INDIAN SCHOOL SOHAR

TERM II EXAMINATION (2022-23)
MATHEMATICS

CLASS: XI	MAX. MARKS: 80
DATE: /03/2023	TIME: 3 HOURS

General Instructions:

1. This question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA) type questions of 2 marks each.
4. Section C has 6 Short Answer (SA) type questions of 3 marks each.
5. Section D has 4 Long Answer (LA) type questions of 5 marks each.
6. 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.	In a class of 70 students, 25 students play cricket and 20 students play tennis, and 10 students play both the games. Then, the number of students who play neither is a) 0 b) 25 c) 35 d) 45	**MARKS** 1
2.	The domain and range of real function f defined by f (x) = $\sqrt{x-1}$ is given by a) Domain = (1, ∞), Range = (0, ∞) b) Domain = [1, ∞), Range = (0, ∞) c) Domain = [1, ∞), Range = [0, ∞) d) Domain = [1, ∞), Range = [0, ∞)	1
3.	If tan A = 1/ 2 , tan B = 1/ 3 , then tan (2A + B) is equal to a) 1 b) 2 c) 3 d) 4	1
4.	The value of sin 50° – sin 70° + sin 10° is equal to a) 1 b) 0 c) 1/ 2 d) 2	1
5.	The complex number z which satisfies the condition $\left\|\frac{i+z}{i-z}\right\| = 1$ lies on a)Circle x^2+y^2=1 b)the x-axis c) the y - axis d) the line x + y =1	1
6.	The number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available a)20 b) 120 c) 60 d) 320	1
7.	How many different 4-letter words can be formed with the letters of the word 'JAIPUR' when A and I are always to be included? a)144 b) 24 c) 6 d) 12	1
8.	The coefficient of x ^{15} in the expansion of $(x-x^2)^{10}$ a)232 b) -156 c) -252 d) 176	1

9	If the sum of the infinite G.P. is $\frac{4}{3}$ and its first term is $\frac{3}{4}$ then its common ratio is a) $\frac{7}{16}$ b) $\frac{9}{16}$ c) $\frac{1}{9}$ d) $\frac{7}{9}$	1
10	If the focus of a parabola is (0, −3) and its directrix is y = 3, then its equation is a) $x^2 = -12y$ b) $x^2 = 12y$ c) $y^2 = -12x$ d) $y^2 = 12x$	1
11	$\lim_{x \to 1} \frac{sinx}{x(1+cosx)}$ is equal to a)1 b) 0 c) 1/2 d) -1/2	1
12	$\lim_{x \to 0} \frac{|x|}{x}$ is equal to a)1 b) 0 c) -1 d) does not exist	1
13	If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then dy/dx at x = 1 is a) 0 b) -1/ 2 c) 1 / 2 d) 1	1
14	The inclination of the line x − y + 3 = 0 with the positive direction of x-axis is a) -135° b) 135° c) – 45° d) 45°	1
15	The ratio in which the line joining (2,4,5) and (-3,5-9) is divide by the yz Plane is a) 1:3 b) 1:2 c) 2:3 d) 4:3	1
16	The mean deviation of the data 2, 9, 9, 3, 6, 9, 4 from the mean is a) 2.23 b) 2.57 c) 3.23 d) 3.57	1
17	Three numbers are choosen from 1 to 20, then the probability that they are consecutive a) $\frac{3}{190}$ b) $\frac{187}{190}$ c) $\frac{18}{20}$ d) $\frac{6}{20}$	1
18	If A and B are mutually exclusive events, P (A) = 0.35 and P (B) = 0.45 then P(A'∩B') is a) 0.80 b) .10 c) .20 d)0	1
	ASSERTION-REASON BASED QUESTIONS In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices. (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.	
19	Assertion (A) :The slope of the line x + 7y = 0 is1/7 and y-intercept is 0. Reason (R): The slope of the line 6x + 3y - 5 = 0 is - 2 and yintercept is 5/3	1
20	Assertion (A) :If the numbers −2/7 , k, −7/2 are in G.P. then k = ± 1 Reason (R): If a, b, c are in G.P. then ac = b ^{2}	1
	SECTION B **(This section comprises of very short answer type questions (VSA) of 2 marks each)**	
21	For all sets A, B and C Is (A ∩ B) ∪ C = A ∩ (B ∪ C)? Justify your statement using example.	2
22	Find the radius of the circle in which a central angle of 60° intercepts an arc of length 37.4 cm.	2

23	Solve : $\|3 - 4x\| \geq 9$	2
	OR	
	The longest side of a triangle is twice the shortest side and the third side is 2cm longer than the shortest side. If the perimeter of the triangle is more than 166 cm then find the minimum length of the shortest side.	
24	In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colour are indistinguishable?	2
	OR	
	The letters of the word 'OUGHT' are written in all possible orders and these words are written out as in a dictionary. Find the rank of the word 'TOUGH' in this dictionary	
25	Evaluate: $\displaystyle\lim_{x \to 1} \frac{1 - x^{\frac{1}{5}}}{1 - x^{\frac{3}{5}}}$	2

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SECTION C
(This section comprises of short answer type questions (SA) of 3 marks each)

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26	Find the domain and range of the function f (x) = $\frac{4}{1-x^2}$	3
27	Evaluate: $\sqrt{3}\ cosec\ 20^0 - sec 20^0$	3
28	If (x + iy) ^{3} = u + iv, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$	3
	OR	
	Solve each of the following equation: $x^2 + \frac{x}{\sqrt{2}} + 1 = 0$	
29	Find the derivative of cos(3x +1) using the first principle.	3
	OR	
	Find $\frac{dy}{dx}$ when y = $\frac{(3x+1)sin^2 x}{(x-1)}$	
30	Find the equation of the line through the point (3,2) which makes an angle of 45^0 with the line x – 2y = 3.	3
31	Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A. P. and the ratio of 7th and $(m - 1)^{th}$ numbers is 5 : 9. Find the value of m.	3
	OR	
	Find the value of n so that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the geometric mean between a and b.	

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SECTION D
(This section comprises of long answer type questions (LA) of 5 marks each)

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32	Prove that: $cos \frac{2\pi}{7} + cos \frac{4\pi}{7} + cos \frac{6\pi}{7} = \frac{-1}{2}$	5
	OR	
	Prove that: $\frac{\sin 8x\ cosx - \cos 3x \sin 6x}{\cos 2x\ cosx - \sin 3x \sin 4x} = \tan 2x$	
33	The coefficients of the (r – 1)th, rth and (r + 1)th terms in the expansion of (x + 1)^n are in the ratio 1 : 3 : 5. Find n and r.	5

34	Find the equation of the circle passing through the points (2,3) and (–1,1) and whose centre is on the line $x - 3y - 11 = 0$. **OR** Find the coordinate of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of latus rectum of the conic: $3x^2 + 2y^2 = 18$.	5
35	Calculate mean, variance and standard deviation for the following distribution.	5

Classes	5– 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35
Frequency	2	9	29	54	11	5

SECTION E

(This section comprises of case study /passage-based questions of 4 marks each with two sub-parts. 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 sub marks each.)

36	The students of class XI were given a task to arrange all letters of the word EQUATIONS in all possible ways. Based on the above information, answer the following questions:	
	i) In how many ways can all letters of the word EQUATIONS be arranged?	1
	ii) In how many ways can all letters of the word EQUATIONS be arranged so that the positions of vowels and consonants are unaltered?	1
	iii) In how many ways can all letters of the word EQUATIONS be arranged so that all vowels are occur together? **OR** iii) In how many ways can all letters of the word EQUATIONS be arranged so that all consonants are occur together?	2
37	An urn contains twenty white slips of paper numbered from 1 through 20, ten red slips of paper numbered from 1 through 10, forty yellow slips of paper numbered from 1 through 40, and ten blue slips of paper numbered from 1 through 10. If these 80 slips of paper are thoroughly shuffled so that each slip has the same probability of being drawn. Based on the above information , answer the following questions:	
	i) What is the probability that slip drawn is red or yellow.	1
	ii) What is the probability that slip drawn is numbered 1, 2, 4 ,6.or 8	1
	iii) What is the probability that slip drawn is numbered 5, 15, 25, or 35; **OR** iii) What is the probability that slip drawn is white and numbered higher than 12 or yellow and numbered higher than 26	2
38	In a college , out of 150 students 15 students offered Mathematics only, 12 students offered Chemistry , 8 students offered only Physics, 40 offered Physics and Mathematics, 20 offered Physics and Chemistry, 10 students offered Chemistry and Mathematics , 65 students offered Physics	
	i) Find the number of students who offered all the three subjects.	2
	ii) Find the number of students who offered Mathematics .	2

----------------------THE END ------------------

MATHS TERM II-2022-23
SCORING KEY
STD XI

	(SECTION –A)	
1.	a) 35	MARKS 1
2.	d) Domain = [1, ∞), Range = [0, ∞)	1
3.	b) 3	1
4.	a) 0	1
5.	b)the x-axis	1
6.	d)320	1
7.	a) 144	1
8.	b)-252	1
9	a) 7/16	1
10	a) $x^2 = -12y$	1
11	c)1/2	1
12	d)does not exist	1
13	a)0	1
14	d)45	1
15	b) 2:3	1
16	c) 2.57	1
17	a)18/ 20 c 3= 3/190	1
18	$(c)\ 1 - P(A\ UB) = 1 - .80 = .20$ (P(A∩B)=0;mutually exclusive given)	1
19	d)	1
20	a)	1
	SECTIONB	
21	$(A \cap B) \cup C = (\{1, 2, 3\} \cap \{2, 3, 5\}) \cup \{4, 5, 6\}$ $= \{2, 3\} \cup \{4, 5, 6\}$ $= \{2, 3, 4, 5, 6\}$ $A \cap (B \cup C) = \{1, 2, 3\} \cap [\{2, 3, 5\} \cup \{4, 5, 6\}$ $= \{1, 2, 3\} \cap \{2, 3, 4, 5, 6\}$ $= \{2, 3\}$ $(A \cap B) \cup C \neq A \cap (B \cup C)$	1 1
22	Here $l = 37.4$ cm and $\theta = 60° = \dfrac{60\pi}{180}$ radian $= \dfrac{\pi}{3}$ by $r = \dfrac{l}{\theta}$, we have $r = \dfrac{37.4 \times 3}{\pi} = \dfrac{37.4 \times 3 \times 7}{22} = 35.7$ cm	1 1

23	$3 - 4x \le -9$ or $3 - 4x \ge 9$ $-4x \le -12$ or $-4x \ge 6$ $x \ge 3$ or $x \le \dfrac{-3}{2}$ $x \in (-\infty, \dfrac{-3}{2}] \cup [3, \infty)$ OR x> 41, minimum length is 41cm	1 1
24	Therefore, the number of arrangements $\dfrac{9!}{4!\,3!\,2!} = 1260$. OR Rank =89	1 1
25	Using formula 1/3	1+1
SECTION C		
26	Domain= R − { −1,1} (steps) Range=$(-\infty, 0) \cup [4, \infty)$ (steps)	1 1+1
27	$\sqrt{3}\ \operatorname{cosec} 20° - \sec 20° = \dfrac{\sqrt{3}}{\sin 20°} - \dfrac{1}{\cos 20°}$ $= \dfrac{\sqrt{3}\cos 20° - \sin 20°}{\sin 20° \cos 20°} = 4\left(\dfrac{\dfrac{\sqrt{3}}{2}\cos 20° - \dfrac{1}{2}\sin 20°}{2\sin 20° \cos 20°}\right)$ $= 4\left(\dfrac{\sin 60° \cos 20° - \cos 60° \sin 20°}{\sin 40°}\right)$ (Why?) $= 4\left(\dfrac{\sin(60° - 20°)}{\sin 40°}\right) = 4$ (Why?)	1 1 1 1
28	Proper steps OR $\dfrac{-b \pm \sqrt{D}}{2a} = \dfrac{-1 \pm \sqrt{-7}}{2\sqrt{2}} = \dfrac{-1 \pm \sqrt{7}\,i}{2\sqrt{2}}$	1+1+1
29	Dy/dx= 3 sin (3x+1) Or when $y = \dfrac{(3x+1)sin^2 x}{(x-1)}$ dy/dx (proper steps using uv and u/v rule)	1 1 1
30	the equation of the line through the point (3,2) which makes an angle of 45^0 with the line x − 2y = 3.	1 1 1

6

	$\tan 45 = \left\| \dfrac{m - 1/2}{1 + m/2} \right\|$ m=3, -1/3 3x-y-7=0, x+3y -9=0		
31	30 = 1 + (m+1) d, d = 30/m+1 A_7 / A_{m-1}= 5/9 Solving we get d = 2 ; m=14 OR n = - 1/2	1+1+1

SECTION D

32	$cos\frac{2\pi}{7} + cos\frac{4\pi}{7} + sin\frac{6\pi}{7} = \frac{-1}{2}$ Let x $=\frac{\pi}{7}$ =1/ 2sinx(2cos2xsinx + 2cos4x sinx + 2 cos 6x sinx) (using formula…) = 1/2sinx (0 – sinx) = -1/2 oR $\frac{sin\,8x\,cosx - cos\,3x\,sin\,6x}{cos\,2x\,cosx - sin\,3x\,sin\,4x}$ = tan 2x (solve by transformation for mula)	1 2 2
33	nCr : nCr-1 = 5:3, nCr-1 : nCr-2 = 3:1 3n-8r+3 , n-4r +5 = 0 N=7, r=3	1 2+2
34	Since the circle passes through points (2, 3) and (−1, 1), $(2 − h)^2 + (3 − k)^2 = r^2$ … (1) $(−1 − h)^2 + (1 − k)^2 = r^2$ … (2) ⇒ 6h + 4k = 11 … (4) On solving equations (3) and (4), we obtain $h = \frac{7}{2}$ and $k = \frac{-5}{2}$. Thus, the equation of the required circle is $\left(x - \frac{7}{2}\right)^2 + \left(y + \frac{5}{2}\right)^2 = \frac{130}{4}$ OR 6 $2\sqrt{6}$ $(0, \pm\sqrt{3})$ $(0, \pm 3)$ $e = \frac{1}{\sqrt{3}}$ $y = \pm 3\sqrt{3}$	1 1 1 1 1
35	Mean = 21 Variance= 23.79 SD= 4.87	2 2+1

SECTION E

36 1) 9! 2) 4! × 5! 3)5! × 5! **OR** 5! × 6!	1+1+2
37 **1)**, 50/80=5/8 **2)** 20/80=1/4 **3)**8/80= 1/10 **or** 22/80 = 11/40	1 1+2
38. 1) 3 **2)** 62	2 2

7

SL.NO	CHAPTER	1 mark	2 marks	3 marks	4mark	5 marks	total
1	Sets	1(1)	2(1)		4(1)		7(3)
2	Relations and Functions	1(1)		3(1)			4(2)
3	Trigonometric Functions	1(1)+1(1)	2(1)	3(1)		5(1)	12(5)
5	Complex Numbers and Quadratic Equations	1(1)		3(1)			4(2)
6	Linear Inequalities		2(1)				2(1)
7	Permutations and Combinations	1(1)+1(1)	2(1)		4(1)		8(4)
8	Binomial Theorem	1(1)				5(1)	6(2)
9	Sequence and series	1(1)+1(1)		3(1)			5(3)
11	Straight lines	1(1)+1(1)		3(1)			5(3)
12	Conic section	1(1)				5(1)	6(2)
13	3 d	1(1)					1(1)
14	Limits and derivative	1(1)+ 1(1)+1(1)	2(1)	3(1)			8(5)
15	statistics	1(1)				5(1)	6(2)
16	Probability	1(1)+ 1(1)			4(1)		6(3)
		20(20)	10(5)	18 (6)	12(3)	20(4)	80(38)

❖ Number outside the bracket indicates marks.

❖ Number inside the bracket indicates the no. of question.

❖ One graph per student