Code No: R07A1BS09 **R07** **Set No. 2**

I B.Tech Examinations,December 2010
NUMERICAL METHODS
Aeronautical Engineering

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

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

1. (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 + y^2, u (x, 0) = x^2, u (x, 4) = 5x-3 by taking h = k = 1. solve by Jacobi's method.
   (b) Solve the equation $u_{xx}+u_{yy}= 0$ in the domain of following Figure 1b by Gauss-seidel's method. [8+8]

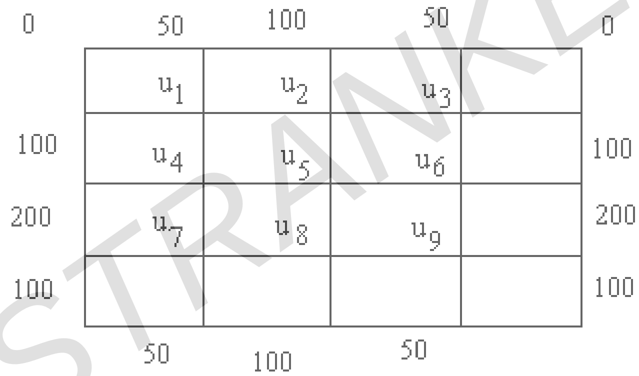

Figure 1b

2. (a) Given sin 45^0=0.7071, sin50^0=0.7660, sin55^0 =0.8192 and sin60^0=0.8660.Find sin52^0 using Newton's interpolation formula. Estimate the error.
   (b) Find the second difference of the polynomial $x^4 - 12x^3 + 42x^2$-30x+9 with interval of differencing h=2. [12+4]

3. Show that on $[t_i, t_{i+1}]$ we have $B_i^k(x) = \frac{(x-t_i)^k}{(t_{i+1}-t_i)(t_{i+2}-t_i)...(t_{i+k}-t_i)}$ [16]

4. (a) Solve the system $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 1 & 1 & 0 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 13 \\ 5 \end{bmatrix}$ by LU decomposition method.
   (b) Solve the system.
   2x-3y+z=-1
   x+4y+5z=25
   3x-4y+z=2
   if it is consistent. [8+8]

5. (a) Fit a parabola to the data:

x	0.5	1	2	4	8	12
y	160	120	94	75	62	56

(b) Fit a straight line to the data below:

x	19	25	30	36	40	45	50
y	76	77	79	80	82	83	85

[8+8]

6. (a) Using Euler's method find y (0.2) given dy/dx = log(x + y) and y (0) = 1, h = 0.2.

   (b) Solve by Taylor series method dy/dx = y + x^3 for x = 1.1, 1.2 given y (1) = 1. [8+8]

7. (a) By dividing the range in to five equal parts, evaluate $\int_0^\pi \sin x dx$ by Trapezoidal rule and Simpson's rule.

   (b) Evaluate $\int_1^6 \frac{dx}{1-x^2}$ by trapezoidal rule and Simpson's 1/3rd rule. [8+8]

8. Find the root of the equation $x^3 + x^2$-100=0 correct to three decimal places by

   (a) Bisection method

   (b) Method of false position. [8+8]

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Code No: R07A1BS09 **R07** **Set No. 4**

I B.Tech Examinations,December 2010
NUMERICAL METHODS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆⋆⋆⋆⋆

1. Find the root of the equation $x^3 + x^2$-100=0 correct to three decimal places by
   (a) Bisection method
   (b) Method of false position. [8+8]

2. (a) Solve the system $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 1 & 1 & 0 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 13 \\ 5 \end{bmatrix}$ by LU decomposition method.
   (b) Solve the system.
   2x-3y+z=-1
   x+4y+5z=25
   3x-4y+z=2
   if it is consistent. [8+8]

3. (a) By dividing the range in to five equal parts, evaluate $\int_0^{\pi} \sin x dx$ by Trapezoidal rule and Simpson's rule.
   (b) Evaluate $\int_1^6 \frac{dx}{1-x^2}$ by trapezoidal rule and Simpson's $1/3^{rd}$ rule. [8+8]

4. (a) Fit a parabola to the data:

x	0.5	1	2	4	8	12
y	160	120	94	75	62	56

   (b) Fit a straight line to the data below:

x	19	25	30	36	40	45	50
y	76	77	79	80	82	83	85

[8+8]

5. (a) Using Euler's method find y (0.2) given dy/dx = log(x + y) and y (0) = 1, h = 0.2.
   (b) Solve by Taylor series method dy/dx = y + x^3 for x = 1.1, 1.2 given y (1) = 1. [8+8]

6. (a) Given sin 45^0=0.7071, sin50^0=0.7660, sin55^0 =0.8192 and sin60^0=0.8660.Find sin52^0 using Newton's interpolation formula. Estimate the error.
   (b) Find the second difference of the polynomial $x^4 - 12x^3 + 42x^2$-30x+9 with interval of differencing h=2. [12+4]

7. Show that on $[t_i, t_{i+1}]$ we have $B_i^k(x) = \frac{(x-t_i)^k}{(t_{i+1}-t_i)(t_{i+2}-t_i)\ldots(t_{i+k}-t_i)}$ [16]

8. (a) Solve: ∇^2u = 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 + y^2, u (x, 0) = x^2, u (x, 4) = 5x-3 by taking h = k = 1. solve by Jacobi's method.

   (b) Solve the equation $u_{xx}+u_{yy}= 0$ in the domain of following Figure 1b by Gauss-seidel's method. [8+8]

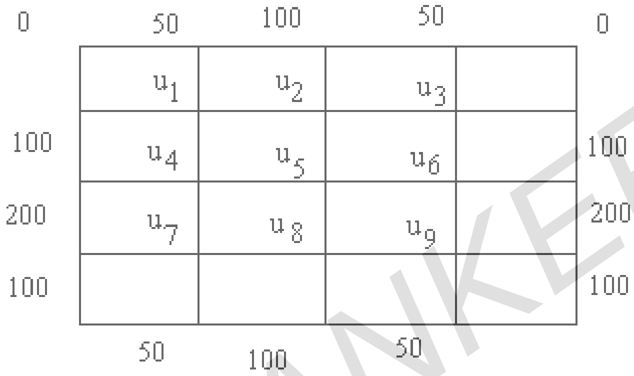

Figure 1b

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Code No: R07A1BS09 **R07** **Set No. 1**

I B.Tech Examinations,December 2010
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) Solve the system $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 13 \\ 5 \end{bmatrix}$ by LU decomposition method.

   (b) Solve the system.
   2x-3y+z=-1
   x+4y+5z=25
   3x-4y+z=2
   if it is consistent. [8+8]

2. (a) By dividing the range in to five equal parts, evaluate $\int_0^\pi \sin x dx$ by Trapezoidal rule and Simpson's rule.

   (b) Evaluate $\int_1^6 \frac{dx}{1-x^2}$ by trapezoidal rule and Simpson's 1/3rd rule. [8+8]

3. (a) Given sin 45^0=0.7071, sin50^0=0.7660, sin55^0 =0.8192 and sin60^0=0.8660.Find sin52^0 using Newton's interpolation formula. Estimate the error.

   (b) Find the second difference of the polynomial $x^4 - 12x^3 + 42x^2$-30x+9 with interval of differencing h=2. [12+4]

4. Show that on $[t_i, t_{i+1}]$ we have $B_i^k(x) = \frac{(x-t_i)^k}{(t_{i+1}-t_i)(t_{i+2}-t_i)...(t_{i+k}-t_i)}$ [16]

5. Find the root of the equation $x^3 + x^2$-100=0 correct to three decimal places by

   (a) Bisection method

   (b) Method of false position. [8+8]

6. (a) Solve: ∇^2u = 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 + y^2, u (x, 0) = x^2, u (x, 4) = 5x-3 by taking h = k = 1. solve by Jacobi's method.

   (b) Solve the equation $u_{xx}+u_{yy}$= 0 in the domain of following Figure 1b by Gauss-seidel's method. [8+8]

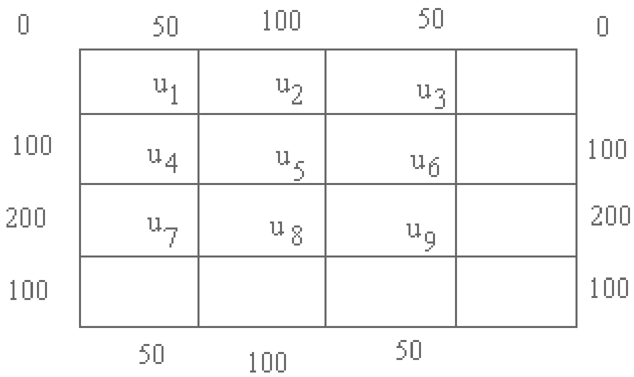

Figure 1b

7. (a) Fit a parabola to the data:

x	0.5	1	2	4	8	12
y	160	120	94	75	62	56

(b) Fit a straight line to the data below:

x	19	25	30	36	40	45	50
y	76	77	79	80	82	83	85

[8+8]

8. (a) Using Euler's method find y (0.2) given dy/dx = log(x + y) and y (0) = 1, h = 0.2.

(b) Solve by Taylor series method dy/dx = y + x^3 for x = 1.1, 1.2 given y (1) = 1. [8+8]

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Code No: R07A1BS09 **R07** **Set No. 3**

I B.Tech Examinations,December 2010
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) 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 + y^2, u (x, 0) = x^2, u (x, 4) = 5x-3 by taking h = k = 1. solve by Jacobi's method.

   (b) Solve the equation $u_{xx}+u_{yy}= 0$ in the domain of following Figure 1b by Gauss-seidel's method. [8+8]

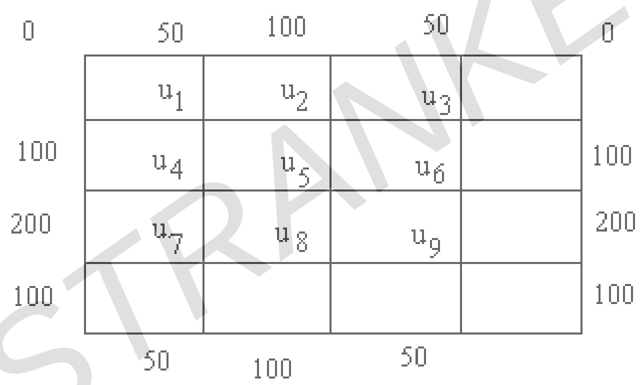

Figure 1b

2. (a) Fit a parabola to the data:

x	0.5	1	2	4	8	12
y	160	120	94	75	62	56

   (b) Fit a straight line to the data below:

x	19	25	30	36	40	45	50
y	76	77	79	80	82	83	85

[8+8]

3. (a) Solve the system $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 13 \\ 5 \end{bmatrix}$ by LU decomposition method.

   (b) Solve the system.
   2x-3y+z=-1
   x+4y+5z=25
   3x-4y+z=2
   if it is consistent. [8+8]

4. (a) Using Euler's method find y (0.2) given dy/dx = log(x + y) and y (0) = 1, h = 0.2.

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5. (a) By dividing the range in to five equal parts, evaluate $\int_0^{\pi} \sin x dx$ by Trapezoidal rule and Simpson's rule.

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   (b) Method of false position. [8+8]

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