Code No: R07A1BS09 **R07**

I B.Tech Examinations,May/June 2012
NUMERICAL METHODS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Using Gauss-Jordan method, solve
4x+y+3z=11
3x+4y+2z=11
2x+3y+z=7.

   (b) Solve the system by LU decomposition method.
3x+4y+5z = 18
2x-y+8z = 13
5x-2y+7z = 20. [8+8]

2. (a) Find the value of $\int_0^2 \frac{dx}{1+x^3}$ dividing into 4 equal parts by trapezoidal and Simpson's rule.

   (b) A body is in the form of solid revolution. The diameter D in cms of its sections at distance x cm from one end are given below. Estimate the volume of the solid.

X:	0	2.5	5.0	7.5	10.0	12.5	15.0
D:	5	5.5	6.0	6.75	6.25	5.5	4.0

[8+8]

3. (a) If y=(3x+1)(3x+4)....(3x+22), prove that Δ^4 y =136080(3x+13)(3x+16)(3x+19)(3x +22).

   (b) Prove that:
   i. $\nabla = 1 - (1 - \nabla)^{-1}$.
   ii. $(1 + \Delta)(1 - \nabla) = 1$. [8+4+4]

4. (a) Fit a parabola y=ax^2+bx+c to the data:

x	10	20	30	40	50	60
y	157	179	210	252	302	361

   (b) Fit a straight line for the following data:

x	12	15	21	25
y	50	70	100	120

[8+8]

5. (a) Explain the rate of convergence of Newton-Raphson method.

   (b) Solve sin$x$=1+x^3 using Newton-Rapson method. [8+8]

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6. (a) Solve: $\nabla^2 u = 0$ in the square region bounded by x = 0, x = 4, y = 0, y = 4 and with boundary conditions u (0, y) = 0, u (4, y) = 8 + $2y^2$ u (x, 0) = $(x^2/2)$, u (x, 4) = 2x+3 by taking h = k = 0.5.

   (b) Derive standard five point formula to solve Laplace equation by stating the assumptions made. [8+8]

7. (a) Show that the Fourier transform of f(x)= $a^2 - x^2$, $|x| < a$; =0 elsewhere is $2\sqrt{\frac{2}{\pi}}(\frac{\sin as - as\cos as}{s^3})$ Hence deduce that $\int_0^\infty \frac{\sin t - t\cos t}{t^3} dt = \frac{\pi}{4}$.

   (b) Using Parseval's identity show that $\int_0^\infty (\frac{\sin t - t\cos t}{t^3})^2 dt = \frac{\pi}{15}$. [8+8]

8. (a) Solve $\frac{dy}{dx} = y - \frac{2x}{y}$ y(0) = 1, y(0.1) = 1.0954, y(0.2) = 1.1832, y (0.3) = 1.2649, find y (0.4) by Adam's method.

   (b) Given that $y'' + xy'^2 + y^2 = 0$. Find y (0.1), y (0.2) by Taylor's series method. [8+8]

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