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SECOND SEMESTER

MID SEMESTER EXAMINATION

Roll No.:

B.Tech (Common for all)

March 2016

MA – 102 MATHEMATICS –II

Time : 90 minutes

Max. Marks: 25

Note : Attempt **ALL** questions. Assume missing data if any.

1. (a) Show that the eigen values of a triangular matrix are just the diagonal elements of the matrix. (2)

   (b) Find all eigen values and the corresponding eigen vectors of the matrix

$$A=\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$ (3)

2. Use elementary transformation method to find the values of a and b for which the system of linear equations (5)

$$3x-2y+z=b;\quad 5x-8y+9z=3;\quad 2x+y+az=-1$$

   (i) has a unique solution (ii) has no solution (iii) has infinitely many solutions.

3. (a) Solve $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=e^x$. (2.5)

   (b) Solve $\frac{d^2y}{dx^2}+y=\operatorname{cosec} x$ (2.5)

4. Solve $\frac{d^2y}{dx^2}-y=\frac{2}{1+e^x}$ by the method of variation of parameters. (5)

5. Obtain the series solution about $x=0$ of the differential equation (5)

$$2x(1-x)\frac{d^2y}{dx^2}+(1-x)\frac{dy}{dx}+3y=0.$$