R09

Code: 9ABS301

B.Tech II Year I Semester (R09) Supplementary Examinations December 2015

MATHEMATICS - II

(Common to AE, BT, CE & ME)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 5 \\ -1 & -2 & 6 & -7 \end{bmatrix}$ by reducing it to Echelon form.

(b) Find the inverse of the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ using Cayley-Hamilton theorem.

2 (a) Prove that Eigen values of a real symmetric matrix are always real.

(b) Express the matrix A as the sum of symmetric and a skew symmetric matrices, where $A = \begin{bmatrix} 4 & 2 & -3 \\ 1 & 3 & -6 \\ -5 & 0 & -7 \end{bmatrix}$.

3 (a) Find the nature, index and signature of the quadratic form $2x_1x_2 + 2x_1x_3 + 2x_2x_3$.

(b) Write the quadratic form corresponding to matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 0 & 3 \\ 3 & 3 & 1 \end{bmatrix}$.

4 (a) Find f(x) if its Fourier sine transform is $\frac{s}{1+s^2}$.

(b) Find f(x) if its Fourier cosine transform is $\frac{s}{1+s^2}$.

5 Solve the boundary value problem $u_{tt} = a^2 u_{xx}$; $0 < x < l$; $t > 0$ with $u(0, t) = 0$; $u(l, t) = 0$; and $u(x, 0) = 0$, $u_t(x, 0) = \sin^3\left(\frac{\pi x}{l}\right)$.

6 (a) Find a real root of the equation $x^3 - 6x - 4 = 0$ by bisection method.

(b) If $f(x) = e^{ax}$, show that $\Delta^n f(x) = (e^{ah} - 1)^n e^{ax}$.

7 (a) Fit a polynomial of second degree to the following data points given in the following table:

x	0	1.0	2.0
y	1.0	6.0	17.0

(b) Evaluate $\int_0^1 \frac{1}{1+x}dx$ by Trapezoidal and Simpson's $\frac{3}{8}$ rule.

8 Find y(0.1) and y(0.2) using Euler's modified formula given that $\frac{dy}{dx} = x^2 - y$, $y(0) = 1$.

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