[103]

Seat No :_____

No of printed pages : **3**

SARDAR PATEL UNIVERSITY
B.Sc.(SEMESTER - I) EXAMINATION (NC)
Wednesday , 20^{th} Nov. ,2019
US01EMTH02 (MATHEMATICS)

ne : 02:00 p.m. to 04:00 p.m. **Maximum Marks : 70**

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ue.1 Fill in the following blanks . 10

(1) $f : \mathbb{N} \to \mathbb{N}$ defined by $f(x) = 2x$. then $R_f =$ .....

(a) {1,3,5,7,...} (b) {4,8,12,16,...} (c) {2,4,6,8,...} (d) {3,6,9,12,...}

(2) $f : \mathbb{N} \to \mathbb{N}$ defined by $f(x) = 2x + 1$. then $R_f =$ .....

(a) {1,3,5,7,...} (b) {3,5,7,9,...} (c) {2,4,6,8,...} (d) {3,6,9,12,...}

(3) If $f : \mathbb{N} \to \mathbb{N}$ defined by $f(x) = x^2$ and $g : \mathbb{N} \to \mathbb{N}$ defined by $g(x) = x^3$ then fog(x)=.....

(a) x^5 (b) x^4 (c) x^6 (d) None of these

(4) Set of all Zero's of Sine function is .....

(a) $\{(2k+1)\frac{\Pi}{2} \setminus k \in \mathbb{Z}\}$ (b) 0 (c) $\{2k\pi \setminus k \in \mathbb{Z}\}$ (d) $\{k\pi \setminus k \in \mathbb{Z}\}$

(5) $\tan^2\theta - \sec^2\theta =$ .....

(a) -1 (b) 0 (c) 1 (d) $\text{cosec}^2\theta$

(6) $\sin\left(\frac{\pi}{2} - \theta\right) =$ .....

(a) $-\cos\theta$ (b) $\sin\theta$ (c) $-\sin\theta$ (d) $\cos\theta$

(7) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$ then $A^T =$ .....

(a) $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ (d) None of these

(8) If $A = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ is.....

(a) Identity matrix (b) Zero matrix (c) Row matrix (d) Column matrix

(9) If $\overline{x} = (\cos\alpha, \sin\alpha)$, $\overline{y} = (\cos\beta, \sin\beta)$ then $|\overline{x}| + |\overline{y}| =$ .....

(a) 1 (b) 0 (c) 2 (d) -1

(10) If $\overline{x} = (\cos\alpha, \sin\alpha)$, $\overline{y} = (\cos\beta, \sin\beta)$ then $|\overline{x}||\overline{y}| =$ .....

(a) 1 (b) 0 (c) 2 (d) -1

(PTO)

Que.2 Answer the following (Any Ten)

(1) Define Composition of function with example .

(2) Simplify $7log(8/5) - 6log(4/15) + 3log(5/72)$.

(3) Prove that $1 + \cot^2\theta = \text{cosec}^2\theta$.

(4) If $A = \begin{bmatrix} 1 & 5 \\ 2 & 3 \end{bmatrix}$ then find $A + 2A^T$. Is it symmetric ? .

(5) Solve $x(1,2) + y(2,1) = (3,3)$.

(6) Evaluate $|(1,2,3) + (1,1,3)|$.

(7) Let $f : \mathbb{N} \to \mathbb{N}$ defined by $f(x) = 5x - 3$. Is it one - one ? Is it onto ? Verify it .

(8) If $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = x^2 - 1$ and $g : \mathbb{R} \to \mathbb{R}$ defined by $g(x) = 2x - 3$ then find fog and gof .

(9) Express $log_{10}1000 = 5$ in Exponential form .

(10) State properties of determinant .

(11) If $A = \begin{bmatrix} 4 & 6 & -2 \\ 2 & 0 & 2 \\ -4 & 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 2 & 1 \\ 0 & -1 & 4 \\ -2 & 3 & 4 \end{bmatrix}$ then find $2A - 3B$ and $A + 2B$.

(12) If $\overline{x} = (-1,0,1)$, $\overline{y} = (1,2,-1)$, $\overline{z} = (1,2,-1)$ then find $(2\overline{x} + 3\overline{y}) \cdot \overline{z}$.

Que.3 (a) Solve $2x(x-7) = 3(2-x)$. 5

(b) Find conjugate and Modulus of $(-3 - 2i)^2$. 5

OR

Que.3 (c) Solve $(3+x)^2 = 4x - 1$. 4

(d) If $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = (x+2)^2$, $g : \mathbb{R} \to \mathbb{R}$ defined by $g(x) = x + 3$ and $h : \mathbb{R} \to \mathbb{R}$ defined by $h(x) = -3x$ then find fog , $go(foh)$, $(gof)oh$, hoh . 6

Que.4 (a) Solve $\frac{1}{2}\, log(11 + 4\sqrt{7}) = log(2+x)$. 5

(b) Prove that $\left(\frac{1 - \tan\theta}{1 - \cot\theta}\right)^2 = \frac{1 + \tan^2\theta}{1 + \cot^2\theta}$. 5

OR

Que.4 (c) Solve $log_{10}(7x-9)^2 + log_{10}(3x-4)^2 = 2$. 5

(d) If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$, then prove that $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$. 5

Que.5 (a) Prove that $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$. 5

(b) $A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$ then prove that $(AB)^{-1} = B^{-1}A^{-1}$. 5

OR

Que.5 (c) Solve $2x + 3y = 7; 4x - y = 9$ by using Cramer's rule. 5

(d) $A = \begin{bmatrix} \sin\theta & \cos\theta \\ -\cos\theta & \sin\theta \end{bmatrix}$ then prove that $A^{-1} = A^T$. 5

Que.6 (a) Find the measure of the angle between (1,-1,-2) and (2,-1,1) . 5

(b) If $\overline{x} = (-1, 1, 2)$, $\overline{y} = (1, 2, -1)$, $\overline{z} = (2, -1, 1)$ then find $\overline{x} \times (\overline{y} \times \overline{z})$. 5

OR

Que.6 (c) If $\overline{x} = \overline{-i} - \overline{j}$, $\overline{y} = \overline{j} + \overline{k}$, $\overline{z} = \overline{k} - \overline{i}$ then find $(\overline{x} \wedge \overline{y})$, $(\overline{y} \wedge \overline{z})$, $(\overline{z} \wedge \overline{x})$. 5

(d) Find direction angles for $(-1, -1, 0)$; $(3, -4, 0)$. 5

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