Subject Code: R13107/R13 **Set No - 1**

I B. Tech I Semester Regular/Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS-II (MATHEMATICAL METHODS)

(Common to ECE, EEE, EIE, Bio-Tech, EComE, Agri.E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1. (a) Evaluate $\sqrt{24}$ to four decimal places by Newton's iterative method.
   (b) Prove that $\sum_{k=0}^{n-1} \Delta^2 f_k = \Delta f_n - \Delta f_0$.
   (c) Solve by Euler's method, $y' = x - y^2, y(0) = 1$, find y(0.2) taking step size h = 0.1.
   (d) Find the half range Fourier cosine series for $f(x) = x^2$ in $0 < x < \pi$.
   (e) If F(p) is the complex Fourier transform of f(x), then show that $F[f(x)\cos ax] = \frac{1}{2}[F(p+a) + F(p-a)]$.
   (f) State left shifting theorem in Z - transform.

[4+4+3+4+4+3]

PART–B

2. (a) Find the root of xsinx + cos x =0 using Newton- Raphson method.
   (b) Using Lagrange's formula, fit a polynomial to the data and find the value of f(1), given that

x	-2	-1	2	7
f(x)	-1	0	4	11

[8+8]

3. (a) Find a real root of x *tanx +1=0* using False position method.
   (b) Find y(66) given that *y(50)= 201, y(60)= 225, y(70)=248 and y(80)=274.* Using Newton's backward difference formula.

[8+8]

4. (a) Tabulate *y(0.1), y(0.2) and y(0.3)* using Picard's method given that $y^1 = y^2 + x$, $y(0)=1$.
   (b) Find the Fourier series of xsinx for 0<x< 2π.

[8+8]

5. (a) Evaluate *y(0.6)* using Runge Kutta method given $y' = (x+y)^{1/2}$, y(0.4)= 0.41.
   (b) Expand sinπx in (0,1) as Fourier cosine series.

[8+8]

|''|'''||''||'''||||

6. (a) Find the Fourier transform of $f(x)=\begin{cases}1-x^2, & if \quad |x|\le 1\\ 0, & if \quad |x|>1\end{cases}$.

   (b) If $\dfrac{3z^2-4z+7}{(z-1)^3}$ is the z-transform of f(n),find f(0), f(1), f(2).

[8+8]

7. (a) Find the solution of the difference equation $y(n+2)$-$2y(n+1)+y(n)=2^n$, $y(0)=2$, $y(1)=1$.

   (b) Find the finite Fourier cosine transform of the function f(x)= $\left(1-\dfrac{x}{\pi}\right)^2$ in 0< x< π .

[8+8]

*****

|''|'''||''||'''||||

Subject Code: R13107/R13 **Set No - 2**

I B. Tech I Semester Regular/Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS-II (MATHEMATICAL METHODS)

(Common to ECE, EEE, EIE, Bio-Tech, EComE, Agri.E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1. (a) Evaluate $\sqrt{42}$ to four decimal places by Newton's iterative method.
   (b) Prove that $1+\frac{1}{4}\delta^2=\mu^2$.
   (c) Solve the equation , $y'=x-y^2, y(0)=1$, find y(0.2) using Taylor's series method.
   (d) Find the half range Fourier sine series for $f(x)=x^2$ in $0<x<2$.
   (e) If $F_S(p)$ is the complex Fourier Sine transform of f(x), then show that
   $F_S[f(x)\cos ax]=\frac{1}{2}[F_S(p+a)+F_S(p-a)]$.
   (f) State Final value theorem in Z - transform.

[4+3+4+4+4+3]

PART–B

2. (a) Find a real root of $x^4-x-9=0$ using false position method.
   (b) Using Lagrange's formula, fit a polynomial to the data and find the value of f(1), given that

x	-1	0	2	3
f(x)	-12	-8	6	11

[8+8]

3. (a) Find a real root of x *tanx +1=0* using Newton Raphson method.
   (b) Find y(54) given that *y(50)= 201, y(60)= 225, y(70)=248 and y(80)=274*. Using Newton's forward difference formula.

[8+8]

4. (a) Tabulate *y(0.1), y(0.2) and y(0.3)* using Taylor's series method given that $y' = y^2+x$, $y(0)=1$.
   (b) Find the Fourier series of xcosx for 0<x< 2π.

[8+8]

5. (a) Evaluate *y(0.8)* using Runge Kutta method given $y'=(x+y)^{1/2}$, y(0.4)= 0.41.
   (b) Expand cosπx in (0,1) as Fourier sine series.

[8+8]

6. (a) Find the Fourier transform of $e^{-\frac{x^2}{2}}$, $-\infty < x < \infty$.

   (b) Find inverse Z transform of $\dfrac{z}{z^3 - 7z^2 + 14z - 8}$.

[8+8]

7. (a) Find the solution of the difference equation $y(n+2)-5y(n+1)+6y(n)=5^n$,

   $y(0)=0$, $y(1)=0$.

   (b) Find the finite Fourier sine and cosine transform of the function f(x)=2x in $0<x<2\pi$.

[8+8]

*****

|''|'''||''||'''||||

Subject Code: R13107/R13 **Set No - 3**

I B. Tech I Semester Regular/Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS-II (MATHEMATICAL METHODS)

(Common to ECE, EEE, EIE, Bio-Tech, EComE, Agri.E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1. (a) Evaluate $\sqrt{26}$ to four decimal places by Newton's iterative method.
   (b) Prove that $1+\mu^2\delta^2 = \left(1+\frac{\delta^2}{2}\right)^2$.
   (c) Solve the equation , $y' = xy+1, y(0)=1$, find y(0.2) using Taylor's series method.
   (d) Find the half range Fourier cosine series for $f(x)=x^2$ in $0<x<3$.
   (e) If $F_S(p)$ and $F_C(p)$ are the complex Fourier sine and cosine transforms of f(x) respectively, then show that $F_C[f(x)\sin ax] = \frac{1}{2}[F_S(p+a) - F_S(p-a)]$.
   (f) State Right shifting theorem in Z - transform.

[4+3+4+4+4+3]

PART–B

2. (a) Find the root of xsinx + cos x =0 using Regula Falsi method.
   (b) Using Lagrange's formula, fit a polynomial to the data and find the value of f(14), given that

x	12	13	15	19
f(x)	11	15	18	31

[8+8]

3. (a) Find a root correct to three decimal places of the equation $x^4 - x - 13 = 0$ using Newton's iterative method.
   (b) The population of a nation in the decimal census was given below. Estimate the population in the year 1925 using appropriate interpolation formula

Year x	1891	1901	1911	1921	1931
Population y (thousands)	46	66	81	93	101

[8+8]

4. (a) Solve $y^1 = 2x - y$ and $y(1)=3$ by modified Euler's method and compute $y(1.1)$.
   (b) Find the Fourier series of $f(x) = \begin{cases} x & 0 \le x \le -\pi \\ 2\pi - x & -\pi \le x \le \pi \end{cases}$. Deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\ldots=\frac{\pi^2}{8}$.

[8+8]

5. (a) Find the Fourier series of xsinx for $0<x<2\pi$.

   (b) Using Runge-Kutta fourth order formula, Find $y(0.2)$ for the equation $y^1 = \frac{y-x}{y+x}$ $y(0) = 1$ taking h=0.1.

[8+8]

6. (a) Find the Fourier sine and cosine transform of $f(x) = \frac{1}{1+x^2}$.

   (b) Find inverse Z-transform of $\frac{8z - z^3}{(4-z)^3}$.

[8+8]

7. (a) Find the solution of the difference equation $y(n+2)-6.y(n+1)+9.y(n) = 3^n$. y(0)=0, y(1)=1.

   (b) Find the inverse Fourier cosine transform of $\frac{\sin ap}{p}$.

[8+8]

*****

Subject Code: R13107/R13 **Set No - 4**

I B. Tech I Semester Regular/Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS-II (MATHEMATICAL METHODS)

(Common to ECE, EEE, EIE, Bio-Tech, EComE, Agri.E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1. (a) Evaluate $\sqrt{45}$ to four decimal places by Newton's iterative method.
   (b) Prove that $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$.
   (c) Solve the equation , $y' = xy+1, y(0)=1$, find y(0.2) using Euler's method taking h = 0.1.
   (d) Find the half range Fourier sine series for $f(x) = x^2$ in $0 < x < \pi$.
   (e) If $F_S(p)$ and $F_C(p)$ are the complex Fourier sine and cosine transforms of f(x) respectively, then show that $F_S[f(x)\sin ax] = \frac{1}{2}[F_C(p-a) - F_C(p+a)]$.
   (f) Evaluate $Z\left(3^{2n+8}\right)$.

[4+3+4+4+4+3]

PART–B

2. (a) Find a real root of $x^2 - log_x e = 12$ using Regula falsi method.
   (b) Using Lagrange's formula, fit a polynomial to the data and find the value of f(10), given that

x	2	5	9	15
f(x)	11	15	18	31

[8+8]

3. (a) Find a real root of the equation by Newton Raphson method for: $e^x - x^3 + \cos 25x$ correct to three decimal places.
   (b) The population of a nation in the decimal census was given below. Estimate the population in the year 1905 using appropriate interpolation formula

Year x	1891	1901	1911	1921	1931
Population y (thousands)	46	66	81	93	101

[8+8]

4. (a) Solve $y^1 = x - y^2$, $y(0) = 1$ using Taylor's series method and compute $y(0.1), y(0.2)$
   (b) Find the Fourier series for the function $f(x) = x^2 - x$ in $(-\pi,\pi)$. Hence deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} \ldots = \frac{\pi^2}{6}$.

[8+8]

5. (a) Find $y(0.1), y(0.2)$ using Runge-Kutta fourth order formula given that $y^1 = x + x^2 y, y(0) = 1$.
   (b) Expand $f(x) = (x-1)^2$ as half range sine series in $(0, 1)$.

[8+8]

6. (a) Find the Fourier transform of $f(x) = \frac{1}{\sqrt{|x|}}$.
   (b) Find inverse Z-transform of $\frac{8z - z^3}{(4-z)^3}$.

[8+8]

7. (a) Find the solution of the difference equation $y(n+2)+5y(n+1)+4y(n) = 2^n, y(0)=1, y(1)= -4$.
   (b) Find the inverse Fourier cosine transform of $p^n e^{-ap}$.

[8+8]

*****