

Code :R5102305

B.Tech I Year (R05) Supplementary Examinations, December 2010
MATHEMATICS FOR BIOTECHNOLOGISTS
 (Biotechnology)

Time: 3 hours

Max Marks: 80

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

1. (a) If $A = [x/2 < x \leq 4]$, $B = [x/1 < x < 3]$ $C = [x/5 \leq x < 8]$, x is an integer. Then find $(A \cup B) \cup C$

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

2. Evaluate the following integrals.

(a) $\int \sqrt{1 - \sin x} dx$

(b) $\int \sqrt{\cot x} \cdot \operatorname{cosec}^2 x dx$

(c) $\int_0^{\pi/2} \frac{dx}{4+5 \cos x}$

3. If $f(\theta) = \begin{vmatrix} \cos^2 \theta & \cos \theta \sin \theta & -\sin \theta \\ \cos \theta \sin \theta & \sin^2 \theta & \cos \theta \\ \sin \theta & -\cos \theta & 0 \end{vmatrix}$

then show that $f(\pi/6)=1$

4. (a) Form the differential equation by eliminating the arbitrary constant: $x^2 + y^2 = c$.

(b) Solve the differential equation: $\frac{dy}{dx} + y \cos x = y^3 \sin 2x$.

5. (a) Solve the differential equation: $(D^2 - 2D + 2)y = 2e^x \cos x$.

(b) Find the orthogonal trajectory of the family of the cardioids $r = a(1 + \cos \theta)$

6. (a) Find a root of $x \sin x + \cos x = 0$ which is near to π using Newton's formula

(b) Solve the system of equations by GaussSeidel method
 $x + 8y + 2z = 3$, $-x + 4y + 8z = 6$, $5x + 3y + z = 3$

7. (a) Find $f(15)$ using Lagrange's formula.

x	5	6	9	11
f(x)	12	13	14	16

(b) Evaluate $\int_0^1 e^{-x^2}$ taking $h = .2$ using

i. Simpson's $\frac{1}{3}rd$

ii. Trapezoidal rule.

8. (a) State and prove second shifting theorem.

(b) Find $L^{-1}\{s / (s^2 - a^2)\}$

★★★★★