

Code :R5102305

**B.Tech I Year (R05) Supplementary Examinations, May 2011**  
**MATHEMATICS FOR BIOTECHNOLOGISTS**  
**(Biotechnology)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE questions**  
**All questions carry equal marks**  
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1. (a) If  $A=(1,2,3)$   $B=(x,y,z)$   $f(1)=x$ ,  $f(2)=y$ ,  $f(3)=y$  then find  $f$  is an injection, surjection or bijection.

(b) Find  $\frac{d}{dx} \left( \frac{\cos 3x}{x^2} \right)$

2. Evaluate the following integrals.

(a)  $\int \frac{\sin 2x dx}{\sqrt{1+\cos^2 x}}$

(b)  $\int \frac{(x+1)dx}{x(x+1)(x+2)}$

(c)  $\int_0^1 x e^{-x^2} dx$

3. (a) Solve the following system of equations  $x+y+4z=6$ ,  $3x+2y-2z=9$ ,  $5x+y+2z=13$ . Using Cramer's rule.

(b) Find the rank of the matrix by reducing it to the normal form.

$$\begin{bmatrix} 1 & 0 & 1 & 0 \\ 3 & -1 & 2 & 1 \\ 2 & 1 & 2 & 1 \\ 2 & -2 & 1 & 0 \end{bmatrix}$$

4. (a) Form the differential equation by eliminating the arbitrary constant :  $\log y/x = cx$ .

(b) Solve the differential equation:  $(1+y^2) dx = (\tan^{-1}y - x) dy$ .

5. (a) Solve the differential equation  $y'' - y' - 2y = 3e^{2x}y(0) = 0, y'(0) = 2$

(b) Find the orthogonal trajectories of the family of circles  $x^2 + y^2 = ax$ .

6. (a) Find the root of  $x \tan x + 1 = 0$  using Newton Raphson method

(b) Solve the system of equations by GaussSeidel method  
 $8x - 3y + 2z = 20$ ,  $6x + 3y + 12z = 35$ ,  $4x + 11y - z = 33$

7. (a) Construct difference table for the following data:

x	0.1	0.3	0.5	0.7	0.9	1.1	1.3
F(x)	0.003	0.067	0.148	0.248	0.370	0.518	0.697

And find  $F(0.6)$  using a cube that fits at  $x = 0.3, 0.5, 0.7$  and  $0.9$  using Newton's forward formula.

(b) Evaluate  $\int_0^5 e^{-x^2} dx$  using Trapezoidal rule. Taking  $h = 1$

8. (a) Find the Laplace Transformations of the following functions  
 $e^{-3t}(2\cos 5t - 3\sin 5t)$

(b) Find  $L^{-1} \left[ \log \left( \frac{s+1}{s-1} \right) \right]$

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