

INDIAN SCHOOL SOHAR TERM I EXAMINATION (2022-23) MATHEMATICS (CODE -041)

CLASS: XI DATE: 24/9/22

General Instructions:

- This question paper contains **five sections** A, B, C, D and E. Each section is compulsory. However, there are some internal choices in some questions.
- Section A has 20 MCQ's of 1 mark each.
- Section B has 5 very Short Answer (V S A) type questions of 2 marks each .
- Section C has 6 Short Answer (S A) type questions of 3 marks each.
- Section D has 4 Long Answer (L A) type questions of 5 marks each
- Section E has 3 source based / case based / passage based / integrated units of assessment (4 marks each) with sub parts

				SECTIO						
				SECTIO (Multiple Choi		stions)				
				Fach question	carries	1 mark				
1.	Given that x y and b are real numbers such that $x < y$ b < 0, then									
	0	$\nabla V = U = U = U = U = U = U = U = U = U =$								
	(a)	xb < yb	(b)	xb > yb	(c)	$xb \le yb$	(d)	$\frac{x}{b} = \frac{y}{b}$		
2.	The	solutions of 5	x-1 < 2	4 and 5x+ 1 >	-24 is					
		<i>(,</i> _)	4.5			()	<i>(</i>))		1	
	(a)	(4, 5)	(b)	(-5, -4)	(C)	(-5, 5)	(d)	(-5, 4)		
2					. 1				1	
э.	The	conjugate of t	he com	nplex number i	$S \frac{1}{i-2}$.	Then the con	nplex n	umber is	1	
	(a)	$\frac{1}{i+2}$	(b)	$\frac{-1}{i+2}$	(C)	$\frac{-1}{i-2}$	(d)	$\frac{1}{i-2}$		
		1+2		172		1-2		1-2		
4.	The value of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is									
	(a)	3	(b)	2i	(C)	-1	(d)	0		
5.	The domain of the function f defined by $f(x) = \frac{1}{\sqrt{1-1}}$ is									
					√ X	- <i>x</i>				
	(a)	R	(b)	R ⁺	(c)	R⁻	(d)	$R - \{0\}$		
	()		(~)		(-)		(0.)			
6.	The density of the function for x^2+2x+1									
	The domain of the function f given by $f(x) = \frac{1}{x^2 - x - 6}$									
	(-)		(1.)		(-)		(.1) 5	(2, 2)		
	(a)	к – {з, -2}	(a)	к – {- 3, 2}	(C)	к – [3, 2]	(a) H	(-(3,2)		
1	1									

7. The number of students who take both the subjects Mathem This represents 10% of the enrollment in Mathematics and 1							ics and C 6 of the e	hemistry is 70. prollment in	1	
	Chen	nistry. The nu	umber of s	tudents at	least one of	these two si	ubjects is			
	(a)	1120	(b)	1130	(c)	1100	(d)	1200		
8.	Let A Then	and B be sul A'∪[(A∩B)∪	bsets of th B'] is	e universal	set N, the s	set of natural	number	5.	1	
	(a)	А	(b)	A'	(c)	В	(d)	N		
9.	The v	value of sin76	55° is	ho take both the subjects Mathematics and Chemistry is 70. enrollment in Mathematics and 14% of the enrollment in students at least one of these two subjects is 1130 (c) 1100 (d) 1200 he universal set N, the set of natural numbers. A' (c) B (d) N $\frac{\sqrt{3}}{2}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$ $\cos(45^{\circ} - A)$ is 0 (c) $\sqrt{2} \cos A$ (d) $\sqrt{2} \sin A$ hen the value of $\alpha + \beta$ is $\frac{\pi}{4}$ (d) π (d) 0 value of sin20 is equal to 1 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$ third quadrant then the value of sin θ is $\frac{-1}{\sqrt{10}}$ (c) $\frac{-3}{\sqrt{10}}$ (d) $\frac{3}{\sqrt{10}}$ of sinx.cosx ? 1 (c) $\frac{-1}{2}$ (d) $\frac{1}{2}$ f a circle of radius 5 cm subtending a central angle $\frac{120}{84}$ (c) $\frac{12\pi}{5}$ (d) 75 cm	1					
	(a)	$\frac{1}{2}$	(b)	$\frac{\sqrt{3}}{2}$	(c)	$-\frac{1}{\sqrt{2}}$	(d)	$\frac{1}{\sqrt{2}}$		
10.	The v	value of sin(4	iber of students who take both the subjects Mathematics and Chemistry is 70.resents 10% of the enrollment in Mathematics and 14% of the enrollment in Y. The number of students at least one of these two subjects is1120(b)1130(c)1100(d)120018be subsets of the universal set N, the set of natural numbers.11(b)A'(c)B(d)N1(b) $\frac{\sqrt{3}}{2}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$ e of sin765° is1(b) $\frac{\sqrt{3}}{2}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$ e of sin(45° + A) - cos(45° - A) is1(b)0(c) $\sqrt{2} cosA$ (d) $\sqrt{2} sinA$ $\frac{1}{2}$ and tan $\beta = \frac{1}{3}$, then the value of $\alpha + \beta$ is1(b) $\frac{\pi}{4}$ (d) π (d)0cos $\theta = 1$, then the value of sin20 is equal to1(b) $\frac{-1}{\sqrt{10}}$ (c) $\frac{1}{2}$ (d) $\frac{3}{\sqrt{10}}$ it and θ lies in the third quadrant then the value of sin θ is1 $\frac{1}{10}$ (b) $\frac{-1}{\sqrt{10}}$ (c) $\frac{-1}{2}$ (d) $\frac{1}{2}$ (b)1(c) $\frac{-1}{2}$ (d) $\frac{1}{2}$ length of an arc of a circle of radius 5 cm subtending a central angle1ng 15°. $\frac{\pi}{2}$ (b) $\frac{120}{84}$ (c) $\frac{12\pi}{5}$ (d)75 cmit heir radii. α α α α α α α α	1						
	(a)	1	(b)	0	(c)	$\sqrt{2} \cos A$	(d)	$\sqrt{2}$ sinA		
11.	If tan	$\alpha = \frac{1}{2}$ and ta	$n\beta = \frac{1}{3}$, the	en the valu	e of α +β is				1	
	(a)	$\frac{\pi}{6}$	(b)	$\frac{\pi}{4}$	(d)	π	(d)	0		
12.	If sin	θ + cosθ = 1,	then the v	value of sin	2θ is equal t	to			1	
	(a)	0	(b)	1	(c)	$\frac{1}{2}$	(d)	$\frac{-1}{2}$		
13.	If tan	$\theta = 3 \text{ and } \theta$	lies in the	third quad	rant then th	e value of sir	n θ is		1	
	(a)	$\frac{1}{\sqrt{10}}$	(b)	$\frac{-1}{\sqrt{10}}$	(c)	$\frac{-3}{\sqrt{10}}$	(d)	$\frac{3}{\sqrt{10}}$		
14.	14. What is the greatest value of sinx.cosx ?			1						
	(a)	$\frac{1}{\sqrt{2}}$	(b)	1	(c)	$\frac{-1}{2}$	(d)	$\frac{1}{2}$		
15.	Find the length of an arc of a circle of radius 5 cm subtending a central angle measuring 15°.									
	(a)	$\frac{5\pi}{12}$	(b)	<u>120</u> 84	(c)	$\frac{12\pi}{5}$	(d)	75 cm		
16.	If the arcs of same lengths in two circles subtend central angles 30° and 80°, find the ratio of their radii.									
	(a)	3: 8	(b)	8:3	(c)	3:5	(d)	9 : 64		

17.	What is the range	of the fur	nction f(x) =	7 - x+1 î)		1			
	(a) (−∞ , −7]	(b)	(∞,7]	(c) (-	-∞,7)	(d)(−∞ , 7]				
18.	Let n(U)=700, n(A	.) = 200, n(B) = 300 <i>,</i> n	(A ∩ B) = 1	LOO. Find n(A'∩B')	1			
	(a) 300	(b)	400	(c)	200	(d) 100				
19.	Simplify $\left(\frac{1+i}{1-i}\right)^{200}$						1			
	(a) 0	(b)	-1	(c)	1	(d) i				
20.	Solve x - 9 < 2 fo	or x.					1			
	(a) x < 11	(b) 7 ·	< x < 11	(c) x	> 11	$(d)-7 \le x \le 11$				
			SE	CTION B						
	This section com	prises of v	very short a	nswer typ	e question	s (VSA)of 2 marks each				
21	If tan (A + B) = p	, tan (A – E	3) = q <i>,</i> then	show that	$\tan 2A = \frac{p}{1}$	$\frac{+q}{-pq}$.	2			
			OR			В				
	π									
	in the thangle ABC, AB = 0 th and the angle BAC = $\frac{1}{3}$, BD is the arc of a circle, centre A and BC is the tangent to the									
	circle. Find the area of the shaded region. $\frac{\pi}{3}$									
22	The adjacent im	age is the $f(x) = (x + 1)$	representat	ion		<i>y</i>	2			
	$\int \int dx = \int dx = \int dx = 2 \int d$									
	Draw the graph of $f(x) = (x + 1)(x - 2) $.									
						-4-				
23	Find the value of $x^3 - 3x^2 - 8x + 15$ when x = 3 + i									
				OR						
	Show that (2 +	$i\sqrt{3}^{10} +$	$(2-i\sqrt{3})$	¹⁰ is real.						
24	The cost of man	ufacturing	x telephon	es by TATA	A given by C	C = 3000 + 200 x, and the	2			
	revenue from selling these is given by $R = 300x$. How many telephones must be produced and sold in order to realize a profit ?									
25	If A and B are two sets so that n (B – A) = 2 (n (A – B)) = 4 (n ($A \cap B$)) and									
	if n ($A \cup B$) =	14 , find n	(A)							

SECTION C						
	This section comprises of very short answer type questions (SA) of 3 marks each					
26	Prove that $\frac{\sin\theta + \sin 2\theta}{1 + \cos \theta + \cos 2\theta} = \tan \theta$.	3				
27	If $f(x) = \begin{cases} 1+x & -1 \le x < 0 \\ x^2 - 1 & 0 < x < 2 \\ 2x & x \ge 2 \end{cases}$ find $f(3)$, $f(-2)$ and $f(\frac{1}{2})$	3				
	OR					
	Redefine $f(x) = x - 1 + 1 + x , -2 \le x \le 2$.					
28	Verify the following by Venn diagram $(A \cup B)' = (A' \cap B')$.	3				
	OR Verify the following by Venn diagram $A - (B \cup C) = (A - B) \cap (A - C)$.					
29	If α and β are different complex numbers with $ \beta = 1$, then find $\left \frac{\beta - \alpha}{1 - \overline{\alpha} \beta}\right $.	3				
	OR					
	If $(x + iy)^3 = a + ib$, then show that $\frac{a}{x} + \frac{b}{y} = 4(x^2 - y^2)$					
30	Solve the system of linear inequalities $\frac{x}{x} \ge \frac{1}{x}$, $\frac{6x}{x} < \frac{1}{x}$ and represent the	3				
	solutions on the number line. $2x+1$ 4 $4x-1$ 2					
31	Find the real part of the complex number $(1 + \cos\theta - i \sin\theta)^{-1}$	3				
	SECTION D					
	(This section comprises of long answer – type questions (L A) of 5 marks each)					
32	In a senior classes of all 29 students take one or more of physics , chemistry and biology.	5				
	The headmaster has informed that 15 take biology, 18 take physics and 15 take					
	chemistry . 10 take biology and chemistry, 5 take physics and chemistry and 7 take					
	biology and physics.					
	How many students take all three subjects?					
33	Find the domain and range of the following functions:	5				
	a) f (x) = $\sqrt{16 - x^2}$ b) f (x) = $\frac{x^2}{1 + x^2}$					
	OP					
	Draw the graph of the following functions in the interval $\begin{bmatrix} -3 & 3 \end{bmatrix}$					
	a) $f: R \to R$ defined by f(x) = x ³ (polynomial function)					
	b) $f : R \to R$ defined by f(x) = [x] (greatest integer function)					
	c) $f : R \to R$ defined by $f(x) = x $ (modulus function)					

34	If $x \cos \theta = y \cos \left(\theta + \frac{2\pi}{3}\right) = z \cos \left(\theta + \frac{4\pi}{3}\right)$, then find the value of	5						
	xy + yz + zx. OR							
	Prove that $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$.							
35	Find the value of the real numbers x and y, if the complex number	5						
	(2 + i) x + (1 - i) y + 2i - 3 and $x + (-1 + 2i) y + 1 + i$ are equal.							
	SECTION E							
	(This section comprises of 3 case study /passage based questions 4 marks each with two subparts. First two case study questions have three sub parts (i) (ii) (iii) of marks 1,1,2 respectively. The third case study question has two subparts of 2 marks each)							
36	During 2 week period, Reshma took her umbrella with her on 8 days. It rained on 9 days, and Reshma took her umbrella on five of the days when it rained							
	a) Display the above situation on a Venn diagram	2						
	 b) Hence find the numbers of days that i) Reshma did not take her umbrella and it rained ii) Reshma did not take her umbrella and it did not rain. 							
	OR							
	Identify the following values related with this situation							
	a) n(U) b) n (A U B) c) n (A n B) d) n[(A – B) U (B – A)]							

