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SARDAR PATEL UNIVERSITY(B.Sc. Sem.1 On Demand Examination (NC))

MATHEMATICS - US01EMTH02 – ELECTIVE MATHS

20 June 2022, Monday

Time Duration: 02 Hours, 9:00am to 11:00pm **Maximum Marks: 70**

Note: Figures to the right indicates the full marks.

Q.1 Answer the following by selecting the correct choice from the given options. **[10]**

(1) The domain of function f={ (1,2) , (2,5) , (3,8) , (4,11) } is _____.
(a) $\emptyset$ (b) {1,3,4} (c) {2,5,8,11} (d) {1,2,3,4}

(2) The value of i^{13}=_____.
(a) 1 (b) $-i$ (c) i (d) -1

(3) If $\log_2 16=4$ then _____
(a)$2^4=16$ (b) $4^{-2}=1/16$ (c) $4^2=16$ (d)$2^{-4}=1/16$

(4) The Range of tangent function is =_____.
(a) R (b) [0,1] (c) [-1,1] (d) (-1,1)

(5) The set of zeroes of cosine function is _____.
(a) $\emptyset$ (b) $\{k\pi\ /k \in Z\}$ (c) $\{(2k+1)\frac{\pi}{2}\ /k \in Z\}$ (d) $R^+ \cup \{0\}$.

(6) The inverse of the given matrix A does not exist if _____.
(a) |A|= 0 (b) |A| ≠ 0 (c) |A|> 0 (d) |A|< 0

(7) $4(1,2,1) + 2(1,3,3) =$ _____
(a)(6,10,14) (b)(2,5,4) (c)(6,14,10) (d)(10,6,14).

(8) A row matrix is of the order _____.
(a) $1 \times n$ (b) $n \times 1$ (c) $m \times n$ (d) $n \times m$

(9) For $\bar{x} = (x_1, x_2, x_3) \in R^3$ then $\bar{x} \times \bar{x} =$_____.
(a) 0 (b) $\bar{0}$ (c)$\bar{x}$ (d) $-\bar{x}$

(10) If $\bar{x}$&$\bar{y}$ are two vectors, then $\bar{x} \cdot \bar{y}$ is _____.
(a)vector (b) scalar (c) magnitude (d) None of these

Q.2 Answer the following.(True/False) **[08]**

(1) $i$is an imaginary number.

(2) The modulus of a complex number z is denoted by $|z|$

(3) $\sin\left(\frac{\pi}{2} + \theta\right) = -\cos\theta$

(4) $(a^m)^n = a^{m+n}$

(5) Matrix multiplication is distributive.

(6) $(AB)^T = A^T B^T$

(7) If $\bar{x} = (2,1,0), \bar{y} = (0,4,-3)$ then $\bar{x} \cdot \bar{y} = 4$

(8) If $\bar{x} = (x_1, x_2, x_3)$ then $\sqrt{x_1^2 + x_2^2 + x_3^2}$ is called square root of $\bar{x}$.

Q.3 Answer ANY TEN of the following. **[20]**

(1) Find inverse of a complex numbers $(7, -4)$.

(2) Find modulus of $1 - i$.

(3) Find range of $f: \mathbb{R} \to \mathbb{R}$ defined by $f(x) = \frac{1}{x}$.

(4) Solve: $\log x - \log(x-1) = \log 3$.

(5) Prove that $\tan 81^\circ = \frac{\sqrt{3}\cos 21^\circ + \sin 21^\circ}{\cos 21^\circ - \sqrt{3}\sin 21^\circ}$.

(6) Prove that $1+\tan^2\theta = \sec^2\theta$.

(7) Define Skew - Symmetric matrix with one example.

(8) Prove that $\begin{vmatrix} b^2+c^2 & c^2+a^2 & a^2+b^2 \\ a^2 & b^2 & c^2 \\ 1 & 1 & 1 \end{vmatrix} = 0$.

(9) If $A = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ then find $|A|$.

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

(11) If $\bar{x}=(1,1,1)$; $\bar{y} = (1,2,5)$; $\bar{z} = (1,2,3)$ then find $(2\bar{x} + 3\bar{y}) \cdot \bar{z}$

(12) Evaluate: $|(2,1,1).(-1,2,-3)|$.

Q-4 Answer ANY FOUR of the following. **(32)**

(1) Solve: $\frac{1}{x-3} - \frac{2}{x+4} = \frac{1}{x+6}$.

(2) If $(3x, 2y) + (y, -5x) = (4,6)$ then find $(x, y) \& (xy, x-y)$.

(3) If $\tan\theta + \cot\theta = 2$ then prove that $tan^n\theta + cot^n\theta = 2$; $n \in N$.

(4) Simplify: $7\log(\frac{8}{5}) - 6\log(\frac{4}{15}) + 3\log(\frac{5}{72})$.

(5) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ *then prove that* $A^2 - 5A + 7I_2 = 0$.

(6) If $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}; B = \begin{bmatrix} 1 & 4 \\ 2 & 5 \end{bmatrix}$ *then check* $(AB)^T = B^T A^T$.

(7) If $\bar{x}=(1,1,2)$; $\bar{y} = (1,2,1)$; $\bar{z} = (2,1,1)$ then find $\bar{x} \times (\bar{y} \times \bar{z})$.

(8) Find the measure of the angle between $(1,1,2) \& (2,1,1)$.

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