CODE:1401- AG-4-TS-23-24 पजियन क्रमांक **REG.NO:-TMC -D/79/89/36**

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 case based integrated units of assessment (04 marks each) with sub-parts 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 π =22/7 wherever required if not stated.

EXAMINATION 2022 -23

Time : 3 Hours — Maximum Marks : 80

CLASS – X — **MATHEMATICS**

Sr. No.	**SECTION – A** **This section comprises of very short answer type-questions (VSA) of 1 marks each**	Marks allocated
Q.1	If $a = 2^3 \times 3, b = 2 \times 3 \times 5, c = 3^n \times 5$ and LCM(a,b,c)= $2^3 \times 3^2 \times 5$, then n= (a) 1 (b) 4 (c) 3 (d) 2	1
Q.2	If the zeroes of a quadratic polynomial ax^2+bx+c, c≠0 are equal,	1

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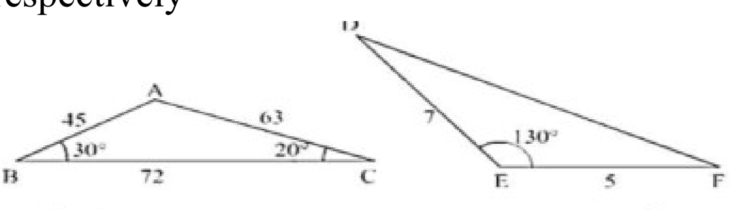
	then (a)c and a have opposite sign (b) b and c have opposite sign (c) c and a have the same sign (d) b and c have the same sign	
Q.3	If $\alpha\ and\ \beta$ are the zeros of a polynomial f(x)=px^2-2x+3p and $\alpha+\beta=\alpha\beta$, then p is (a) -2/3 (b) 2/3 (c) 1/3 (d)-1/3	1
Q.4	I am three times as old as my son. Five years later, I shall be two and a half times as old as my son.my present age is (a) 20years (b)45years (c)15years (d)50years	1
Q.5	If the vertices of a parallelogram PQRS taken in order are P(3,4), Q(-2,3), and R(-3,-2) then the coordinates of its fourth vertex S are (a)(-2,3) (b) (-2,-3) (c) (2,-1) (d)(1,2)	1
Q.6	If P $(\frac{a}{3},4)$ is the mid-pointof the segment joining the points Q(-6,5) and R(-2,3), then the value of a is (a) 12 (b) -12 (c) -4 (d)-6	1
Q.7	If 7 $\tan\theta = 4 then\ \frac{(7\sin\theta - 3\cos\theta)}{(7\sin\theta + 3\cos\theta)} = ?$ (a) 3/7 (b) 1/7 (c) 5/14 (d)5/7	1
Q.8	If $\sin\alpha = \frac{1}{\sqrt{2}}\ and\ \tan\beta = 1$, then the value of $\cos(\alpha+\beta)$ is (a) 3 (b)1 (c)2 (d)0	1
Q.9	In the given figures the measures of $\angle D\ and\ \angle F$ are respectively  (a)$20^0,30^0$(b)$30^0,20^0$ (c) $50^0,40^0$ (d) $40^0,50^0$	1
Q.10	In triangle ABC,D,E and F are the midpoints of sides BC, CA and AB respectively and $\frac{AB}{DE}=\frac{BC}{FE}=\frac{CA}{FD}$, then	1

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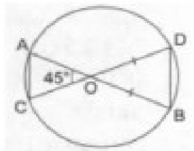
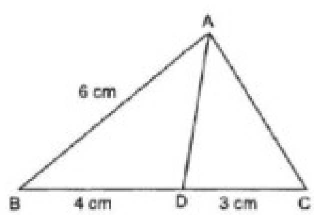
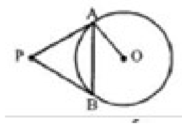
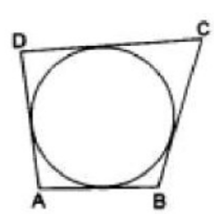
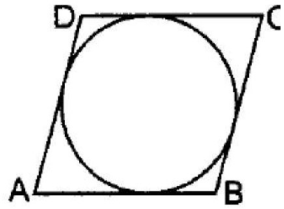
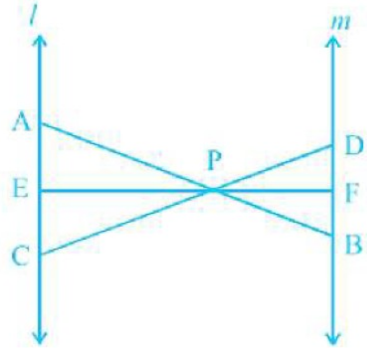
	(a) $\Delta BCA \backsim \Delta FDE$ (b) (c) $\Delta FDE \Delta ABC$ (d) $\Delta FDE \Delta CAB$	
Q.11	In the given figure, O is the point of intersection of two chords AB and CD such that OB=OD and $\angle AOC = 45^0. Then, \Delta OAC \, and \, \Delta ODB$ are  (a)equilateral and similar (b) equilateral but not similar (c) isosceles but not similar (d) isosceles and similar	1
Q.12	The area of the circle that can be inscribed in a square of 6cm is (a) $36\pi\, cm^2$ (b) $18\pi\, cm^2$ (c) $12\pi\, cm^2$ (d) $9\pi\, cm^2$	1
Q.13	The maximum volume of a cone that can be carved out of a solid hemisphere of radius 'r' is (a) πr^3 (b) $\frac{2}{3}\pi r^3$ (c) $\frac{1}{3}\pi r^3$ (d) $\frac{1}{3}\pi r^2 h$	1
Q.14	For the following distribution, Class: 0-5, 5-10, 10-15, 15-20, 20-25 Frequency: 10, 15, 12, 20, 9 The sum of the lower limits of the median and modal class is (a) 15 (b) 25 (c) 30 (d)35	1
Q.15	The sum of the length, breadth and height of a cuboid is $6\sqrt{3}cm$ and the length of its diagonal is $2\sqrt{3}cm$. the total surface area of the cuboid is (a) 48cm^2 (b) 72cm^2 (c) 96cm^2 (d) $108cm^2$	1
Q.16	For the following distribution: Class: 60-70, 70-80, 80-90, 90-100, 100-110 Frequency: 13, 10, 15, 8, 11 The lower limit of the modal class is (a) 80 (b) 100 (c) 90 (d)70	1
Q.17	A number is selected from first 50 natural number. What is the probability that it is a multiple of 3 or 5? (a) $\frac{21}{50}$ (b) $\frac{12}{25}$ (c) $\frac{23}{50}$ (d) $\frac{13}{25}$	1

Q.18	The number of revolutions made by a circular wheel od radius 0.25m in rolling a distance of 11km is (a) 2800 (b) 4000 (c) 5500 (d) 7000	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.	
Q.19	Assertion: 3 is a rational number. Reason: the square roots of all positive integers are irrationals	1
Q.20	Assertion: in the ΔABC,AB=24cm, BC=10cm and AC=26cm, then ΔABC is a right-angle triangle . Reason: if in two triangles, their corresponding angles are equal, then the triangles are similar.	1
	SECTION – B **This section comprises of very short answer type-questions (VSA) of 2 marks each**	
Q.21	solve the following system of linear equations graphically: x-y=1 2x+y=8 Shade the area bounded by these two lines and y-axis. Also, determine this area.	2
Q.22	In fig.AD is the bisector of $\angle A$.if BD=4cm, DC=3cm and AB=6cm, determineAC 	2
Q.23	The base radii of two circular cones of the same height are in the ratio of 3 : 5. Find the ratio of their volumes. OR A mason has to fit a bathroom with square marbel tiles of the largest possible size. The size of the bathroom is 10ft. by 8ft. what would be the size (in inches) of the tile required that has to be cut and how many such tiles are required?	2

Q.24	In the adjoining figure PA and PB are tangents to the circle with centre O. If $\angle APB = 60^0$, then find $\angle OAB$. 	2
Q.25	If a tower 30m high, casts a shadow $10\sqrt{3}m$ long on the ground, then what is the angle of elevation of the sun ? OR Prove the trigonometric identity: $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\cos ec\theta$	2
	SECTION – C **(This section comprises of short answer type questions (SA) of 3 marks each)**	
Q.26	A train covered a certain distance at a uniform speed. If the train would have been 6km/h faster, it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6km/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 rs2 for 3 chocolates and the second lot at the rate of rs1 per chocolate, and got a total of rs400. If he had sold the first lot at the rate of rs1 per chocolate, and the second lot at the rate of rs4 for 5 chocolates, his total collection would have been rs460 find the total number of chocolates he had.	3
Q.27	If tan A= n tanB and sinA= m sinB, then prove that $\cos^2 A=\frac{m^2-1}{n^2-1}$	3
Q.28	In the adjoining figure, a circle touches all the four sides of a quadrilateral ABCD whose sides are AB=6cm, BC=9cm, and CD=8 cm. find the length of side AD  OR prove that the lengths of tangents drawn from an external point to a circle are equal. Using the above prove the following: A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB+CD=AD+BC	3

		
Q.29	From a deck of 52 playing cards,jacks and kings of red colour and queen and aces of black colour are removed. The remaining cards are mixed and a card is drown at random. Find the probability that the drawn card is (i) A black queen (ii) A card of red colour (iii) A jack of black colour (iv)A face card	3
Q.30	Find the HCF and LCM of the following positive integers by applying the prime factorization method: 15, 55, 99 .	3
Q.31	if (x-k) is the HCF of ($2x^2$-kx-9) and x^2+x-12, find the value of k.	3
	SECTION – D **(This section comprises of long answer-type questions (LA) of 5 marks each)**	
Q.32	Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of a longer diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. OR solve for y: $\frac{y+3}{y-2}-\frac{1-y}{y}=\frac{17}{4}; y\neq 0.2$	5
Q.33	Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points then other two sides are divided in the same ratio. By using this theorem, prove that in ΔABC if DE|| BC then $\frac{AD}{BD}=\frac{AE}{AC}$. OR In the figure,1||m and line segments AB, CD and EF are concurrent at point P. prove that $\frac{AE}{BF}=\frac{AC}{BD}=\frac{CE}{FD}$	5



Q.34 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 cube is scooped out. This hemisphere is inverted and placed on the top of the second cube's surface to form a dome. Find **5**

(i) the ratio of the total surface area of the two new solids formed

(ii) volume of each new solid formed.

OR

A chord of a circle of radius 10cm subtends a right angle at the center. Find the area of the corresponding:(use $\pi = 3.14$)

(i) minor sector (ii) major sector (iii) minor segment (iv) major segment

Q.35 The following table gives the distribution of the life time of 400 neon lamps: **5**

Lite time (in hours)	Number of lamps
1500-2000	14
2000-2500	56
2500-3000	60
3000-3500	86
3500-4000	74
4000-4500	62
4500-5000	48

Find the median life time of a lamp.

SECTION – E

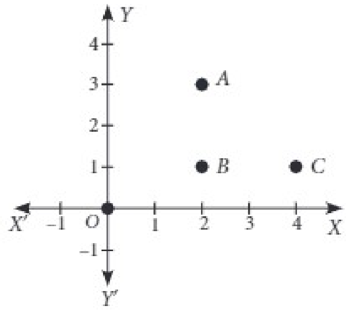
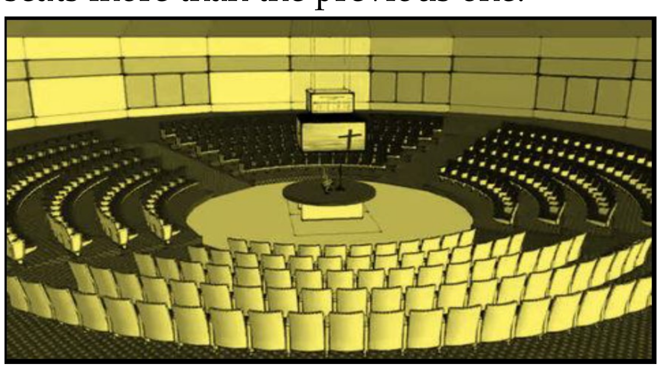
(This section comprises of 3 case study / passage – based questions of 4 marks each with two sub parts (i),(ii),(iii) of marks 1, 1, 2 respectively.The third case study question has two sub – parts of 2 marks each.)

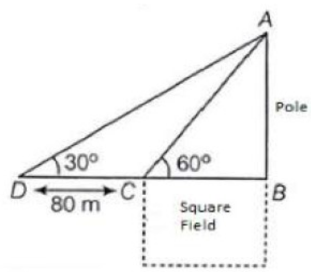
Q.36

CASE STUDY: 1

Analyzing Distance:

Alia and Shagun are friends living on the same street in Patel Nagar. Shagun's house is at the intersection of one street with another street on which there is a library. They both study in the same school and that is not far from Shagun's house.

	 Suppose the school is situated at the point *O*, *i.e.*, the origin, Alia's house is at the point *A*. Shagun's house is at *B* and library is at *C*. Based on the above information, answer the following questions.	
i.	How far Alia's house from Shagun's house? (a) 3 units (b) 4 units (c) 5 units (d) 2 units	1
ii.	How far is the library from Shagun's house? (a) 3 units (b) 2 units (c) 5 units (d) 4 units	1
iii.	Which of the following is true? (a) (a) ABC forms a scalene triangle (b) ABC forms a isosceles triangle (c) ABC forms a equilateral triangle (d) none of these OR How far is the school from Alia's house then Shagun's house? (a) $\sqrt{13}$ units (b) $\sqrt{5}$ units (c) $\left(\sqrt{13}+\sqrt{5}\right)$ units (d) $\left(\sqrt{13}-\sqrt{5}\right)$ units	2
Q.37	**CASE STUDY - 2** 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 10^{th} row?	1
ii.	If there were 17 rows in the auditorium, how many seats will be there in the middle row?	1

iii.	For 1500 seats in the auditorium, how many rows need to be there? OR If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10^{th} row?	2
Q.38	**CASE STUDY - 3** Basant kumar is a farmer in a remote village of rajasthan. He has a small square farm land. He wants to do fencing of the land so that stray animals may not enter his farmland. For this, he wants to get the perimeter of the land.there is a pole at one corner of this field. He wants to hang an effigy on the top of it to keep birds away. He standing in one corner of his square field and observes that the angle subtended by the pole in the corner just diagonally opposite to this corner is 60^0. When he retires 80m from the corner, along the same straight line, he finds the angle to be 30^0 	
i.	find the height of the pole too so that he can arrange a ladder accordingly to put an effigy on the pole.	1
ii.	find the length of his square field so that he can buy material to do the fencing work accordingly.	1
iii.	find the distance from farmer at position C and top of the pole? OR Find the distance from farmer at position D and top of the pole?	2
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	"अगर सूरज के तरह जलना है तो रोज उगना पड़ेगा।"	