R07

Set No. 2

I B.Tech Examinations,June 2011 MATHEMATICAL METHODS Common to ME, BME, IT, MECT, MEP, AME, ICE, E.COMP.E, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

Time: 3 hours

Code No: R07A1BS06

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks

- 1. Express the following quadratic form as 'sum of squares' by congruent transformation and write down the corresponding linear transformation $Q = 10x^2 + y^2 + z^2 - 6xy - 2yz + xz$. [16]
- 2. (a) Find the rank of $\begin{pmatrix} 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \\ 15 & 16 & 17 & 18 & 19 \end{pmatrix}$
 - (b) Find all the solutions of the following systems of linear homogeneous equations x + y + z = 0, 2x + 5y + 7z = 0, 2x 5y + 3z = 0. [8+8]
- 3. (a) If $f(x) = \begin{cases} kx; & 0 < x < \frac{\pi}{2} \\ k(\pi x); & \frac{\pi}{2} < x < \pi \end{cases}$ Find the half-range sine series.
 - (b) Find the Fourier expansion of $f(x) = x \cos x$; $0 < x < 2\pi$. [8+8]
- 4. (a) Solve $z=px+qy+p^2q^2$

(b) Using Convolution theorem, find the inverse-Z transform of $\frac{1}{(1-\frac{1}{2}z^{-1})(1-\frac{1}{4}z^{-1})}$. [8+8]

5. Determine the characteristic roots and the corresponding characteristic vectors of $\begin{bmatrix} 6 & -2 & 2 \end{bmatrix}$

the matrix
$$A = \begin{bmatrix} -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$
 [16]

- (a) The table given below reveals the velocity v of a body during the specified time t. Find the acceleration at t=1.1.
 - t: 1.0 1.1 1.2 1.3 1.4 v: 43.1 47.7 52.1 56.4 60.8 (b) Evaluate $\int_{0}^{1} \frac{dx}{1+x}$ by i. Trapezoidal rule
 - ii. Simpson's one-third rule. [8+8]
- 7. Find the value of y(0.1) and y(0.2) from $\frac{d^2y}{dx^2} x \cdot (\frac{dy}{dx})^2 + y^2 = 0$; y(0)=1, y'(0)=0 by using Taylor's series correct to 4 decimal places. [16]

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- 8. (a) Solve the following by iteration method: $x^3 + x^2 = 100$
 - (b) Solve for a positive root by False position method: $e^{-x} = \sin x$. [8+8]

RANKER

Set No. 4 $\mathbf{R07}$ Code No: R07A1BS06 I B.Tech Examinations, June 2011 MATHEMATICAL METHODS Common to ME, BME, IT, MECT, MEP, AME, ICE, E.COMP.E, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE Time: 3 hours Max Marks: 80 Answer any FIVE Questions All Questions carry equal marks **** 1. (a) Solve $z=px+qy+p^2q^2$ (b) Using Convolution theorem, find the inverse-Z transform of $\frac{1}{4}z^{-1}$ 8 + 8(a) Solve the following by iteration method: $x^3 + x^2 = 100$ 2. (b) Solve for a positive root by False position method: e^{-x} $= \sin x.$ [8+8]3. Determine the characteristic roots and the corresponding characteristic vectors of the matrix $A = \begin{bmatrix} 0 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ [16]4. Find the value of y(0.1) and y(0.2) from $\frac{d^2y}{dx^2} - x \cdot (\frac{dy}{dx})^2 + y^2 = 0$; y(0)=1, y'(0)=0 by using Taylor's series correct to 4 decimal places. [16] 5. (a) If $f(x) = \begin{cases} kx; \ 0 < x < \frac{\pi}{2} \\ k(\pi - x); \ \frac{\pi}{2} < x < \pi \end{cases}$ Find the half-range sine series. (b) Find the Fourier expansion of $f(x) = x \cos x$; $0 < x < 2\pi$. [8+8](a) Find the rank of $\begin{pmatrix} 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \\ 15 & 16 & 17 & 18 & 19 \end{pmatrix}$ 6. (b) Find all the solutions of the following systems of linear homogeneous equations x + y + z = 0, 2x + 5y + 7z = 0, 2x - 5y + 3z = 0. |8+8|7. Express the following quadratic form as 'sum of squares' by congruent transformation and write down the corresponding linear transformation $Q = 10x^2 + y^2 + z^2 - 6xy$ -

8. (a) The table given below reveals the velocity v of a body during the specified time t. Find the acceleration at t=1.1.
t: 1.0 1.1 1.2 1.3 1.4
v: 43.1 47.7 52.1 56.4 60.8

[16]

2yz+xz.

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(b) Evaluate $\int_{0}^{1} \frac{dx}{1+x}$ by

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i. Trapezoidal rule

ii. Simpson's one-third rule.

[8+8]

FIRST

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Set No. 1

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Time: 3 hours

Code No: R07A1BS06

Max Marks: 80

[16]

[8+8]

Answer any FIVE Questions All Questions carry equal marks

- 1. Determine the characteristic roots and the corresponding characteristic vectors of $\begin{bmatrix} 6 & -2 & 2 \end{bmatrix}$
 - the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
- 2. Find the value of y(0.1) and y(0.2) from $\frac{d^2y}{dx^2} x \cdot (\frac{dy}{dx})^2 + y^2 = 0$, y(0)=1, y'(0)=0 by using Taylor's series correct to 4 decimal places. [16]
- 3. (a) Solve the following by iteration method: $x^3 + x^2 = 100$
 - (b) Solve for a positive root by False position method: $e^{-x} = \sin x$. [8+8]

4. (a) If
$$f(x) = \begin{cases} kx; & 0 < x < \frac{\pi}{2} \\ k(\pi - x); & \frac{\pi}{2} < x < \pi \end{cases}$$

Find the half-range sine series

- (b) Find the Fourier expansion of $f(x) = x \cos x$; $0 < x < 2\pi$. [8+8]
- Express the following quadratic form as 'sum of squares' by congruent transformation and write down the corresponding linear transformation Q =10x²+y²+z²-6xy-2yz+xz.
- 6. (a) The table given below reveals the velocity v of a body during the specified time t. Find the acceleration at t=1.1.

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t: 1.0 1.1 1.2 1.3 1.4
v: 43.1 47.7 52.1 56.4 60.
b) Evaluate
$$\int_{0}^{1} \frac{dx}{1+x}$$
 by

- i. Trapezoidal rule
- ii. Simpson's one-third rule.

7. (a) Find the rank of
$$\begin{pmatrix} 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \\ 15 & 16 & 17 & 18 & 19 \end{pmatrix}$$

(b) Find all the solutions of the following systems of linear homogeneous equations x + y + z = 0, 2x + 5y + 7z = 0, 2x - 5y + 3z = 0. [8+8]

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Set No. 1

- 8. (a) Solve $z=px+qy+p^2q^2$
 - (a) Solve z=px+qy+p q
 (b) Using Convolution theorem, find the inverse-Z transform of 1/((1-1/2)z^{-1})(1-1/4)z^{-1}). [8+8]

FRANKER

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Set No. 3

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Time: 3 hours

Code No: R07A1BS06

Max Marks: 80

[8+8]

Answer any FIVE Questions All Questions carry equal marks

- 1. (a) The table given below reveals the velocity v of a body during the specified time t. Find the acceleration at t=1.1.
 - t: 1.0 1.1 1.2 1.3 1.4 v: 43.1 47.7 52.1 56.4 60.8 Evaluate $\int_{1}^{1} \frac{dx}{dx}$ by
 - (b) Evaluate $\int_{0}^{1} \frac{dx}{1+x}$ by
 - i. Trapezoidal rule
 - ii. Simpson's one-third rule.
- 2. Express the following quadratic form as 'sum of squares' by congruent transformation and write down the corresponding linear transformation $Q = 10x^2+y^2+z^2-6xy-2yz+xz$. [16]
- 3. Find the value of y(0.1) and y(0.2) from $\frac{d^2y}{dx^2} x \cdot (\frac{dy}{dx})^2 + y^2 = 0$; y(0)=1, y'(0)=0 by using Taylor's series correct to 4 decimal places. [16]
- 4. (a) Solve the following by iteration method: $x^3 + x^2 = 100$
 - (b) Solve for a positive root by False position method: $e^{-x} = \sin x$. [8+8]

5. (a) If
$$f(x) = \begin{cases} kx; & 0 < x < \frac{\pi}{2} \\ k(\pi - x); & \frac{\pi}{2} < x < \end{cases}$$

Find the half-range sine series.

(b) Find the Fourier expansion of $f(x) = x \cos x$; $0 < x < 2\pi$. [8+8]

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6. (a) Find the rank of
$$\begin{pmatrix}
3 & 4 & 5 & 6 & 7 \\
4 & 5 & 6 & 7 & 8 \\
5 & 6 & 7 & 8 & 9 \\
15 & 16 & 17 & 18 & 19
\end{pmatrix}$$

(b) Find all the solutions of the following systems of linear homogeneous equations x + y + z = 0, 2x + 5y + 7z = 0, 2x - 5y + 3z = 0. [8+8]

7. (a) Solve
$$z=px+qy+p^2q^2$$

(b) Using Convolution theorem, find the inverse-Z transform of $\frac{1}{(1-\frac{1}{2}z^{-1})(1-\frac{1}{4}z^{-1})}$. [8+8]

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8. Determine the characteristic roots and the corresponding characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ [16]

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