Exam No:_____

No. of printed pages:02

SARDAR PATEL UNIVERSITY

[21/A-21]

M.Sc. Integrated Biotechnology,First semester

Subject Code: PS01CIGB06

Subject Title: Biomathematics

Date:24/04/2018

Time:02:00pm to 05:00pm

Day:Tuesday

Total Marks:70

Note: Figures to the right indicate marks.

Q-1 **Choose the best appropriate alternative for the following:** [08]

1 If f(x) represents parabola opening upward, f(x) can be____.
(a)-2x (b) 5 (c) $-2x^2+9$ (d) $2x^2+9$

2 Derivative of $2x^4$ is____.
(a)$18x^3$ (b) $8x^3$ (c) $2x^3$ (d) None of these

3 Partial derivative of xy with respect to x is____.
(a)x (b)y (c) 0 (d) None of these

4 Integration of 2cosx is____.
(a)2sinx (b) -2sinx (c) (sinx)/2 (d) None of these

5 If $f'(x_0)=0, x_0$ is called____.
(a)Maxima (b) Minima (c) Extrema (d) None of these

6 If A is a 3×3 matrix whose inverse exists,then the rank of A is____.
(a) ≥ 3 (b) ≤ 3 (c) 3 (d)Is not defined

7 Which of the following property does not hold for matrix multiplication?
(a)Commutative (b) Distributive (c) Both (d) None of these

8 If f:A→B is a function ,A is called
(a)Domain (b) Range (c)Codomain (d)None of these

Q-2 **Attempt any seven of the following:** [14]

1 Find coordinates of vertex of the parabola $y= -2x^2+15x+9$

2 Determine slope and y-intercept for 9x-2y+5=0.

3 Evaluate: $\lim_{x\to 3}\frac{x^3-27}{x^2-9}$.

4 Find $\frac{dy}{dx}$ for $y=e^{5x}$.

5 Find $\frac{\partial z}{\partial x}$ if $z=x^2+y^2$.

6 Identify order and degree of the differential equation:
$\left(\frac{d^2y}{dx^2}\right)^4+9\left(\frac{dy}{dx}\right)-7xy=0$.

7 Evaluate 3A-2B if $A=\begin{pmatrix}-2 & 2\\ -1 & 1\end{pmatrix}$ and $B=\begin{pmatrix}4 & -1\\ 1 & 4\end{pmatrix}$.

8 Define: (i) Equality of matrices (ii) Skew symmetric matrix.

9 Explain Row echelon form of a matrix.

[P.T.O.]

Q-3 A Define Power function. Describe various shapes of power function for different values of n. [06]

B (i)Find domain and range of the function f(x)=$\frac{2x-1}{x-5}$. [06]

(ii)Solve:logx+log2=log5-logx.

OR

B (i)Prove that $\frac{\tan x+\sec x}{\tan x-\sec x}=\frac{1+\cos ecx}{1-\cos ecx}$. [06]

(ii)Give equation of a straight line passing through (1,5) and (2,4). [06]

Q-4 A Evaluate: (i)$\lim_{x\to 0}\frac{5^x-9^x}{\sin x}$ (ii) $\lim_{n\to\infty}\frac{11n^5+7n^3+n^2+1}{15n^5+8n^3+3n^2+15}$. [06]

B Find $\frac{dy}{dx}$ for (i)y=sin(logx) (ii) y=$\frac{2x^2+1}{5x}$. [06]

OR

B Define local maxima and local maximum for a function of single variable. Find local maximum and local minimum value for f(x)=(logx)/x, if they exist. [06]

Q-5 A Find all second order partial derivatives for z=xy. [06]

B Find the local minimum value for the function of two variables: f(x,y)=$2x^2+2y^2+xy$. [06]

OR

B Evaluate (i)$\int x\sin x dx$ (ii) $\int(x^3+3x^2+8x+11)dx$ [06]

Q-6 A Find the inverse of the matrix $\begin{bmatrix}2 & 1 & 3\\ 4 & 2 & -1\\ 2 & -1 & -1\end{bmatrix}$ [06]

B Find the eigenvalues and the corresponding eigenvectors of the matrix $\begin{bmatrix}3 & 5\\ -2 & -4\end{bmatrix}$. [06]

OR

B Find the eigenvalues and the corresponding eigenvectors of the matrix $\begin{bmatrix}5 & 2 & 2\\ 3 & 6 & 3\\ 6 & 6 & 9\end{bmatrix}$. [06]