SUBJECT NAME : **Transforms and Partial Differential Equation**

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Name of the Student: Branch:

Unit – I (Fourier Series)

- **Fourier Series in the interval $(0,2\ell)$**

1. Expand $f(x) = x(2\pi - x)$ as Fourier series in $(0, 2\pi)$ and hence deduce that the sum of $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \ldots$. (A/M 2011)

2. Find the Fourier series of $f(x) = (\pi - x)^2$ in $(0, 2\pi)$ of periodicity 2π . (M/J 2012)

3. Find the Fourier series expansion of $f(x) = \begin{cases} x & \text{for } 0 \le x \le \pi \\ 2\pi - x & \text{for } \pi \le x \le 2\pi \end{cases}$. Also, deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots \infty = \frac{\pi^2}{8}$. (N/D 2010)

4. Find the Fourier series expansion of $f(x) = \begin{cases} x, & 0 \le x \le 1 \\ 2 - x, & 1 \le x \le 2 \end{cases}$. Also, deduce $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots \infty = \frac{\pi^2}{8}$. (N/D 2012)

5. Find the Fourier series for $f(x) = 2x - x^2$ in the interval $0 < x < 2$. (A/M 2010)

6. Obtain the Fourier series of periodicity 3 for $f(x) = 2x - x^2$ in $0 < x < 3$. (N/D 2011)

• Fourier Series in the interval $(-\ell,\ell)$

1. Find the Fourier series of x^2 in $(-\pi,\pi)$ and hence deduce that $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}+\ldots=\frac{\pi^4}{90}$. (M/J 2013)

2. Obtain the Fourier series of $f(x)=x\sin x$ in $(-\pi,\pi)$. (N/D 2011)

3. Obtain the Fourier series to represent the function $f(x)=x,\ -\pi<x<\pi$ and deduce $\sum_{n=1}^{\infty}\frac{1}{(2n-1)^2}=\frac{\pi^2}{8}$. (M/J 2012)

4. Obtain the Fourier series of the periodic function defined by $f(x)=\begin{cases}-\pi & -\pi<x<0\\ x & 0<x<\pi\end{cases}$. Deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots+\infty=\frac{\pi^2}{8}$. (N/D 2009)

5. Obtain the Fourier series for the function $f(x)$ given by $f(x)=\begin{cases}1-x, & -\pi<x<0\\ 1+x, & 0<x<\pi\end{cases}$. Hence deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots=\frac{\pi^2}{8}$. (A/M 2011)

6. Find the Fourier series of the function $f(x)=\begin{cases}0, & -\pi\le x\le 0\\ \sin x, & 0\le x\le\pi\end{cases}$ and hence evaluate $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\ldots$. (N/D 2011)(AUT)

7. Expand $f(x)=x-x^2$ as a Fourier series in $-L<x<L$ and using this series find the root mean square value of $f(x)$ in the interval. (N/D 2009)

8. Find the Fourier series expansion of $f(x)=x+x^2$ in $(-\pi,\pi)$. (N/D 2012)

9. Find the Fourier series expansion of $f(x)=1-x^2$ in the interval $(-1,1)$. (N/D 2010)

• Half Range Fourier Series

1. Find the half range cosine series of the function $f(x) = x(\pi - x)$ in the interval $0 < x < \pi$. Hence deduce that $\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \ldots = \frac{\pi^4}{90}$. (A/M 2010)

2. Find the half-range Fourier cosine series of $f(x) = (\pi - x)^2$ in the interval $(0, \pi)$. Hence find the sum of the series $\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \ldots + \infty$. (M/J 2012)

3. Obtain the Fourier cosine series of $(x-1)^2$, $0 < x < 1$ and hence show that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots = \frac{\pi^2}{6}$. (M/J 2013)

4. Obtain the half range cosine series for $f(x) = x$ in $(0, \pi)$. (N/D 2010),(N/D 2012)

5. Obtain the Fourier cosine series expansion of $x \sin x$ in $(0, \pi)$ and hence find the value of $1 + \frac{2}{1.3} - \frac{2}{3.5} + \frac{2}{5.7} - \frac{2}{7.9} + \ldots$. (N/D 2011)

6. Obtain the sine series for $f(x) = \begin{cases} x & \text{in } 0 \le x \le \frac{\pi}{2} \\ \pi - x & \text{in } \frac{\pi}{2} \le x \le \pi \end{cases}$. (A/M 2011)

7. Obtain the Fourier cosine series for $f(x) = \begin{cases} kx & \text{in } 0 < x < \frac{l}{2} \\ k(l - x) & \text{in } \frac{l}{2} < x < l \end{cases}$. (M/J 2013)

• Complex Form of Fourier Series

1. Find the complex form of the Fourier series of $f(x) = e^{ax}$, $-\pi < x < \pi$. (A/M 2010)

2. Find the complex form of the Fourier series of $f(x) = e^{-x}$ in $-1 < x < 1$. (N/D 2009)

3. Find the complex form of Fourier series of $\cos ax$ in $(-\pi, \pi)$, where "a" is not an integer. (M/J 2013)

• Harmonic Analysis

1. Compute upto first harmonics of the Fourier series of $f(x)$ given by the following table

x	0	T/6	T/3	T/2	2T/3	5T/6	T
f (x)	1.98	1.30	1.05	1.30	– 0.88	– 0.25	1.98

(N/D 2009),(N/D 2011)

2. Find the Fourier series as far as the second harmonic to represent the function $f(x)$ with the period 6, given in the following table.
(N/D 2009),(N/D 2010),(M/J 2012),(N/D 2012)

x	0	1	2	3	4	5
f (x)	9	18	24	28	26	20

3. Find the Fourier series up to second harmonic for $y = f(x)$ from the following values.

x:	0	π/3	2 π/3	π	4π/3	5 π/3	2 π
y:	1.0	1.4	1.9	1.7	1.5	1.2	1.0

(A/M 2011)

4. Calculate the first 3 harmonics of the Fourier of $f(x)$ from the following data

x:	0	30	60	90	120	150	180	210	240	270	300	330
f (x) :	1.8	1.1	0.3	0.16	0.5	1.3	2.16	1.25	1.3	1.52	1.76	2.0

(N/D 2011)(AUT)

Unit – II (Fourier Transform)

• Fourier Transform with Deduction

1. Find the Fourier transform of $f(x) = \begin{cases} 1 - x & \text{if } x < 1 \\ 0 & \text{if } x \geq 1 \end{cases}$ and hence find the value of $\int_0^\infty \frac{\sin^4 t}{t^4} dt$.

(N/D 2009),(A/M 2010),(N/D 2011),(N/D 2012)

2. Find the Fourier transform of $f(x)$ given by $f(x) = \begin{cases} 1 & \text{for } |x| < a \\ 0 & \text{for } |x| > a > 0 \end{cases}$ and using Parseval's identity prove that $\int_0^{\infty} \left(\frac{\sin t}{t} \right)^2 dt = \frac{\pi}{2}$. (A/M 2011)

3. Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < a \\ 0 & \text{for } |x| > a \end{cases}$ and hence find $\int_0^{\infty} \frac{\sin x}{x} dx$. (M/J 2013)

4. Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2 & \text{if } |x| < 1 \\ 0 & \text{if } |x| > 1 \end{cases}$. Hence evaluate $\int_0^{\infty} \left(\frac{x \cos x - \sin x}{x^3} \right) \cos \frac{x}{2} dx$. (A/M 2011)

5. Show that the Fourier transform of $f(x) = \begin{cases} a^2 - x^2, & |x| \le a \\ 0, & |x| > a > 0 \end{cases}$ is $2\sqrt{\frac{2}{\pi}} \left(\frac{\sin as - as \cos as}{s^3} \right)$. Hence deduce that $\int_0^{\infty} \frac{\sin t - t \cos t}{t^3} dt = \frac{\pi}{4}$. Using Perserval's identity show that $\int_0^{\infty} \left(\frac{\sin t - t \cos t}{t^3} \right)^2 dt = \frac{\pi}{15}$. (N/D 2011),(N/D 2012)

• Integration using Parseval's Identity

1. Evaluate $\int_0^{\infty} \frac{dx}{(x^2 + a^2)^2}$ using Parseval's identity. (M/J 2013)

2. Evaluate $\int_0^{\infty} \frac{dx}{(4 + x^2)(25 + x^2)}$ using transform methods. (N/D 2009)

3. Using Fourier cosine transform method, evaluate $\int_0^{\infty} \frac{dt}{(a^2 + t^2)(b^2 + t^2)}$. (A/M 2010)

4. Evaluate $\int_0^{\infty} \frac{dx}{(x^2 + a^2)(x^2 + b^2)}$ using Fourier cosine transforms of e^{-ax} and e^{-bx}.

(N/D 2010),(A/M 2011)

• Fourier Transform of Exponential Function & Self Reciprocal Problems

1. Find the Fourier sine transform of e^{-ax} and hence evaluate Fourier cosine transforms of xe^{-ax} and $e^{-ax}\sin ax$. (N/D 2011)

2. Find the Fourier cosine and sine transforms of $f(x) = e^{-ax}, a > 0$ and hence deduce the inversion formula. (N/D 2012)

3. Find the Fourier sine transformation of $\frac{e^{-ax}}{x}$ where $a > 0$. (N/D 2011)(AUT)

4. Find the Fourier cosine transform of e^{-x^2}. (N/D 2009),(N/D 2011)(AUT)

5. Show that the Fourier transform of $e^{-\frac{x^2}{2}}$ is $e^{-\frac{s^2}{2}}$. (A/M 2010),(M/J 203)

6. Find the Fourier cosine transform of $e^{-a^2x^2}, a > 0$. Hence show that the function $e^{-\frac{x^2}{2}}$ is self-reciprocal. (N/D 2012)

7. Show that $e^{-\frac{x^2}{2}}$ is a self reciprocal with respect to Fourier transform. (N/D 2011)

8. Prove that $\frac{1}{\sqrt{x}}$ is self reciprocal under Fourier sine and cosine transforms.(N/D 2009)

9. Find Fourier sine and cosine transform of x^{n-1} and hence prove $\frac{1}{\sqrt{x}}$ is self reciprocal under Fourier sine and cosine transforms. (M/J 2012)

• Fourier Transform of General Function & Derivations

1. Find the Fourier sine and cosine transform of $f(x) = \begin{cases} \sin x, & 0 < x < a \\ 0, & x>a \end{cases}$. (A/M 2010)

2. Find the Fourier integral representation of $f(x)$ defined as $f(x) = \begin{cases} 0 & \text{for } x < 0 \\ \frac{1}{2} & \text{for } x = 0 \\ e^{-x} & \text{for } x > 0 \end{cases}$. (N/D 2010),(M/J 2012)

3. Find the Fourier sine transform of $f(x) = \begin{cases} x, & 0< x<1 \\ 2 - x, & 1 < x < 2 \\ 0, & x>2 \end{cases}$. (N/D 2010),(A/M 2011)

4. Derive the Parseval's identity for Fourier Transforms. (N/D 2010),(M/J 2012)

5. State and prove convolution theorem for Fourier transforms. (N/D 2011),(M/J 2012)

6. Verify the convolution theorem under Fourier Transform, for $f(x) = g(x) = e^{-x^2}$. (M/J 2013)

Unit – III (Partial Differential Equation)

• Formation of PDE and Standard Types of PDE

1. Find the partial differential equation of all planes which are at a constant distance 'a' from the origin.(A/M 2010)

2. Form the PDE by eliminating the arbitrary function ϕ from $\phi\left(x^2+y^2+z^2, ax+by+cz\right)=0$. (N/D 2010),(M/J 2012)

3. Form the partial differential equation by eliminating arbitrary functions f and ϕ from $z = f(x+ct) + \phi(x-ct)$. (A/M 2011)

4. Solve $z = px + qy + p^2q^2$. (N/D 2009)

5. Find the singular integral of $z = px + qy + \sqrt{1 + p^2 + q^2}$. (N/D 2011),(M/J 2013)

6. Find the singular integral of $z = px + qy + p^2 + pq + q^2$. (N/D 2012)

7. Solve $p\left(1+q\right) = qz$ (A/M 2010)

8. Solve $p^2 + q^2 = x^2 + y^2$ (A/M 2010)

9. Solve $z^2\left(p^2 + q^2\right) = x^2 + y^2$. (N/D 2011)(AUT)

• PDE of Lagrange's Equation

1. Solve the partial differential equation $(mz - ny)p + (nx - z)q = y - mx$.(A/M 2011)

2. Solve the partial differential equation $x^2\left(y-z\right)p + y^2\left(z-x\right)q = z^2\left(x-y\right)$. (N/D 2010),(M/J 2012)

3. Solve the partial differential equation $x(y-z)p + y(z-x)q = z(x-y)$. (N/D 2011)

4. Solve $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$. (N/D 2011)(AUT),(M/J 2013)

5. Solve $(x - 2z)p + (2z - y)q = y - x$. (N/D 2012)

6. Solve $(y - xz)p + (yz - x)q = (x + y)(x - y)$. (N/D 2009)

7. Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$ (A/M 2010)

• Homogeneous Linear Partial Differential Equation

1. Solve $(D^2 + 2DD' + D'^2)z = \sinh(x + y) + e^{x+2y}$. (N/D 2009)

2. Solve $\left[D^3 + D^2D' - 4DD'^2 - 4D'^3\right]z = \cos(2x + y)$. (N/D 2010),(M/J 2012)

3. Solve $(D^2 - D'^2)z = e^{x-y}\sin(2x + 3y)$. (A/M 2011)

4. Solve $(D^3 - 2D^2D')z = 2e^{2x} + 3x^2y$. (N/D 2011)

5. Solve $(D^2 + 3DD' - 4D'^2)z = \cos(2x + y) + xy$. (N/D 2012)

6. Solve $(D^3 - 7DD'^2 - 6D'^3)z = \cos(x + 2y) + x$. (N/D 2011)(AUT)

7. Solve $(D^3 - 7DD'^2 - 6D'^3)z = \sin(2x + y)$. (M/J 2013)

8. Solve $(D^2 + DD' - 6D'^2)z = y\cos x$. (M/J 2013)

• Non Homogeneous Linear Partial Differential Equation

1. Solve $(D^2 - D'^2 - 3D + 3D')z = xy + 7$. (N/D 2009)

2. Solve $(D^2 + 2DD' + D'^2 - 2D - 2D')z = \sin(x + 2y)$. (A/M 2010)

3. Solve $\left[2D^2 - DD' - D'^2 + 6D + 3D'\right]z = xe^{y}$. (N/D 2010),(M/J 2012)

4. Solve $(D^2 - 3DD' + 2D'^2 + 2D - 2D')z = x + y + \sin(2x + y)$. (A/M 2011)

5. Solve $(D^2 - 2DD' + D'^2 - 3D + 3D' + 2)z = e^{2x-y}$. (N/D 2011)

6. Solve $\left(D^2 - DD' + 2D\right)z = e^{2x+y} + 4$. (N/D 2012)

Unit – IV (Application of Partial Differential Equation)

• One Dimensional Wave Equation with No Velocity

1. A tightly stretched string with fixed end points $x = 0$ and $x =$ is initially in a position given by $y(x, 0) = y_0 \sin^3\left(\pi x\right)$. It is released from rest from this position. Find the expression for the displacement at any time t .(N/D 2012)

2. A uniform string is stretched and fastened to two points ' ' apart. Motion is started by displacing the string into the form of the curve $y = kx(-x)$ and then released from this position at time $t = 0$. Derive the expression for the displacement of any point of the string at a distance x from one end at time t .(A/M 2011)

3. A string is stretched and fastened to two points $x = 0$ and $x =$ apart. Motion is started by displacing the string into the form $y = k\left(lx - x^2\right)$ from which it is released at time $t = 0$. Find the displacement of any point on the string at a distance of x from one end at time t .(N/D 2011)(AUT)

4. A tightly stretched string of length ' ' has its ends fastened at $x = 0$ and $x =$. The mid – point of the string is then taken to height 'b' and released from rest in that position. Find the lateral displacement of a point of the string at time 't' from the instant of release.(A/M 2010)

5. A tightly stretched string of length 2 is fastened at both ends. The midpoint of the string is displaced by a distance 'b' transversely and the string is released from rest in this position. Find an expression for the transverse displacement of the string at any time during the subsequent motion.(N/D 2010)

• One Dimensional Wave Equation with Velocity

1. A tightly stretched string with fixed end points $x = 0$ and $x =$ is initially at rest in its equilibrium position. If it is set vibrating giving each point a initial velocity $3x(-x)$, find the displacement. (N/D 2009)

2. A tightly stretched string between the fixed end points $x = 0$ and $x =$ is initially at rest in its equilibrium position. If each of its points is given a velocity $kx(-x)$, find the displacement $y(x, t)$ of the string. (M/J 2013)

3. A tightly stretched string of length 'l' is initially at rest in its equilibrium position and each of its points is given the velocity $V_0 \sin^3\left(\frac{\pi x}{l}\right)$. Find the displacement $y(x,t)$.

(N/D 2011)

• One Dimensional Heat Equation with Both Ends Are Change to Zero Temperature

1. A rod, 30 cm long has its ends A and B kept at 20^oC and 80^oC respectively, until steady state conditions prevail. The temperature at each end is then suddenly reduced to 0^oC and kept so. Find the resulting temperature function is a regular function $u(x,t)$ taking $x = 0$ at A.

(N/D 2009)

• One Dimensional Heat Equation with Both Ends Are Change to Non Zero Temperature

1. A bar of 10 cm long, with insulated sides has its ends A and B maintained at temperatures $50\ C$ and $100\ C$ respectively, until steady-state conditions prevail. The temperature at A is suddenly raised to $90\ C$ and at B is lowered to $60\ C$. Find the temperature distribution in the bar thereafter.(N/D 2011)(AUT)

2. The ends A and B of a rod 40 cm long have their temperatures kept at 0˚C and 80˚C respectively, until steady state condition prevails. The temperature of the end B is then suddenly reduced to 40˚C and kept so, while that of the end A is kept at 0˚C. Find the subsequent temperature distribution $u(x,t)$ in the rod.(M/J 2012)

• Two Dimensional Heat Equation

1. A rectangular plate with insulated surface is 10 cm wide and so long compared to its width that may be considered infinite in length without introducing appreciable error. The temperature at short edge $y = 0$ is given by $u = \begin{cases} 20x & \text{for } 0 \le x \le 5 \\ 20(10-x) & \text{for } 5 \le x \le 10 \end{cases}$ and the other three edges are kept at 0°C. Find the steady state temperature at any point in the plate.(A/M 2010),(M/J 2013)

2. A rectangular plate with insulated surface is 20 cm wide and so long compared to its width that it may be considered infinite in length without introducing an appreciable error. If the temperature of the short edge $x = 0$ is given by $u = \begin{cases} 10y & \text{for } 0 \le y \le 10 \\ 10(20-y) & \text{for } 10 \le y \le 20 \end{cases}$ and the two long edges as well as the other short

edge are kept at 0°C. Find the steady state temperature distribution in the plate. (A/M 2011)

3. A square plate is bounded by the lines $x = 0, y = 0, x = 20$ and $y = 20$. Its faces are insulated. The temperature along the upper horizontal edge is given by $u(x, 20) = x(20 - x), 0 < x < 20$ while the other two edges are kept at $0\ C$. Find the steady state temperature distribution in the plate. (N/D 2010),(N/D 2011)

4. Find the steady state temperature distribution in a rectangular plate of sides a and b insulated at the lateral surfaces and satisfying the boundary conditions:

   $u(0, y) = u(a, y) = 0$, for $0 \le y \le b$;

   $u(x, b) = 0$ and $u(x, 0) = x(a - x)$, for $0 \le x \le a$. (N/D 2012)

5. A long rectangular plate with insulated surface is cm wide. If the temperature along one short edge ($y = 0$) is $u(x, 0) = k(x - x^2)$ degrees, for $0 < x <$, while the other two long edges $x = 0$ and $x =$ as well as the other short edge are kept at 0˚C , find the steady state temperature function $u(x, y)$.(M/J 2012)

Unit – V (Z - Transforms)

• Simple problems on Z - transforms

1. Find $Z[n(n-1)(n-2)]$. (M/J 2012)

2. Find the Z – transform of $\cos n\theta$ and $\sin n\theta$. Hence deduce the Z – transforms of $\cos(n+1)\theta$ and $a^n \sin n\theta$. (N/D 2010)

3. Find $Z(\cos n\theta)$ and hence deduce $Z\left[\cos\left(\frac{n\pi}{2}\right)\right]$ (M/J 2013)

4. Find the Z – transform of $\sin^2\left(\frac{n\pi}{4}\right)$ and $\cos\left(\frac{n\pi}{2}+\frac{n\pi}{4}\right)$ (N/D 2012)

5. Find the Z – transforms of $a^n \cos n\theta$ and $e^{-at} \sin bt$. (A/M 2011)

6. Find $Z\left(n a^n \sin n\theta\right)$. (A/M 2010)

7. If $Z[f(n)] = F(z)$, find $Z[f(n-k)]$ and $Z[f(n-k)]$. (N/D 2011)

8. State and prove the second shifting property of Z-transform. (M/J 2013)

• Inverse Z - transform by Partial Fraction

1. Find the inverse Z – transform of $\frac{10z}{z^2-3z+2}$. (N/D 2009)

2. Find the inverse Z – transform of $\frac{z^3-20z}{(z-2)^3(z-4)}$. (N/D 2009)

3. Find $Z^{-1}\left[\frac{z(z^2-z+2)}{(z+1)(z-1)^2}\right]$ and $Z^{-1}\left[\frac{z}{(z-1)(z-2)}\right]$. (A/M 2010)

4. Evaluate $Z^{-1}\left[(z-5)^{-3}\right]$ for $z > 5$. (N/D 2011)

• Inverse Z - transform by Residue Theorem

1. Find the inverse Z – transform of $\frac{z(z+1)}{(z-1)^3}$ by residue method. (N/D 2010)

• Inverse Z - transform by Convolution Theorem

1. Using convolution theorem, find the Z^{-1} of $\frac{z^2}{(z-4)(z-3)}$. (N/D 2009)

2. Using convolution theorem, find inverse Z – transform of $\frac{z^2}{(z-1)(z-3)}$. (A/M 2011)

3. Using convolution theorem, find the inverse Z – transform of $\frac{z^2}{(z+a)^2}$. (N/D 2012)

4. State and prove convolution theorem on Z-transformation. Find $Z^{-1}\left[\frac{z^2}{(z-a)(z-b)}\right]$. (N/D 2011)(AUT)

5. Using convolution theorem, find $Z^{-1}\left[\frac{z^2}{(z-a)(z-b)}\right]$. (M/J 2013)

6. Using Convolution theorem, find the inverse Z – transform of $\frac{8z^2}{(2z-1)(4z-1)}$. (M/J 2012)

7. Using convolution theorem, find the inverse Z – transform of $\left(\frac{z}{z-4}\right)^3$. (A/M 2010)

- **Formation &Solution of Difference Equation**

1. Form the difference equation from the relation $y_n = a + b.3^n$. (N/D 2010)

2. Derive the difference equation from $y_n = (A + Bn)(-3)^n$. (A/M 2011)

3. Form the difference equation of second order by eliminating the arbitrary constants A and B from $y_n = A(-2)^n + Bn$. (N/D 2011)

4. Using Z-transform solve: $y_{n+2} - 3y_{n+1} - 10y_n = 0$, $y_0 = 1$ and $y_1 = 0$. (M/J 2013)

5. Solve the equation $u_{n+2} + 6u_{n+1} + 9u_n = 2^n$ given $u_0 = u_1 = 0$. (N/D 2009),(N/D 2012)

6. Solve by Z – transform $u_{n+2} - 2u_{n+1} + u_n = 2^n$ with $u_0 = 2$ and $u_1 = 1$.(A/M 2010)

7. Solve $y_{n+2} + 4y_{n+1} + 3y_n = 2^n$ with $y_0 = 0$ and $y_1 = 1$, using Z – transform.(N/D 2010)

8. Solve: $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ given that $u_0 = 0, u_1 = 1$. (N/D 2011)

9. Solve $y(k+2) + y(k) = 1, y(0) = y(1) = 0$,using Z-transform. (M/J 2012)

10. Solve $y_{n+2} + y_n = 2^n.n$, using Z-transform. (M/J 2012)

11. Using Z-transform, solve $y_{n+2} + 4y_{n+1} - 5y_n = 24n - 8$ given that $y_0 = 3$ and $y_1 = -5$. (N/D 2011)(AUT)

12. Solve the difference equation $y(n+3) - 3y(n+1) + 2y(n) = 0$, given that $y(0) = 4$, $y(1) = 0$ and $y(2) = 8$. (A/M 2011),(N/D 2012)

----*All the Best*----