 1+\tan^{-1}(x)$ by iteration method.
    b) Find the root of the equation $x^4 = x+10$ by bisection method.   [7+8]

5. a) Find the interpolating polynomial f(x) from the table

x	0	1	4	5
y=f(x)	4	3	24	39

    b) Find the number of students whose weight is between 60 and 70 from the following data

Weight	0-40	40-60	60-80	80-100	100-120
No. of students	250	120	100	70	50

    [7+8]

6. Evaluate $\int_0^4 e^x dx$ using (i) Trapezoidal rule (ii) Simpson's $1/3^{rd}$ rule (iii) Simpson's $3/8^{th}$ rule

    [15]

7. a) By modified Euler's formula find y(0.2),y(0.4) given that $\frac{dy}{dx} = 2xy^2, y(0) = 1$

    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) Fit a second degree curve $y = a+bx+cx^2$ to the following data

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

    b) Derive normal equations for $y = ax^b$ [8+7]