Class- X Session- 2022-23

Subject- Mathematics (Standard)

Sample Question Paper

Time Allowed: 3 Hrs. Maximum Marks: 80

General Instructions:

- 1. This Question Paper has 5 Sections A-E.
- 2. Section A has 20 MCQs carrying 1 mark each
- 3. Section **B** has 5 questions carrying 02 marks each.
- 4. Section C has 6 questions carrying 03 marks each.
- 5. Section **D** has 4 questions carrying 05 marks each.
- **6.** Section **E** has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
- 7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
- 8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

		\$	SECTION A		
		Section A consists	of 20 questions of 1	mark each.	
S.NO			_		MA RKS
1		wo positive integers s If $HCF(a,b) = p^mq^n$ (b) 30		d b = p^2q^3 , where p and q are, then (m+n)(r+s)= (d) 72	1
2	Let p be a prime (a) $x^2 - px + p = 0$			ts roots as factors of p is $x + p = 0$ (d) $x^2 - px + p + 1 = 0$	1
3	If α and β are the	e zeros of a polynomi	$ial f(x) = px^2 - 2x + 3$	$3p$ and $\alpha + \beta = \alpha\beta$, then p is	1
	(a)-2/3	(b) 2/3	(c) 1/3	(d) -1/3	
4	If the system of	equations $3x+y=1$ ar	$\frac{1}{1}$ nd $(2k-1)x + (k-1)y = 2$	2k+1 is inconsistent, then $k =$	1
	(a) -1	(b) 0	(c) 1	(d) 2	
5		a parallelogram PQF ates of its fourth vert		P(3,4), Q(-2,3) and R(-3,-2),	1
	(a) (-2,-1)	(b) (-2,-3)	(c) $(2,-1)$	(d) (1,2)	
6	Δ ABC~ΔPQR. If AM and PN are altitudes of ΔABC and ΔPQR respectively and AB ² : PQ ² = 4 : 9, then AM: PN =				1
	(a) 3:2	(b) 16:81	(c) 4:9	(d) 2:3	

7	If x tan 60° cos	$s 60^\circ = sin60^\circ cot$	60°, then	x =			1
	(a) cos30°	(b) tan30	0	(c) sin30°	(d) cot	30°	
8	If $\sin\theta + \cos\theta$	$=\sqrt{2}$, then $\tan\theta$	$-\cot \theta =$				1
	(a) 1	(b) 2		(c) 3	(d) 4		
9	_	gure, DE BC, A of the following i		ts, EC =b units	s, DE =x units a	and BC = y	1
			D	A E C			
	(a) $x = \frac{a+b}{ay}$	(b) $y = \frac{a}{a+1}$	<u>x</u> -b	(c) $x = \frac{ay}{a+b}$	(d) $\frac{x}{y}$ =	$=\frac{a}{b}$	
10		pezium with AD			-	C and BD	1
	intersect each (a) 6cm	other at O such to (b) 7cm	hat AO/OC	C = DO/OB = 1 (c) 8cm	1/2, then BC = (d) 9cr	n	
11	If two tangents	s inclined at an a	ngle of 60°	are drawn to	a circle of radiu	is 3cm, then the	1
	_	tangent is equal	_		W 011 010 01 1 W 010	,	
	(a) $\frac{3\sqrt{3}}{2}$ cm	(b) 3cm		(c) 6cm	(d) $3\sqrt{3}$	3cm	
12	The area of t	he circle that car	be inscrib	ed in a square	e of 6cm is		1
	(a) $36\pi \text{ cm}^2$	(b) 18π	cm ²	(c) 12π cm	1^2 (d) 97	τ cm ²	
13		The sum of the length, breadth and height of a cuboid is $6\sqrt{3}$ cm and the length of its					
		3cm. The total su			is (d) 108	22	
	(a) 48 cm^2	(b) 72 cm	1-	(c) 96 cm ²	(a) 10a	8 CIII-	
14	If the difference and mean is	If the difference of Mode and Median of a data is 24, then the difference of median and mean is					1
	(a) 8	(b) 12		(c) 24	(d) 36		
15	The number of revolutions made by a circular wheel of radius 0.25m in rolling a distance of 11km is				1		
	(a) 2800	(b) 4000		(c) 5500	(d) 700	00	
16	For the follow	ing distribution,					1
	Class	0-5	5-10	10-15	15-20	20-25	
	Frequency		5	12	20	9	
		lower limits of t	he median				
	(a) 15	(b) 25		(c) 30	(d) 35		1

17	Two dice are rolled simultaneously. What is the probability that 6 will come up at least once?					
	(a)1/6	(b) 7/36	(c) 11/36	(d) 13/36		
18	If 5 $\tan \beta = 4$, then	$nen \frac{5 \sin \beta - 2 \cos \beta}{5 \sin \beta + 2 \cos \beta} =$			1	
	(a) 1/3	(b) 2/5	(c) 3/5	(d) 6		
		statement of Reason (ment of assertion (A) is	1	
19	Statement A (A) their LCM is 3	· •	of two numbers is 57	80 and their HCF is 17, then		
	Statement R(Reason) : HCF is alwa	ays a factor of LCM			
	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)					
	(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)					
	(c) Assertion ((A) is true but reason (A	R) is false.			
	(d) Assertion ((A) is false but reason	(R) is true.			
20	,	Assertion): If the co-or D(3,5) and E(-3,-3) res		oints of the sides AB and AC = 20 units	1	
	-	Reason): The line join third side and equal to		f two sides of a triangle is		
	(a) Both assert of assertion (A) are true and reason	(R) is the correct explanation		
	(b) Both asser explanation of	tion (A) and reason (R assertion (A)) are true and reason	(R) is not the correct		
	(c) Assertion ((A) is true but reason(F	R) is false.			
	(d) Assertion ((A) is false but reason(R) is true.			

	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
S.No.		Marks
21	If $49x+51y=499$, $51x+49y=501$, then find the value of x and y	2
22	In the given figure below, $\frac{AD}{AE} = \frac{AC}{BD}$ and $\angle 1 = \angle 2$. Show that \triangle BAE \sim \triangle CAD .	2
23	In the given figure, O is the centre of circle. Find ∠AQB, given that PA and PB are tangents to the circle and ∠APB= 75°.	2
24	The length of the minute hand of a clock is 6cm. Find the area swept by it when it moves from 7:05 p.m. to 7:40 p.m. OR In the given figure, arcs have been drawn of radius 7cm each with vertices A, B, C and D of quadrilateral ABCD as centres. Find the area of the shaded region.	2

25	If $sin(A+B) = 1$ and $cos(A-B) = \sqrt{3/2}$, $0^{\circ} < A+B \le 90^{\circ}$ and $A > B$, then find the measures of angles A and B.		
	OR		
	Find an acute angle θ when $\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$		

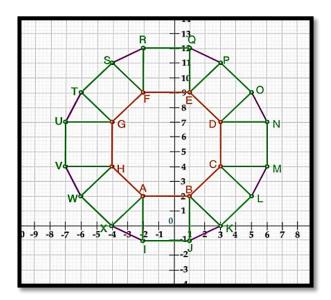
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
S.No	•	Marks
26	Given that $\sqrt{3}$ is irrational, prove that $5 + 2\sqrt{3}$ is irrational.	3
27	If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the polynomial $2x^2 - 5x - 3$, then find the values of p and q.	3
28	A train covered a certain distance at a uniform speed. If the train would have been 6 km/h	3
	faster, it would have taken 4 hours less than the scheduled time. And, if the train were	
	slower by 6 km/hr; it would have taken 6 hours more than the scheduled time. Find the	
	length of the journey.	
	OR	
	Anuj had some chocolates, and he divided them into two lots A and B. He sold the first	
	lot at the rate of ₹2 for 3 chocolates and the second lot at the rate of ₹1 per chocolate, and	
	got a total of ₹400. If he had sold the first lot at the rate of ₹1 per chocolate, and the	
	second lot at the rate of ₹4 for 5 chocolates, his total collection would have been ₹460.	
	Find the total number of chocolates he had.	
29	Prove the following that-	3
	$\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta \csc\theta - 2\sin\theta \cos\theta$	
30	Prove that a parallelogram circumscribing a circle is a rhombus	3
	OR	

	In the figure XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C interesting XY at A and X'Y' at B, what is the measure of ∠AOB.		
31	Two coins are tossed simultaneously. What is the probability of getting (i) At least one head? (ii) At most one tail? (iii) A head and a tail?	3	
	SECTION D		
C N -	Section D consists of 4 questions of 5 marks each.	Manla	
S.No 32		Marks 5	
	To fill a swimming pool two pipes are used. If the pipe of larger diameter used for 4 hours		
	and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. Find, how		
	long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter		
	takes 10 hours more than the pipe of larger diameter to fill the pool?		
	OR		
	In a flight of 600km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr from its usual speed and the time of the flight		
	increased by 30 min. Find the scheduled duration of the flight.		
33	Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.	5	
	Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non parallel sides in the same ratio.		

34					5				
34	Due to heavy floods in a state, thousands were rendered homeless. 50 schools								
	collectively decided to provide place and the canvas for 1500 tents and share the								
	whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m²,								
	find the amount shared	find the amount shared by each school to set up the tents.							
		OR	R						
	There are two identical solid cubical boxes of side 7cm. From the top face of the first cube								
	a hemisphere of diameter	equal to the side of the	ne cube is scoop	ped out. This hemisphere is					
	inverted and placed on the	e top of the second cu	ıbe's surface to	form a dome. Find					
	(i) the ratio of the total surface area of the two new solids formed								
	(ii) volume of each	ch new solid formed.							
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				5				
35	The median of the following data is 525. Find the values of x and y, if the total								
	frequency is 100		T	1					
		Class interval	Frequency						
		0-100	2						
		100-200	5						
		200-300	X						
		300-400	12						
		400-500	17						
		500-600	20						
		600-700	у						
		700-800	9						
I		800-900	7						
		000 700	,						

	SECTION E	
	Case study based questions are compulsory.	
36	A tiling or tessellation of a flat surface is the covering of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps. Historically, tessellations were used in ancient Rome and in Islamic art. You may find tessellation patterns on floors, walls, paintings etc. Shown below is a tiled floor in the archaeological Museum of Seville, made using squares, triangles and hexagons.	

A craftsman thought of making a floor pattern after being inspired by the above design. To ensure accuracy in his work, he made the pattern on the Cartesian plane. He used regular octagons, squares and triangles for his floor tessellation pattern



Use the above figure to answer the questions that follow:

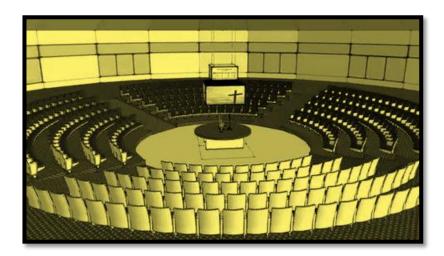
- (i) What is the length of the line segment joining points B and F?
- (ii) The centre 'Z' of the figure will be the point of intersection of the diagonals of quadrilateral WXOP. Then what are the coordinates of Z?
- (iii) What are the coordinates of the point on y axis equidistant from A and G?

OR

What is the area of Trapezium AFGH?

1

The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.



- (i) If the first circular row has 30 seats, how many seats will be there in the 10th row?
- (ii) For 1500 seats in the auditorium, how many rows need to be there?

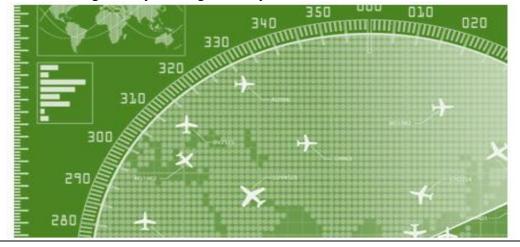
OR

2

1

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row?

- (iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?
- We all have seen the airplanes flying in the sky but might have not thought of how they actually reach the correct destination. Air Traffic Control (ATC) is a service provided by ground-based air traffic controllers who direct aircraft on the ground and through a given section of controlled airspace, and can provide advisory services to aircraft in non-controlled airspace. Actually, all this air traffic is managed and regulated by using various concepts based on coordinate geometry and trigonometry.



At a given instance, ATC finds that the angle of elevation of an airplane from a point on the ground is 60° . After a flight of 30 seconds, it is observed that the angle of elevation changes to 30° . The height of the plane remains constantly as $3000\sqrt{3}$ m. Use the above information to answer the questions that follow-

(i) Draw a neat labelled figure to show the above situation diagrammatically.

(ii) What is the distance travelled by the plane in 30 seconds?

OR

Keeping the height constant, during the above flight, it was observed that after $15(\sqrt{3} - 1)$ seconds, the angle of elevation changed to 45° . How much is the distance travelled in that duration.

(iii) What is the speed of the plane in km/hr.

1

1

2