Code No: RR210101 **RR** **Set No. 2**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

MATHEMATICS - II

Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, AME, ICE, E.COMP.E, MMT, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

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

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Form the partial differential equation by eliminating the arbitrary functions z = f(x - it) + g(x - it) [5]

   (b) Solve the partial differential equation pyz + qz=xy . [5]

   (c) Solve the partial differential equation $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$ [6]

2. (a) Show that A= $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is a skew-Hermitian matrix and also umitary

   (b) Show that the matrix $\frac{1}{2}\begin{bmatrix} -1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 \end{bmatrix}$ is orthogonal. [8+8]

3. A bar 10cm long with insulated surfaces , has its ends A and B kept at 40^0C and 80^0C , respectively until steady state conditions prevail. Then both the ends are suddenly insulated and kept so. Find the subsequent temperature function u (x , t). [16]

4. (a) Find the Z transform of 2^{2k+3} [6]

   (b) Solve the difference equation, using Z - transforms
   $y_{n+2} - 4y_{n+1} + 3y_n = 0$ given that
   $y_0 = 2$ and $y_1 = 4$ [10]

5. (a) Find the Fourier series of the following function f (x) = $\begin{cases} \mathrm{x}^2, & 0 \le \mathrm{x} \le \pi \\ -\mathrm{x}^2, & -\pi \le \mathrm{x} \le 0 \end{cases}$ [10]

   (b) If f(x)=x, $0 < x < \frac{\pi}{2}$

   $$= \pi - x, \frac{\pi}{2} < x < \pi$$

   Show that f(x)= $\frac{\pi}{4}$ - $\frac{2}{\pi}$ $\left[\frac{1}{1^2}\cos 2x + \frac{1}{3^2}\ \cos 6x + \frac{1}{5^2}\ \cos\ 10x + ...\right]$ [6]

6. (a) For what value of K the matrix [8]
$$\begin{bmatrix} 4 & 4 & -3 & 1 \\ 1 & 1 & -1 & 0 \\ k & 2 & 2 & 2 \\ 9 & 9 & k & 3 \end{bmatrix}$$ has rank 3.

   (b) Find whether the following set of equations are consistent if so, solve them.[8]

$$x_1 + x_2 + x_3 + x_4 = 0$$
$$x_1 + x_2 + x_3 - x_4 = 4$$
$$x_1 + x_2 - x_3 + x_4 = -4$$
$$x_1 - x_2 + x_3 + x_4 = 2.$$

7. Solve the partial differential equation using Fourier transforms, $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$ related to a string of length π subject to

   (a) u(0, t) = a sin wt
   (b) u(π , t) = 0
   (c) u(x, 0) = 0
   (d) $\left(\frac{\partial u}{\partial t}\right)_{(x,0)} = 0$ [16]

8. If A = $\frac{1}{3}\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ verify cayley Hamilton theorem.
   Find A^4 and A^{-1} using cayley Hamilton theorem. [16]

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Code No: RR210101 **RR** **Set No. 4**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

MATHEMATICS - II

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Z transform of 2^{2k+3} [6]
   (b) Solve the difference equation, using Z - transforms
   $y_{n+2} - 4y_{n+1} + 3y_n = 0$ given that
   $y_0 = 2$ and $y_1 = 4$ [10]

2. A bar 10cm long with insulated surfaces , has its ends A and B kept at 40^0C and 80^0C , respectively until steady state conditions prevail. Then both the ends are suddenly insulated and kept so. Find the subsequent temperature function u (x , t). [16]

3. Solve the partial differential equation using Fourier transforms, $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$ related to a string of length π subject to
   (a) u(0, t) = a sin wt
   (b) u(π , t) = 0
   (c) u(x, 0) = 0
   (d) $\left(\frac{\partial u}{\partial t}\right)_{(x,0)} = 0$ [16]

4. If A = $\frac{1}{3}\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ verify cayley Hamilton theorem.
   Find A^4 and A^{-1} using cayley Hamilton theorem. [16]

5. (a) Form the partial differential equation by eliminating the arbitrary functions z = f(x - it) + g(x - it) [5]
   (b) Solve the partial differential equation pyz + qz=xy . [5]
   (c) Solve the partial differential equation $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$ [6]

6. (a) Show that A= $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is a skew-Hermitian matrix and also umitary
   (b) Show that the matrix $\frac{1}{2}\begin{bmatrix} -1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 \end{bmatrix}$ is orthogonal. [8+8]

7. (a) Find the Fourier series of the following function $f(x) = \begin{cases} x^2, & 0 \le x \le \pi \\ -x^2, & -\pi \le x \le 0 \end{cases}$ [10]

   (b) If f(x)=x, $0 < x < \frac{\pi}{2}$

$$= \pi - x, \frac{\pi}{2} < x < \pi$$

   Show that f(x)= $\frac{\pi}{4}$ - $\frac{2}{\pi}$ $\left[\frac{1}{1^2}\cos 2x + \frac{1}{3^2}\cos 6x + \frac{1}{5^2}\cos 10x + ...\right]$ [6]

8. (a) For what value of K the matrix [8]
$\begin{bmatrix} 4 & 4 & -3 & 1 \\ 1 & 1 & -1 & 0 \\ k & 2 & 2 & 2 \\ 9 & 9 & k & 3 \end{bmatrix}$ has rank 3.

   (b) Find whether the following set of equations are consistent if so, solve them.[8]

$$x_1 + x_2 + x_3 + x_4 = 0$$

$$x_1 + x_2 + x_3 - x_4 = 4$$

$$x_1 + x_2 - x_3 + x_4 = -4$$

$$x_1 - x_2 + x_3 + x_4 = 2.$$

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Code No: RR210101 **RR** **Set No. 1**

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MATHEMATICS - II

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Show that A= $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is a skew-Hermitian matrix and also unitary

   (b) Show that the matrix $\frac{1}{2}\begin{bmatrix} -1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 \end{bmatrix}$ is orthogonal. [8+8]

2. (a) For what value of K the matrix [8]
   $\begin{bmatrix} 4 & 4 & -3 & 1 \\ 1 & 1 & -1 & 0 \\ k & 2 & 2 & 2 \\ 9 & 9 & k & 3 \end{bmatrix}$ has rank 3.

   (b) Find whether the following set of equations are consistent if so, solve them.[8]

$$x_1 + x_2 + x_3 + x_4 = 0$$

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3. Solve the partial differential equation using Fourier transforms, $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$ related to a string of length π subject to

   (a) u(0, t) = a sin wt

   (b) u(π , t) = 0

   (c) u(x, 0) = 0

   (d) $\left(\frac{\partial u}{\partial t}\right)_{(x,0)} = 0$ [16]

4. If A = $\frac{1}{3}\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ verify cayley Hamilton theorem.
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[10]

(b) If f(x)=x, $0 < x < \frac{\pi}{2}$

$$= \pi - x, \frac{\pi}{2} < x < \pi$$

Show that f(x)= $\frac{\pi}{4}$ - $\frac{2}{\pi}$ $\left[\frac{1}{1^2}\cos 2x + \frac{1}{3^2}\ \cos 6x + \frac{1}{5^2}\ \cos\ 10x + ...\right]$ [6]

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(c) Solve the partial differential equation $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$ [6]

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Code No: RR210101 **RR** **Set No. 3**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

MATHEMATICS - II

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

Answer any FIVE Questions

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