

Code.No: R05010202

R05

SET-1

**I - B.TECH EXAMINATIONS, DECEMBER – 2010****MATHEMATICAL METHODS****(COMMON TO EEE, ECE, CSE, EIE, BME, IT, E.CON.E CSS, ETM, ECC, ICE)****Time: 3hours****Max.Marks:80**

**Answer any FIVE questions**  
**All questions carry equal marks**

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- 1.a) Find the positive root of  $x^4 - x - 10 = 0$  by iteration.  
 b) Find the value of  $\cos 1.747$  using the values given in the table below: [8+8]

|           |        |        |        |        |        |
|-----------|--------|--------|--------|--------|--------|
| $x:$      | 1.70   | 1.74   | 1.78   | 1.82   | 1.86   |
| $\sin x:$ | 0.9916 | 0.9857 | 0.9781 | 0.9691 | 0.9584 |

- 2.a) Fit a parabola of the form  $y = a + bx + cx^2$  to the following data.

|     |     |     |     |      |      |      |      |
|-----|-----|-----|-----|------|------|------|------|
| $x$ | 1   | 2   | 3   | 4    | 5    | 6    | 7    |
| $y$ | 2.3 | 5.2 | 9.7 | 16.5 | 29.4 | 35.5 | 54.4 |

- b) A rocket is launched from the ground. Its acceleration is registered during the first 80 seconds and is given in the table below. Using Simpson's  $\frac{1}{3}$ rd rule, find the velocity of the rocket at  $t = 80$  seconds. [8+8]

|                      |    |       |       |       |       |       |       |       |       |
|----------------------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| $t(\text{sec})$      | 0  | 10    | 20    | 30    | 40    | 50    | 60    | 70    | 80    |
| $f(\text{cm/sec}^2)$ | 30 | 31.63 | 33.34 | 35.47 | 37.75 | 40.33 | 43.25 | 46.69 | 50.67 |

3. Given  $y' = x^2(1+y)$  and  $y(1)=1$ ,  $y(1.1)=1.233$ ,  $y(1.2)=1.548$ ,  $y(1.3)=1.974$  estimate  $y(1.4)$  using Milne's predictor-corrector method. [16]

- 4.a) Find the Rank of the matrix  $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -3 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$  by reducing it to the normal form.

- b) Solve the following system by the method of factorization  
 $x + 3y + 8z = 4$ ;  $x + 4y + 3z = -2$ ;  $x + 3y + 4z = 1$ . [8+8]

- 5.a) Find the eigen values and the corresponding eigen vectors of  $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ .

- b) Find the inverse of the matrix  $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \\ 2 & 1 & 2 \end{bmatrix}$  using Cayley-Hamilton theorem. [8+8]

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6. Reduce the quadratic form  $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$  to the canonical form. [16]

7.a) Obtain Fourier series for the function  $f(x)$  given by  $f(x) = \begin{cases} -x, & \text{for } -\pi < x \leq 0 \\ x, & \text{for } 0 < x < \pi \end{cases}$   
and deduce the value of  $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$

b) Find the Fourier transform of the function [8+8]

$$f(x) = \begin{cases} 1 + \frac{x}{a} & \text{for } -a < x < 0 \\ 1 - \frac{x}{a} & \text{for } 0 < x < a \\ 0, & \text{other wise} \end{cases}$$

8.a) Solve  $q^2 y^2 = z(z - px)$ .

b) Show that  $z(\sinh n\theta) = \frac{z \sinh \theta}{z^2 - 2z \cosh \theta + 1}$ . [8+8]

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SET-2

## I - B.TECH EXAMINATIONS, DECEMBER – 2010

## MATHEMATICAL METHODS

(COMMON TO EEE, ECE, CSE, EIE, BME, IT, E.CON.E CSS, ETM, ECC, ICE)

Time: 3hours

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- 2.a) Find the Rank of the matrix  $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -3 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$  by reducing it to the normal form. [8+8]
- b) Solve the following system by the method of factorization  $x+3y+8z=4$ ;  $x+4y+3z=-2$ ;  $x+3y+4z=1$ . [8+8]
- 3.a) Find the eigen values and the corresponding eigen vectors of  $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ . [8+8]
- b) Find the inverse of the matrix  $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \\ 2 & 1 & 2 \end{bmatrix}$  using Cayley-Hamilton theorem. [8+8]
4. Reduce the quadratic form  $3x^2+5y^2+3z^2-2yz+2zx-2xy$  to the canonical form. [16]
- 5.a) Obtain Fourier series for the function  $f(x)$  given by  $f(x) = \begin{cases} -x, & \text{for } -\pi < x \leq 0 \\ x, & \text{for } 0 < x < \pi \end{cases}$  and deduce the value of  $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$ . [8+8]
- b) Find the Fourier transform of the function  $f(x) = \begin{cases} 1 + \frac{x}{a} & \text{for } -a < x < 0 \\ 1 - \frac{x}{a} & \text{for } 0 < x < a \\ 0, & \text{other wise} \end{cases}$

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6.a) Solve  $q^2 y^2 = z(z - px)$ .

b) Show that  $z(\sinh n\theta) = \frac{z \sinh \theta}{z^2 - 2z \cosh \theta + 1}$ . [8+8]

7.a) Find the positive root of  $x^4 - x - 10 = 0$  by iteration.

b) Find the value of  $\cos 1.747$  using the values given in the table below: [8+8]

|           |        |        |        |        |        |
|-----------|--------|--------|--------|--------|--------|
| $x:$      | 1.70   | 1.74   | 1.78   | 1.82   | 1.86   |
| $\sin x:$ | 0.9916 | 0.9857 | 0.9781 | 0.9691 | 0.9584 |

8.a) Fit a parabola of the form  $y = a + bx + cx^2$  to the following data.

|     |     |     |     |      |      |      |      |
|-----|-----|-----|-----|------|------|------|------|
| $x$ | 1   | 2   | 3   | 4    | 5    | 6    | 7    |
| $y$ | 2.3 | 5.2 | 9.7 | 16.5 | 29.4 | 35.5 | 54.4 |

b) A rocket is launched from the ground. Its acceleration is registered during the first 80 seconds and is given in the table below. Using Simpson's  $\frac{1}{3}$ rd rule, find the velocity of the rocket at  $t = 80$  seconds. [8+8]

|                      |    |       |       |       |       |       |       |       |       |
|----------------------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| $t(\text{sec})$      | 0  | 10    | 20    | 30    | 40    | 50    | 60    | 70    | 80    |
| $f(\text{cm/sec}^2)$ | 30 | 31.63 | 33.34 | 35.47 | 37.75 | 40.33 | 43.25 | 46.69 | 50.67 |

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SET-3

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**Answer any FIVE questions**  
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- 1.a) Find the eigen values and the corresponding eigen vectors of  $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ .
- b) Find the inverse of the matrix  $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \\ 2 & 1 & 2 \end{bmatrix}$  using Cayley-Hamilton theorem. [8+8]
2. Reduce the quadratic form  $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$  to the canonical form. [16]
- 3.a) Obtain Fourier series for the function  $f(x)$  given by  $f(x) = \begin{cases} -x, & \text{for } -\pi < x \leq 0 \\ x, & \text{for } 0 < x < \pi \end{cases}$   
 and deduce the value of  $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$
- b) Find the Fourier transform of the function [8+8]
- $$f(x) = \begin{cases} 1 + \frac{x}{a} & \text{for } -a < x < 0 \\ 1 - \frac{x}{a} & \text{for } 0 < x < a \\ 0, & \text{other wise} \end{cases}$$
- 4.a) Solve  $q^2 y^2 = z(z - px)$ .
- b) Show that  $z(\sinh n\theta) = \frac{z \sinh \theta}{z^2 - 2z \cosh \theta + 1}$ . [8+8]
- 5.a) Find the positive root of  $x^4 - x - 10 = 0$  by iteration.
- b) Find the value of Cos 1.747 using the values given in the table below: [8+8]

|            |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|
| $x :$      | 1.70   | 1.74   | 1.78   | 1.82   | 1.86   |
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|   |     |     |     |      |      |      |      |
|---|-----|-----|-----|------|------|------|------|
| x | 1   | 2   | 3   | 4    | 5    | 6    | 7    |
| y | 2.3 | 5.2 | 9.7 | 16.5 | 29.4 | 35.5 | 54.4 |

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|                         |    |       |       |       |       |       |       |       |       |
|-------------------------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| t(sec)                  | 0  | 10    | 20    | 30    | 40    | 50    | 60    | 70    | 80    |
| f(cm/sec <sup>2</sup> ) | 30 | 31.63 | 33.34 | 35.47 | 37.75 | 40.33 | 43.25 | 46.69 | 50.67 |

7. Given  $y' = x^2(1+y)$  and  $y(1)=1$ ,  $y(1.1)=1.233$ ,  $y(1.2)=1.548$ ,  $y(1.3)=1.974$  estimate  $y(1.4)$  using Milne's predictor-corrector method. [16]

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SET-4

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5. Given  $y' = x^2(1+y)$  and  $y(1)=1$ ,  $y(1.1)=1.233$ ,  $y(1.2)=1.548$ ,  $y(1.3)=1.974$  estimate  $y(1.4)$  using Milne's predictor-corrector method. [16]
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- b) Find the inverse of the matrix  $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \\ 2 & 1 & 2 \end{bmatrix}$  using Cayley-Hamilton theorem. [8+8]
8. Reduce the quadratic form  $3x^2+5y^2+3z^2-2yz+2zx-2xy$  to the canonical form. [16]

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