Code: 9ABS301

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

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 $\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 0 \\ 3 & 1 & 2 \end{bmatrix}$ by reducing it to normal form.

(b) Determine the rank of the matrix A = $\begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ by reducing it to normal form.

2 (a) Reduce the quadratic form $17x_1^2 - 30x_1x_2 + 17x_2^2$ to canonical form.

(b) Determine the nature, index and signature of the quadratic form:
$x_1^2 + 2x_2^2 + 3x_3^2 + 2x_2x_3 - 2x_3x_1 + 2x_1x_2$.

3 (a) Expand f(x) = x as a half – range cosine series in (0, 2).

(b) Find a Fourier sine series of $f(x) = k \ in \ (0, \pi)$.

4 (a) Find the finite Fourier sine and cosine transforms of $f(x) = 1 \ in \ (0, c)$.

(b) Find the finite Fourier sine transform of $f(x) = x^2 \ in (0, \pi)$.

5 (a) Form the partial differential equation of $z = ax + by + a^2 + b^2$ by eliminating arbitrary constants.

(b) Solve $2xz_x - 3yz_y = 0$ by the method of separation of variables.

6 Using Newton-Raphson method:
(i) Find square root of a number. (ii) Find reciprocal of a number.

7 (a) Find a weighted least square parabola for the following data by choosing the weights 1, 4, 2, 4 and 1 respectively:

x	0	2	3	4	5
y	-1	1	7	17	31

(b) The population of a certain town is shown in the following table:

Year	1931	1941	1951	1961	1971
Population y(x)	40.62	60.80	79.95	103.56	132.65

Find the growth rate of the population in the year 1931.

8 Solve $\frac{dy}{dx} = x^2 + y$ with y (0) = 2 by both Picard method and Taylor series method up to third degree terms. Compute y (0.2).

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