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

I B.Tech Examinations,June 2011
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) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using
   i. Simpson's $\frac{3}{8}$ rule
   ii. Weddle's rule

   (b) Fit the Cubic spline for

x	0	1	3
y	1	0	2

   Hence find f(0.75) and f(1.75). $\int_0^3 f(x)dx$ [8+8]

2. (a) Solve the Laplace's equation in the region as shown in Figure 7a; by Liebmann's principle.

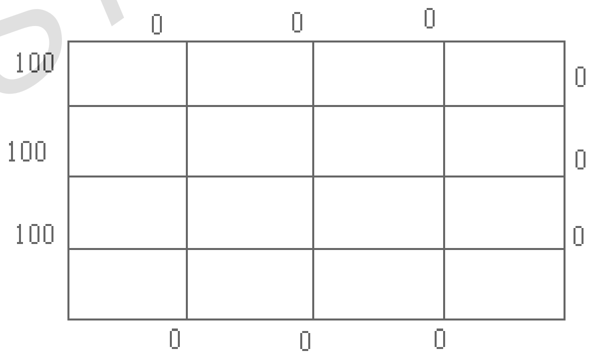

Figure 7a

   (b) Derive the Two dimentional Heat flow equation in steady state(Laplace'seqution) [8+8]

3. Find the root of the equation sin$x$=1+x^3 between (-2,-1) using
   (a) Regular falsi method.
   (b) Newton's method. [8+8]

4. (a) Using Gauss-Jordan method solve
   $10x - 2y + 3z = 23, 2x + 10y - 5z = -33, 3x - 4y + 10z = 41$

   (b) Solve the system of equations by Gauss elimination method
   $4x + 2y + z = 14, x + 5y - z = 10, x + y + 8z = 20$ [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) Determine the maximum step size that can be used in the tabulation of f(x)=e^x in [0,1], so that the error in linear interpolation be less than 5x10^{-4}.

   (b) Evaluate $\Delta^{10}(1 - ax)(1 - bx^2)(1 - cx^3)(1 - dx^4)$. [12+4]

7. (a) Fit a curve y=a+bx+cx^2 to the data:

x	0	1	2	3	4
y	1	0	3	10	21

   (b) Find the curve of best fit for the data below:

x	120	110	100	90	80	70	60
y	0.0051	0.0059	0.0071	0.0085	0.00102	0.00124	0.00148

[8+8]

8. (a) If the scalar product is given by $< g, h >= \int_a^b g(x)h(x)w(x)dx$ then prove that P_k(x) has k simple real zeros, all of which lie in the interval (a,b).

   (b) Use FFT to calculate approximately the Fourier coefficients $\hat{f}(j)$ for

      i. f(x)=sin3x

      ii. f(x)=sin(πx) using, e.g., N=81 or 324 or whatever.Why do the Fourier coefficients for f(x)=sin(πx) fail to decay rapidly as $|j|$ increases? [8+8]

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

I B.Tech Examinations,June 2011
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 sin$x$=1+x^3 between (-2,-1) using
   (a) Regular falsi method.
   (b) Newton's method. [8+8]

2. (a) Using Gauss-Jordan method solve
   $10x - 2y + 3z = 23, 2x + 10y - 5z = -33, 3x - 4y + 10z = 41$
   (b) Solve the system of equations by Gauss elimination method
   $4x + 2y + z = 14, x + 5y - z = 10, x + y + 8z = 20$ [8+8]

3. (a) Solve the Laplace's equation in the region as shown in Figure 7a; by Liebmann's principle.

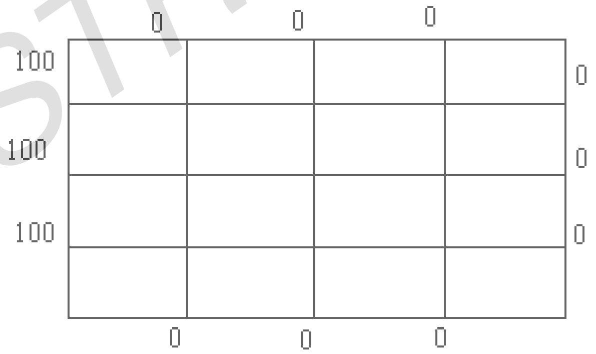

Figure 7a

   (b) Derive the Two dimentional Heat flow equation in steady state(Laplace'seqution) [8+8]

4. (a) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using
      i. Simpson's $\frac{3}{8}$ rule
      ii. Weddle's rule
   (b) Fit the Cubic spline for

x	0	1	3
y	1	0	2

   Hence find f(0.75) and f(1.75). $\int_0^3 f(x)dx$ [8+8]

5. (a) Fit a curve y=a+bx+cx^2 to the data:

x	0	1	2	3	4
y	1	0	3	10	21

(b) Find the curve of best fit for the data below:

x	120	110	100	90	80	70	60
y	0.0051	0.0059	0.0071	0.0085	0.00102	0.00124	0.00148

[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) If the scalar product is given by $< g, h >= \int_a^b g(x)h(x)w(x)dx$ then prove that P_k(x) has k simple real zeros, all of which lie in the interval (a,b).

(b) Use FFT to calculate approximately the Fourier coefficients $\hat{f}(j)$ for

i. f(x)=sin3x

ii. f(x)=sin(πx) using, e.g., N=81 or 324 or whatever.Why do the Fourier coefficients for f(x)=sin(πx) fail to decay rapidly as $|j|$ increases? [8+8]

8. (a) Determine the maximum step size that can be used in the tabulation of f(x)=e^x in [0,1], so that the error in linear interpolation be less than 5x10^{-4}.

(b) Evaluate $\Delta^{10}(1 - \text{ax})(1 - \text{bx}^2)(1 - \text{cx}^3)(1 - \text{dx}^4)$. [12+4]

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

I B.Tech Examinations,June 2011
NUMERICAL METHODS
Aeronautical Engineering

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

Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using
   i. Simpson's $\frac{3}{8}$ rule
   ii. Weddle's rule

   (b) Fit the Cubic spline for

x	0	1	3
y	1	0	2

Hence find f(0.75) and f(1.75). $\int_0^3 f(x)dx$ [8+8]

2. (a) If the scalar product is given by $< g, h >= \int_a^b g(x)h(x)w(x)dx$ then prove that P_k(x) has k simple real zeros, all of which lie in the interval (a,b).

   (b) Use FFT to calculate approximately the Fourier coefficients $\hat{f}(j)$ for
   i. f(x)=sin3x
   ii. f(x)=sin(πx) using, e.g., N=81 or 324 or whatever.Why do the Fourier coefficients for f(x)=sin(πx) fail to decay rapidly as $|j|$ increases? [8+8]

3. Find the root of the equation sin$x$=1+x^3 between (-2,-1) using
   (a) Regular falsi method.
   (b) Newton's method. [8+8]

4. (a) Solve the Laplace's equation in the region as shown in Figure 7a; by Liebmann's principle.

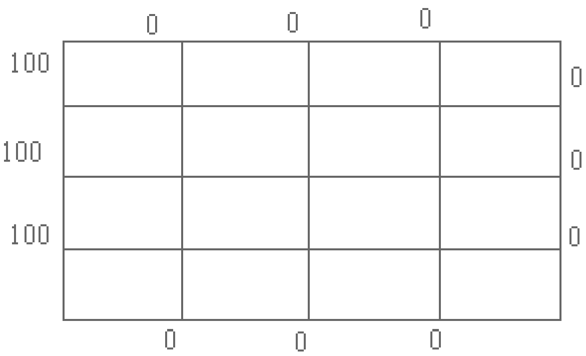

Figure 7a

(b) Derive the Two dimentional Heat flow equation in steady state(Laplace'seqution) [8+8]

5. (a) Determine the maximum step size that can be used in the tabulation of f(x)=e^x in [0,1], so that the error in linear interpolation be less than 5x10^{-4}.

   (b) Evaluate $\Delta^{10}(1 - ax)(1 - bx^2)(1 - cx^3)(1 - dx^4)$. [12+4]

6. (a) Fit a curve y=a+bx+cx^2 to the data:

x	0	1	2	3	4
y	1	0	3	10	21

   (b) Find the curve of best fit for the data below:

x	120	110	100	90	80	70	60
y	0.0051	0.0059	0.0071	0.0085	0.00102	0.00124	0.00148

[8+8]

7. (a) Using Gauss-Jordan method solve
   $10x - 2y + 3z = 23, 2x + 10y - 5z = -33, 3x - 4y + 10z = 41$

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   $4x + 2y + z = 14, x + 5y - z = 10, x + y + 8z = 20$ [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,June 2011
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) Fit a curve y=a+bx+cx^2 to the data:

x	0	1	2	3	4
y	1	0	3	10	21

   (b) Find the curve of best fit for the data below:

x	120	110	100	90	80	70	60
y	0.0051	0.0059	0.0071	0.0085	0.00102	0.00124	0.00148

[8+8]

2. (a) Determine the maximum step size that can be used in the tabulation of f(x)=e^x in [0,1], so that the error in linear interpolation be less than 5x10^{-4}.

   (b) Evaluate $\Delta^{10}(1 - \text{ax})(1 - \text{bx}^2)(1 - \text{cx}^3)(1 - \text{dx}^4)$. [12+4]

3. (a) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using

      i. Simpson's $\frac{3}{8}$ rule

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   (b) Fit the Cubic spline for

x	0	1	3
y	1	0	2

   Hence find f(0.75) and f(1.75). $\int_0^3 f(x)dx$ [8+8]

4. (a) If the scalar product is given by $< g, h >= \int_a^b g(x)h(x)w(x)dx$ then prove that P_k(x) has k simple real zeros, all of which lie in the interval (a,b).

   (b) Use FFT to calculate approximately the Fourier coefficients $\hat{f}(j)$ for

      i. f(x)=sin3x

      ii. f(x)=sin(πx) using, e.g., N=81 or 324 or whatever.Why do the Fourier coefficients for f(x)=sin(πx) fail to decay rapidly as $|j|$ increases? [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]

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

6. (a) Using Gauss-Jordan method solve
$10x - 2y + 3z = 23, 2x + 10y - 5z = -33, 3x - 4y + 10z = 41$

   (b) Solve the system of equations by Gauss elimination method
$4x + 2y + z = 14, x + 5y - z = 10, x + y + 8z = 20$ [8+8]

7. (a) Solve the Laplace's equation in the region as shown in Figure 7a; by Liebmann's principle.

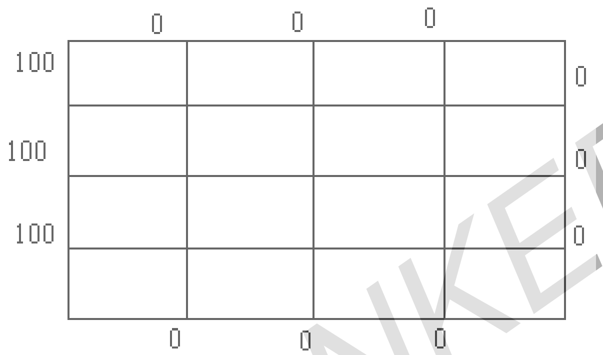

Figure 7a

   (b) Derive the Two dimentional Heat flow equation in steady state(Laplace'seqution) [8+8]

8. Find the root of the equation sin$x$=1+x^3 between (-2,-1) using

   (a) Regular falsi method.

   (b) Newton's method. [8+8]

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