R05

Code No: R05012304

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year Examinations, June - 2014
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) Find i) $\frac{dy}{dx}$, if $x^y + y^x = a^b$ ii) find the equation of the normal to the curve $y^2 = 4ax$ at the point (a, a).

b) Verify Euler's Theorem for the function $f(x, y) = x^2 + y^2 + xy$.

2.a) Integrate:

i) $\int e^{3x} Sin\, 2x dx$

ii) When $m \neq n$ $\int_0^{2\pi} \sin mx\, Cos\, nx dx$

iii) $\int_0^{\pi/2} \sin^m x\, Cos^{\,3} x dx$

b) Find the area between the curves $y = \frac{x^2}{4} - 1$ and the line $x - 2y + 2 = 0$.

3.a) Solve the differential equation $\frac{dy}{dx} = \frac{x^2 y}{x^3 + y^3}$.

b) Form the differential equation by eliminating the constants from $y = aSinx + b\, Cos\, x$

4.a) Solve the differential equation $\left(D^2 + 5D + 4\right) y = e^{-x} Sin\, 2x$.

b) Solve the differential equation $\left(D^2 + 4\right) y = x^4 + x^2 + 1$.

5.a) Find the Eigen values and Eigen Vectors of the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$.

b) Solve the simultaneous equations $\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ -3 \\ 3 \end{bmatrix}$ using Gauss Jordan Method.

6. Find:

a) $L[t \sin t]$ b) $L\left(\frac{Sin\, t\, Sin\, 5t}{t}\right)$ c) $L^{-1}\left(Tan^{-1} \frac{s+a}{b}\right)$.

7. Use Gauss Siedal iterative method to obtain the solution of the equations:
$9x - y + 2z = 9;\ \ x + 10y - 2z = 15;\ \ 2x - 2y - 13z = -17$

8.a) The velocity V of a particle at a distance S from a point on its path is given by the table below. Estimate the time taken to travel 60 mts by Simpson's 1/3rd rule and Simpson's 3/8th rule.

S(meters)	0	10	20	30	40	50	60
V(m/sec)	47	58	64	65	61	52	38

b) Use Runge-Kutta method of 4th order to find y(0.2), given $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, y(0)=1, taking h=0.2.

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