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(9/A10)

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SARDAR PATEL UNIVERSITY

M. Sc. Integrated Biotechnology (IGBT) 1st Semester
Theory Exam – April 2015
PS01CIGB06 – Biomathematics
1st May 2015 (Friday), 10:30 am to 1:30 pm

Maximum Marks: 70

Note: 1) All the Questions are compulsory.
2) Figures on the right indicate marks.

Q.1 Choose the correct option. **1x8= 8**

(1) If a set A has *n* elements, then the total number of subsets of A is .....
(a) 2^n (b) n (c) n^2 (d) 2n

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

(3) Equation of a linear function with slope (-2) a *y*- intercept 5 is .....
(a) $y = 5x + (-2)$ (b) $y = (-2)x + 5$ (c) $y = (-2)$ (d) $x = (-2)y + 5$

(4) $\frac{d}{dx}(logx)$ =.....
(a) $\frac{1}{x^2}$ (b) $\frac{1}{x}$ (c) $\frac{1}{logx}$ (d) e^x

(5) $\int sinx\, dx =$ .....
(a) $\cos x + C$ (b) $-\cos x + C$ (c) $\sin x + C$ (d) $-\sin x + C$

(6) The integration is also known as.....
(a) summation (b) antiderivative (c) combination (d) none of these

(7) If A = $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ then A is. . . . . .
(a) Identity matrix (b) Diagonal matrix (c) Scalar matrix (d) None of these

(8) If A is skew symmetric matrix then A^T =.....
(a) −A (b) A (c) A^{-1} (d) None of these

Q.2. Attempt any Seven of the following: **2x7= 14**

(1) Define set and If A={1,2,4,5,6} and B={2,3,4,5,6} find the intersection of set A and set B

(2) Find slope and *y*-intercept of $3x + 5y = 15$

(3) Find domain and range of $f(x) = \sqrt{x-4}$

(4) Calculate $\lim_{x\to 3}(x^2 + 2x)$.

(5) Find d*y*/d*x* when $y = \cos 3x$.

(6) Evaluate $\int sint^6 cost\ dt$.

(7) Calculate $\partial z/\partial x$, when $z = y \ln x$.

(8) Define with example: Square matrix, Colum matrix.

(9) If A= $\begin{bmatrix} 1 & 0 & -1 \\ 0 & -2 & 4 \end{bmatrix}$ then find the matrix 2A.

Q.3 (A) If $f(x) = 3x^2 - 7x + 2$ then find $f(a)$, $f(a + h)$, $f(a + h) - f(a)$ [06]

(B) (i) Find the vertex of parabola whose equation $y = (-2x^2 + 12x)$ [03]

(ii) Find the equation of a circle with its centre at (2, -3) and its radius equal to 5. [03]

OR

(B) Prove that $1 + \cot^2 \theta = \text{cosec}^2\theta$. [06]

Q.4 (A) If $y = \sqrt{t+1}$, find dy/dt. [06]

(B) Find the derivative of y, when $y = (x^2 + 5x + 1)(2 - x^2)^4$. [06]

OR

(B) Evaluate $lim_{x\to\infty} \frac{\sqrt{1+x}-1}{x}$. [06]

Q.5 (A) Find integral of $\left(x - \frac{3}{x}\right)^2$. [06]

(B) Evaluate $\int \frac{1}{\sqrt{a^2-x^2}} dx$, $a > 0$ [06]

OR

(B) Calculate $\partial^2 z/\partial y^2$, $\partial^2 z/\partial x \partial y$ when $z = x^3y^4$. [06]

Q.6 (A) If G= $\begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$, H= $\begin{bmatrix} -1 & 0 \\ 2 & 1 \end{bmatrix}$ and I= $\begin{bmatrix} 0 & 1 \\ 1 & -1 \end{bmatrix}$, then prove that G(H+I) = GH+GI. [06]

(B) If A= $\begin{bmatrix} 2 & -1 & 1 \\ -3 & 2 & 4 \\ 0 & 3 & -5 \end{bmatrix}$ and B= $\begin{bmatrix} 1 & 1 \\ 4 & -2 \\ 2 & -3 \end{bmatrix}$, then find AB. Is BA defined? Why? [06]

OR

(B) Find eigen value and eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. [06]

All the best!