

I B.Tech YEAR(R05) Supplementary Examinations, May/June 2010
MATHEMATICS FOR BIOTECHNOLOGISTS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Find $\frac{d}{dx} [\tan^{-1} x + e^{2x} \sin^{-1} x]$
 (b) Find the length of tangent for $\frac{x^2}{4} + \frac{y^2}{16} = 1$ at (2,0) [8+8]
2. Evaluate the following integrals.
 (a) $\int \frac{1+x+\sqrt{1+x^2}}{\sqrt{x}+\sqrt{1+x}} dx$
 (b) $\int \frac{(7x-4)dx}{(x-1)^2(x+2)}$
 (c) $\int_{\pi/4}^{\pi/2} \frac{\cos \theta d\theta}{\left(\cos \frac{\theta}{2} + \sin \frac{\theta}{2}\right)^2}$ [5+5+6]
3. (a) Solve the system of equations $x+y-z=1$, $2x-3y+4z=3$, $x+3y-z=3$ by Matrix Inversion method.
 (b) Find the eigen values and the corresponding eigen vectors of the matrix.

$$\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$
 [8+8]
4. (a) From the differential equation by eliminating the arbitrary constants, $y=a \sec x + b \tan x$.
 (b) Solve the differential equation $(y^4+2y)dx+(xy^3+2y^4-4x)dy=0$. [6+10]
5. (a) Solve the differential equation: $(D^2 + 5D + 6)y = e^x$.
 (b) In a chemical reaction a given substance is being converted into another at a rate proportional to the amount of substance unconverted. If $1/5$ th of the original amount has been transformed in 4 minutes how much time will be required to transform one half. [10+6]
6. (a) Find a real root of the equation $x^3 - x - 4 = 0$ by bisection method
 (b) Solve the system of equations by Jacobis method.

$$\begin{aligned} 4x + y + 3z &= 17 \\ x + 5y + z &= 14 \\ 2x - y + 8z &= 12 \end{aligned}$$
 [8+8]
7. (a) Find $y(35)$ using Lagranges interpolation formula

x	25	30	40	50
y	52	67.3	84.1	94.4

 (b) Using Lagrange interpolation formula find $f(4)$, given $f(1.5) = -0.25$, $f(3) = 2$, and $f(6) = 20$. [8+8]
8. (a) Find $L [\cos^3 3t]$
 (b) Find $L^{-1} \left[\frac{(5s+3)}{(s-1)(s^2+2s+5)} \right]$ [8+8]
