P P SAVANI UNIVERSITY

First Semester of Diploma Examination
November 2022
IDSH1010 Fundamental of Mathematics

18.11.2022, Friday **Time: 01:00 p.m. To 03:30 p.m.** **Maximum Marks: 60**

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

			CO	BTL
Q - 1	**Choose the correct answer:**	**[10]**		
(i)	$\log_2 8 =$ ___.		1	5
	a) 3 **b)** 2 **c)** 1 **d)** 4			
(ii)	If $\log x + \log 2x = \log 18$, then what is the value of x?		1	5
	a) 2 **b)** 6 **c)** 1 **d)** 3			
(iii)	If $A = \begin{pmatrix} 6 & 2 \\ 4 & 5 \end{pmatrix}$, then $\lvert A \rvert =$ ___.		2	5
	a) 30 **b)** 2 **c)** 1 **d)** 4			
(iv)	If determinant of A is zero then matrix is called ___.		2	2
	a) Non-Singular Matrix **b)** Singular Matrix **c)** Scalar Matrix **d)** Unit Matrix			
(v)	$A = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ is called ___.		2	1
	a) Null Matrix **b)** Void Matrix **c)** Identity Matrix **d)** Both (a) & (b)			
(vi)	For two invertible matrices A and B of suitable orders, the value of $(AB)^{-1}$ is ___.		2	2
	a) $(BA)^{-1}$ **b)** $B^{-1}A^{-1}$ **c)** $A^{-1}B^{-1}$ **d)** $(AB)^{-1}$			
(vii)	If $\sin x = \frac{3}{4}$, then $\cos x =$ ___.		3/4	3/5
	a) $\frac{2}{3}$ **b)** $\frac{\sqrt{3}}{2}$ **c)** $\frac{\sqrt{7}}{2}$ **d)** $\frac{1}{2}$			
(viii)	$\sin\left(x - \frac{\pi}{2}\right) =$ ___.		3/4	2
	a) $\sin x$ **b)** $-\sin x$ **c)** $\cos x$ **d)** $-\cos x$			
(ix)	$\cos^2 x =$ ___.		3/4	2
	a) $1 + \sin^2 x$ **b)** $1 - \sin^2 x$ **c)** $1 - \sin x$ **d)** None of these			
(x)	$\sec^2 x - \tan^2 x =$ ___.		3/4	1
	a) -1 **b)** 1 **c)** 0 **d)** $\sec^2 x$			
Q - 2	**Answer the following question: (Any four)**	**[20]**		
(i)	Solve $\log_2(x + 5) + \log_2(x - 2) = 3$.		1	3/5
(ii)	Solve $\log x + \log(x - 5) = \log 6$.		1	3/5
(iii)	If $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 3 \\ 1 & 1 \end{bmatrix}$, then prove that $A^T B^T = (BA)^T$.		2	5
(iv)	If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then show that $A^2 - 5A + 7I = 0$.		2	5
(v)	$A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$, then find AB and BA. Is $AB = BA$?		2	5
(vi)	Prove that $\tan\theta\,(1 - \cot^2\theta) + \cot\theta\,(1 - \tan^2\theta) = 0$		3/4	2/5

(vii)	Prove that $(\csc\theta - \sin\theta)(\sec\theta - \cos\theta)(\cot\theta + \tan\theta) = 1$	3/4	2/5
(viii)	If $\sin\theta = \frac{4}{5}$ then find $\tan\theta$, $\cos\theta$, $\cot\theta$, $\sec\theta$, & $\csc\theta$.	3/4	2/5

Q - 3	**Choose the correct answer:**	[10]	
(i)	Find the distance between points $A(1,2,4)$ and $B(5,1,4)$?	3/4	3
	a) $\sqrt{17}$ b) $\sqrt{20}$ c) $\sqrt{15}$ d) $\sqrt{23}$		
(ii)	If the distance between the points $(a,2)$ and $(3,4)$ be 8, then $a =$ ___.	3/4	2/5
	a) $2+3\sqrt{15}$ b) $2-3\sqrt{15}$		
	c) $2\pm3\sqrt{15}$ d) None of these		
(iii)	If $\vec{a} = -2i + j$ & $\vec{b} = i + j$ then $\lvert\vec{a}\rvert + \lvert\vec{b}\rvert = \sqrt{5} + \sqrt{2}$	3/4	2/5
	a) True b) False		
(iv)	If $\vec{a} = 3i + 3j$ then $\lvert\vec{a}\rvert =$ ___.	3/4	6
	a) $3\sqrt{2}$ b) $\sqrt{18}$ c) 0 d) None of these		
(v)	If $\vec{a} = 2i + 3j, \vec{b} = 3i - j - 2k$ then find $\vec{a} + \vec{b}$.	3/4	5
	a) $-i + 4j + 2k$ b) $5i + 2j - 2k$		
	c) $-i - 4j + 2k$ d) $5i - 2j - 2k$		
(vi)	Volume of cube is a^3.	3/4	1
	a) True b) False		
(vii)	Area of rectangle is $A = l \times b$.	3/4	1
	a) True b) False		
(viii)	If triangle ABC is an equilateral triangle and side $BC = 6\ c.m.$ then find the area of ABC.	3/4	5
	a) $9\sqrt{3}\ c.m^2$. b) $\sqrt{3}\ c.m^2$. c) $9\ c.m^2$. d) None of these		
(ix)	Volume of cylinder is $\pi r^2 h$.	3/4	1
	a) True b) False		
(x)	If r= 20 $c.m.$ the $d =$ ___.	3/4	5
	a) 2 $c.m.$ b) 10 $c.m.$ c) 40 $c.m.$ d) None of these		

Q - 4	**Answer the following question: (Any four)**	[20]	
(i)	If $\bar{a} = 2i + j - 3k, \bar{b} = 4i + 5j + 4k$ and $\bar{c} = 3i - 2j + k$ the find $3\bar{a} + 2\bar{b} - 3\bar{c}$.	3/4	3
(ii)	For $\bar{x} = (-4,\ 9,\ 6), \bar{y} = (0,\ 7,\ 10)$ and $\bar{z} = (-1,\ 6,\ 6)$ show that $(\bar{x} - \bar{z})(\bar{y} - \bar{z}) = 0$	3/4	3
(iii)	If $\vec{x} = (1,\ 3,\ 2)$ and $\vec{y} = (4,\ -2,\ 1)$ then find,	3/4	3
	a) $\vec{x}.\vec{y}$		
	b) $\lvert\vec{x}.\vec{y}\rvert$		
	c) $\vec{x} + \vec{y}$		
	d) $\vec{x} - \vec{y}$		
(iv)	Prove that the lines $7x + y - 1 = 0$ and $3x - 21y + 2 = 0$ are perpendicular to each other.	3/4	2/5
(v)	Find the equation of lines passing through the following point:	3/4	2/5
	a) $(1,3), (0,7)$		
	b) $(1,6), (-2,5)$		
(vi)	What will be the value of k such that the points $(k^2, 2k), (-5,-1)$ and $(-1,1)$ are collinear?	3/4	2/5
(vii)	The radius of the base of cylinder is 10 $c.m.$ and their heights are 14 $c.m.$ then find area of its curved surface.	3/4	5

(viii) Find area of isosceles triangle whose same slides are of length 13 $c.m.$ and base is of length of 24 $c.m.$ 3/4

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create