Code: 9ABS301

R09

B.Tech II Year I Semester (R09) Supplementary Examinations June 2016

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 Eigen values and the corresponding Eigen vectors of the matrix $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$.

(b) If λ is a Eigen value of a non singular matrix A, show that $\frac{|A|}{\lambda}$ is an Eigen value of the matrix adj A.

2 Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2xy + 2xz - 2yz$ to canonical form by orthogonal transformation.

3 (a) Show that for $-\pi < x < \pi$,

$$\sin ax = \frac{2\sin a\pi}{\pi}\left[\frac{\sin x}{1^2 - a^2} - \frac{2\sin 2x}{2^2 - a^2} + \frac{3\sin 3x}{3^2 - a^2} - - - -\right]$$

(b) Obtain The Fourier series for the function $f(x) = \frac{1}{2}(\pi - x)\, in\,(0, 2\pi)$.

4 (a) Find the finite sine transform of cos ax, $0<x<\pi$.

(b) Find f(x), if its transform is $F_s(s) = F_s\{f(x)\} = \frac{1-\cos s\pi}{s^2\pi^2}$, $0<x<\pi$, s=1,2,3,………

5 Find the temperature in a thin metal rod of length L, with both ends insulated and with initial temperature $\sin\left(\frac{\pi x}{L}\right)$.

6 (a) Find a real root of the equation $x^3 - 5x + 3 = 0$ using bisection method.

(b) If $f(x) = u(x)\, v(x)$ show that $f[x_0, x_1] = u[x_0] \cdot v[x_0, x_1] + u[x_0, x_1]v[x_1]$.

7 (a) Fit a least square parabola of the form $ax^2 + bx + c$ to the following data:

x	0	1	2	3	4	5	6
y	3	3	5	9	15	23	33

(b) Find $\frac{dy}{dx}$ at $x = 7.5$ from the following table:

x	7.47	7.48	7.49	7.5	7.51	7.52	7.53
y	0.193	0.195	0.198	0.201	0.203	0.206	0.208

8 Find the solution of $\frac{dy}{dx} = x - y$, $y(0) = 1$ at x = 0.1, 0.2, 0.3, 0.4 and 0.5 using modified Euler's method.

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