

Code.No: R05012304

R05

SET-1

I B.TECH – EXAMINATIONS, JUNE - 2011
MATHEMATICS FOR BIOTECHNOLOGISTS
(BIOTECHNOLOGY)

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

Answer any FIVE questions
All questions carry equal marks

- - -

1.a) Find $\lim_{x \rightarrow 0} \left[\frac{(1+x)^{3/2} - 1}{x} \right]$.

b) Find the length of the tangent and normal to the curve $y = x^3 + 4x^2 + 6x$ at '-1'. [8+8]

2.a) Evaluate $\int x \sin^2 x dx$.

b) Find the area bounded between the curves $y = x^2 - 5x$ and $y = 4 - 2x$. [8+8]

3.a) Solve $x + 2y + z = 14$; $3x + 4y + z = 11$; $2x + 3y + z = 11$ by Gauss-Jordan Method.

b) Find the Eigen values and Eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. [8+8]

4.a) Form the differential equation of $y = e^x (A \cos x + B \sin x)$ by estimating arbitrary constants A and B.

b) Solve $x \frac{dy}{dx} + y = x^3 y^6$. [8+8]

5.a) Solve $\frac{d^2 y}{dx^2} + \frac{dy}{dx} = x^2 + 2x$.

b) The number 'N' of bacteria in a culture grew at a rate proportional to 'N'. The value of 'N' is initially 100 and increased 332 in one hour. What was the value of 'N' after $1\frac{1}{2}$ hour? [8+8]

6. Solve the following system of equations by Gauss Seidel Iteration Method
 $28x + 4y - z = 32$; $x + 3y + 10z = 24$; $2x + 17y + 4z = 35$. [16]

7.a) Find $f(2.5)$ using Newton's forward formula from the following table

| | | | | | | | |
|---|---|---|----|----|-----|-----|------|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 0 | 1 | 16 | 81 | 256 | 625 | 1296 |

b) Evaluate $\int_0^1 \sqrt{1+x^4} dx$ using Simpson's $\frac{3}{8}$ rule $h = \frac{1}{6}$. [8+8]

8.a) Find the Laplace Transform of i) $t^2 e^{-2t}$ ii) $\frac{1 - \cos t}{t^2}$.

b) Solve $y''' + 2y'' - y' - 2y = 0$; $y(0) = 1$; $y'(0) = y''(0) = 2$. [8+8]

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SET-2

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- 1.a) Solve $x + 2y + z = 14$; $3x + 4y + z = 11$; $2x + 3y + z = 11$ by Gauss-Jordan Method.
- b) Find the Eigen values and Eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. [8+8]
- 2.a) Form the differential equation of $y = e^x (A \cos x + B \sin x)$ by estimating arbitrary constants A and B.
- b) Solve $x \frac{dy}{dx} + y = x^3 y^6$. [8+8]
- 3.a) Solve $\frac{d^2 y}{dx^2} + \frac{dy}{dx} = x^2 + 2x$.
- b) The number 'N' of bacteria in a culture grew at a rate proportional to 'N'. The value of 'N' is initially 100 and increased 332 in one hour. What was the value of 'N' after $1\frac{1}{2}$ hour? [8+8]
4. Solve the following system of equations by Gauss Seidel Iteration Method
 $28x + 4y - z = 32$; $x + 3y + 10z = 24$; $2x + 17y + 4z = 35$. [16]
- 5.a) Find $f(2.5)$ using Newton's forward formula from the following table
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|---|---|---|----|----|-----|-----|------|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 0 | 1 | 16 | 81 | 256 | 625 | 1296 |
- b) Evaluate $\int_0^1 \sqrt{1+x^4} dx$ using Simpson's $\frac{3}{8}$ rule $h = \frac{1}{6}$. [8+8]
- 6.a) Find the Laplace Transform of i) $t^2 e^{-2t}$ ii) $\frac{1 - \cos t}{t^2}$.
- b) Solve $y''' + 2y'' - y' - 2y = 0$; $y(0) = 1$; $y'(0) = y''(0) = 2$. [8+8]
- 7.a) Find $\lim_{x \rightarrow 0} \left[\frac{(1+x)^{3/2} - 1}{x} \right]$.
- b) Find the length of the tangent and normal to the curve $y = x^3 + 4x^2 + 6x$ at '-1'. [8+8]
- 8.a) Evaluate $\int x \sin^2 x dx$.
- b) Find the area bounded between the curves $y = x^2 - 5x$ and $y = 4 - 2x$. [8+8]

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- b) The number 'N' of bacteria in a culture grew at a rate proportional to 'N'. The value of 'N' is initially 100 and increased 332 in one hour. What was the value of 'N' after $1\frac{1}{2}$ hour? [8+8]
2. Solve the following system of equations by Gauss Seidel Iteration Method
 $28x + 4y - z = 32$; $x + 3y + 10z = 24$; $2x + 17y + 4z = 35$. [16]
- 3.a) Find $f(2.5)$ using Newton's forward formula from the following table
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| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
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- b) Evaluate $\int_0^1 \sqrt{1+x^4} dx$ using Simpson's $\frac{3}{8}$ rule $h = \frac{1}{6}$. [8+8]
- 4.a) Find the Laplace Transform of i) $t^2 e^{-2t}$ ii) $\frac{1 - \cos t}{t^2}$.
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- 5.a) Find $\lim_{x \rightarrow 0} \left[\frac{(1+x)^{3/2} - 1}{x} \right]$.
- b) Find the length of the tangent and normal to the curve $y = x^3 + 4x^2 + 6x$ at '-1'. [8+8]
- 6.a) Evaluate $\int x \sin^2 x dx$.
- b) Find the area bounded between the curves $y = x^2 - 5x$ and $y = 4 - 2x$. [8+8]
- 7.a) Solve $x + 2y + z = 14$; $3x + 4y + z = 11$; $2x + 3y + z = 11$ by Gauss-Jordan Method.
- b) Find the Eigen values and Eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. [8+8]
- 8.a) Form the differential equation of $y = e^x (A \cos x + B \sin x)$ by estimating arbitrary constants A and B.
- b) Solve $x \frac{dy}{dx} + y = x^3 y^6$. [8+8]

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|---|---|---|----|----|-----|-----|------|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 0 | 1 | 16 | 81 | 256 | 625 | 1296 |

- b) Evaluate $\int_0^1 \sqrt{1+x^4} dx$ using Simpson's $\frac{3}{8}$ rule $h = \frac{1}{6}$. [8+8]
- 2.a) Find the Laplace Transform of i) $t^2 e^{-2t}$ ii) $\frac{1-\cos t}{t^2}$.
- b) Solve $y''' + 2y'' - y' - 2y = 0$; $y(0) = 1$; $y'(0) = y''(0) = 2$. [8+8]
- 3.a) Find $\lim_{x \rightarrow 0} \left[\frac{(1+x)^{3/2} - 1}{x} \right]$.
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- 4.a) Evaluate $\int x \sin^2 x dx$.
- b) Find the area bounded between the curves $y = x^2 - 5x$ and $y = 4 - 2x$. [8+8]
- 5.a) Solve $x + 2y + z = 14$; $3x + 4y + z = 11$; $2x + 3y + z = 11$ by Gauss-Jordan Method.
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