



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

No. of printed pages: 6

CLASS: XI
DATE: 24/9/22

MAX. MARKS: 80
TIME: 3 Hrs.

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

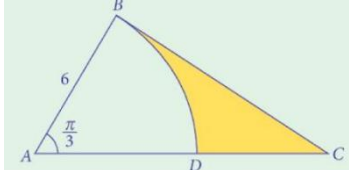
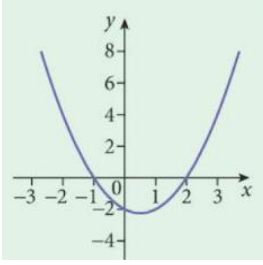
SECTION – A (Multiple Choice Questions) Each question carries 1 mark		
1.	Given that x, y and b are real numbers such that $x < y$, $b < 0$, then (a) $xb < yb$ (b) $xb > yb$ (c) $xb \leq yb$ (d) $\frac{x}{b} = \frac{y}{b}$	1
2.	The solutions of $5x-1 < 24$ and $5x+ 1 > -24$ is (a) (4, 5) (b) (-5, -4) (c) (-5, 5) (d) (-5, 4)	1
3.	The conjugate of the complex number is $\frac{1}{i-2}$. Then the complex number is (a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$	1
4.	The value of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is (a) 3 (b) $2i$ (c) -1 (d) 0	1
5.	The domain of the function f defined by $f(x) = \frac{1}{\sqrt{ x -x}}$ is (a) \mathbb{R} (b) \mathbb{R}^+ (c) \mathbb{R}^- (d) $\mathbb{R} - \{0\}$	1
6.	The domain of the function f given by $f(x) = \frac{x^2+2x+1}{x^2-x-6}$ (a) $\mathbb{R} - \{3, -2\}$ (b) $\mathbb{R} - \{-3, 2\}$ (c) $\mathbb{R} - [3, 2]$ (d) $\mathbb{R} - (3, 2)$	1


7.	The number of students who take both the subjects Mathematics and Chemistry is 70. This represents 10% of the enrollment in Mathematics and 14% of the enrollment in Chemistry. The number of students at least one of these two subjects is (a) 1120 (b) 1130 (c) 1100 (d) 1200	1
8.	Let A and B be subsets of the universal set N, the set of natural numbers. Then $A \cup [(A \cap B) \cup B']$ is (a) A (b) A' (c) B (d) N	1
9.	The value of $\sin 765^\circ$ is (a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$	1
10.	The value of $\sin(45^\circ + A) - \cos(45^\circ - A)$ is (a) 1 (b) 0 (c) $\sqrt{2} \cos A$ (d) $\sqrt{2} \sin A$	1
11.	If $\tan \alpha = \frac{1}{2}$ and $\tan \beta = \frac{1}{3}$, then the value of $\alpha + \beta$ is (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) 0	1
12.	If $\sin \theta + \cos \theta = 1$, then the value of $\sin 2\theta$ is equal to (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$	1
13.	If $\tan \theta = 3$ and θ lies in the third quadrant then the value of $\sin \theta$ is (a) $\frac{1}{\sqrt{10}}$ (b) $-\frac{1}{\sqrt{10}}$ (c) $-\frac{3}{\sqrt{10}}$ (d) $\frac{3}{\sqrt{10}}$	1
14.	What is the greatest value of $\sin x \cdot \cos x$? (a) $\frac{1}{\sqrt{2}}$ (b) 1 (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$	1
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) $\frac{120}{84}$ (c) $\frac{12\pi}{5}$ (d) 75 cm	1
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	1

17.	What is the range of the function $f(x) = 7 - x+1 $? (a) $(-\infty, -7]$ (b) $(\infty, 7]$ (c) $(-\infty, 7)$ (d) $(-\infty, 7]$	1
18.	Let $n(U)=700$, $n(A) = 200$, $n(B) = 300$, $n(A \cap B) = 100$. Find $n(A' \cap B')$ (a) 300 (b) 400 (c) 200 (d) 100	1
19.	Simplify $\left(\frac{1+i}{1-i}\right)^{200}$. (a) 0 (b) -1 (c) 1 (d) i	1
20.	Solve $ x - 9 < 2$ for x. (a) $x < 11$ (b) $7 < x < 11$ (c) $x > 11$ (d) $-7 \leq x \leq 11$	1

SECTION B

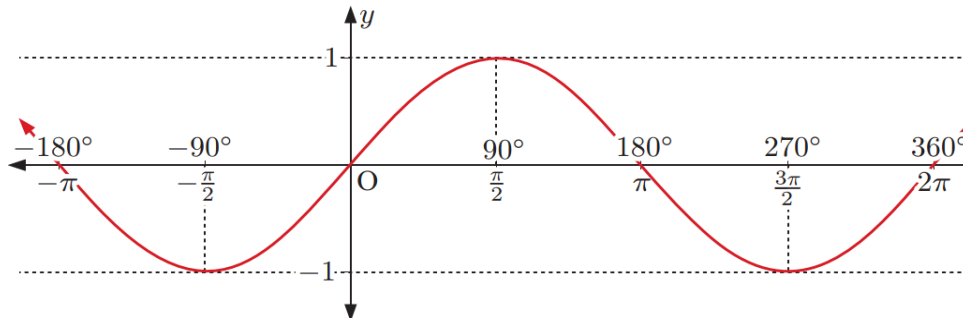
This section comprises of very short answer type questions (VSA) of 2 marks each

21	<p>If $\tan(A + B) = p$, $\tan(A - B) = q$, then show that $\tan 2A = \frac{p+q}{1-pq}$.</p> <p style="text-align: center;">OR</p> <p>In the triangle ABC, AB = 6 cm and the angle $BAC = \frac{\pi}{3}$, BD is the arc of a circle, centre A and BC is the tangent to the circle. Find the area of the shaded region.</p> 	2
22	<p>The adjacent image is the representation of the function $f(x) = (x + 1)(x - 2)$.</p> <p>Draw the graph of $f(x) = (x + 1)(x - 2)$.</p> 	2
23	<p>Find the value of $x^3 - 3x^2 - 8x + 15$ when $x = 3 + i$</p> <p style="text-align: center;">OR</p> <p>Show that $(2 + i\sqrt{3})^{10} + (2 - i\sqrt{3})^{10}$ is real.</p>	2
24	<p>The cost of manufacturing x telephones by TATA given by $C = 3000 + 200x$, and the revenue from selling these is given by $R = 300x$. How many telephones must be produced and sold in order to realize a profit ?</p>	2
25	<p>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 $n(A)$</p>	2

34	<p>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 $xy + yz + zx$.</p> <p style="text-align: center;">OR</p> <p>Prove that $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3} \right) + \cos^2 \left(x - \frac{\pi}{3} \right) = \frac{3}{2}$.</p>	5
35	<p>Find the value of the real numbers x and y, if the complex number $(2 + i)x + (1 - i)y + 2i - 3$ and $x + (-1 + 2i)y + 1 + i$ are equal.</p>	5
<p>SECTION E</p> <p>(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)</p>		
36	<p>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</p>	
		
a) Display the above situation on a Venn diagram		2
<p>b) Hence find the numbers of days that</p> <p>i) Reshma did not take her umbrella and it rained</p> <p>ii) Reshma did not take her umbrella and it did not rain.</p> <p style="text-align: center;">OR</p> <p>Identify the following values related with this situation</p> <p>a) $n(U)$</p> <p>b) $n(A \cup B)$</p> <p>c) $n(A \cap B)$</p> <p>d) $n[(A - B) \cup (B - A)]$</p>		2

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The graph of the sine function is given below. It is observed that the unit circle repeats after one full revolution so the **period** of $y = \sin x$ is 2π . The maximum value is 1. The minimum value is -1.



4

Using the above information, complete the following table:

Q.No	Function	Period	Maximum	Minimum
i	$Y = 2 \sin x$	2π		
ii	$Y = \sin 2x$		1	
III	$Y = \sin x $			
	OR			
	$Y = \sin\left(\frac{x}{2}\right)$			

4

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A solution of 9% acid is to be diluted by adding 3% acid solution to it. The resulting mixture is to be more than 5% but less than 7% acid. There are 460 litres of the 9% solution.

Based on the above information answer the following:

- Write the inequality to find how many litres of 3% solution will have to be added
- How many litres of 3% solution will have to be added?



4

OR

If water is added instead of 3% acid solution, how many litres of water to be added to get a required percent of diluted solution?