Code No: R7100204 **R7**

B.Tech I Year(R07) Supplementary Examinations, May 2010
MATHEMATICAL METHODS
(Common to Electrical & Electronic Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Computer Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Express the following system in matrix form and solve by Gauss elimination method.
   $2x_1 + x_2 + 2x_3 + x_4 = 6$; $6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$,
   $4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$; $2x_1 + 2x_2 - x_3 + x_4 = 10$.
   (b) Show that the system of equations $3x + 3y + 2z = 1$; $x + 2y = 4$; $10y + 3z = -2$; $2x - 3y - z = 5$ is consistent and hence solve it. [8+8]

2. (a) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$
   (b) If $A = \begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$, find A^{256}. [8+8]

3. Reduce to diagonal form the following symmetric matrix by congruent transformation and interpret the result in terms of quadratic form $a = \begin{pmatrix} 3 & 2 & -1 \\ 2 & 2 & 3 \\ -1 & 3 & 1 \end{pmatrix}$ [16]

4. (a) Solve the following by iteration method: $x^3 + 2x^2 + 10x - 20 = 0$
   (b) Find an iterative formula to find the reciprocal of a given number N and hence find the value of $\frac{1}{19}$. [8+8]

5. (a) When a train is moving at 30m/sec, steam is shut off and brakes are applied. The speed of the train per second after t seconds is given by

Time(t):	0	5	10	15	20	25	30	35	40
Speed(v):	30	24	19.5	16	13.6	11.7	10	8.5	7.0

   Using simpon's rule, determine the distance moved by the train in 40 seconds.
   (b) By the method of least squares find the best fitting straight line to the data given below:

x:	5	10	15	20	25
y:	15	19	23	26	30

   [8+8]

6. (a) Solve $y'' - x(y')^2 + y^2 = 0$ using R.K. method for x=0.2 given y(0)=1, y'(0)=0 taking h=0.2.
   (b) Solve the equation $\frac{d^2y}{dx^2} + y = 0$ with the conditions y(0)=1and y'(0)=1. Find y(0.2) and y(0.4) using Taylor's series method. [8+8]

7. (a) If 'a' is not an integer, find the Fourier Series expansion of period 2π for the function f(x)= sinax in $-\pi < x < \pi$
   (b) Find the half-range Sine series for $f(t) = t - t^2$; $0 < t < 1$. [8+8]

8. (a) Form the partial differential equations by eliminating the arbitrary constants
      i. $x^2 + y^2 + (z-c)^2 = a^2$
      ii. $z=(x^2+a)(y^2+b)$
   (b) Find the Z-transform of the sequences $\{x(n)\}$ where x(n) is
      i. $\left(\frac{1}{3}\right)^n u(n)$
      ii. $(3)^n \, Cos\frac{n\pi}{2}$. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆