

Code :9ABS301

R9

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
MATHEMATICS-II

(Aeronautical Engineering, Biotechnology, Civil Engineering, Mechanical Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- (a) Find whether the following equations are consistent, if so solve them.
 $X + Y + 2Z = 4 : 2X - Y + 3Z = 9 : 3X - Y - Z = 2$

(b) Show that the matrix statistics its characteristic equation. Hence find A^{-1} .

$$\begin{bmatrix} 1 & -2 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & 2 \end{bmatrix}$$
- Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to canonical form by an orthogonal transformation and hence find its rank, index, signature and nature.
- (a) Find the Fourier series for $f(x) = e^{-x}$ in $0 < x < 2\pi$

(b) Find the half-range sine series for the function $f(x) = x - x^2, 0 < x < 1$.
- (a) Show that the Fourier transforms of $e^{-\frac{x^2}{2}}$ is $\sqrt{2\pi}e^{-\frac{s^2}{2}}$.

(b) Find the Fourier sine and cosine transform of $f(x) = 2e^{-5x} + 5e^{-2x}$.
- (a) Form the partial differential equation by eliminating the arbitrary function from $f(xy + z^2, x + y + z) = 0$.

(b) Find the three possible solutions of the wave equation $\frac{\partial^2 y}{\partial t^2} = \frac{a^2 \partial^2 y}{\partial x^2}$ by the method of separation of variables.
- (a) Find a real root of the equation $xe^x - \cos x = 0$ using Newton's -Raphson method.

(b) Using Newton's forward interpolation formula, and the given table of values find $f(1.4)$.

X:1.1	1.3	1.5	1.7	1.9
F(x):0.21	0.69	1.25	1.89	2.61
- (a) Fit a straight line to the following data.

X	0	5	10	15	20	25
Y	12	15	17	22	24	30

(b) Given the following table of values of x and y

X:1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y:7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$
- Use Runge-Kutta method to evaluate $y(0.1)$ and $y(0.2)$ given that $\frac{dy}{dx} = x + y, y(0) = 1$.
