CODE:1002- AG-C-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 2023 -24

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	a and b, when divided by 7 and 6 respectively, leave remainders p and q respectively. What is the maximum value of p + q? (A) 5 (B) 6 (C) 12 (D) 11	1
Q.2	If the roots of $5x^2 - px + 1 = 0$ are real and distinct, then	1

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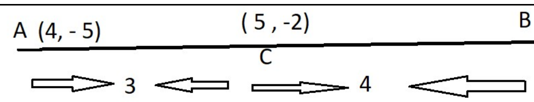
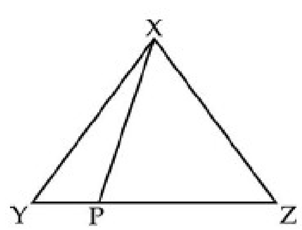
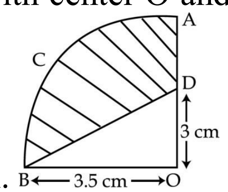
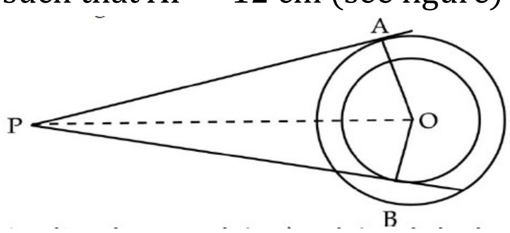
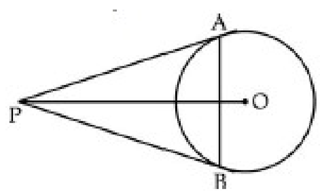
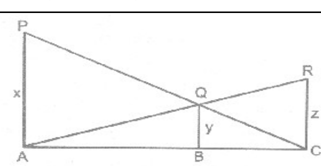
	(A) $p > 2\sqrt{5}$ (B) $p < -2\sqrt{5}$ (C) $-2\sqrt{5} < p < 2\sqrt{5}$ (D) $p > 2\sqrt{5}$ or $p < -2\sqrt{5}$	
Q.3	If α, β be the zeroes of the polynomial $2x^2 + 5x + k$ such that $(\alpha + \beta)^2 - \alpha\beta = \frac{21}{4}$, then k = ? (a) 3 (b) -3 (c) -2 (d) 2	1
Q.4	If x = y, 3x - y = 4 and x + y + z = 6 then the value of z is : (A) 1 (B) 2 (C) 3 (D) 4	1
Q.5	 In given fig. find the missing coordinate B (a) $\left(-\frac{19}{3}, 2\right)$ (b) $\left(\frac{19}{3}, 2\right)$ (c) $\left(\frac{19}{3}, -2\right)$ (d) NONE	1
Q.6	A vertical stick 30 m long casts a shadow 15 m long on the ground. At the same time, a tower casts a shadow 75 m long on the ground. The height of the tower is : (a) 150 m (b) 100 m (c) 25 m (d) 200 m	1
Q.7	$(\cos^4 A - \sin^4 A)$ is equal to (a) $1 - 2\cos^2 A$ (b) $2\sin^2 A - 1$ (c) $\sin^2 A - \cos^2 A$ (d) $2\cos^2 A - 1$	1
Q.8	The angle of elevation of the top of a tower, as seen from two points A & B situated in he same line and at distances 'p' and 'q' respectively from the foot of the tower, are complementary, then the height of the tower is (A) pq (B) $\frac{p}{q}$ (C) $\sqrt{pq}$ (D) none of these	1
Q.9	In the given figure $\angle YXZ = \angle XPZ$, then $\frac{ZX}{ZY}$ is equal to :  (a) $ZY \times ZP$ (b) XZ^2 (c) $\frac{PZ}{XZ}$ (d) PZ^2	1
Q.10	In ΔPQR & ΔMNS, $\frac{PQ}{NS} = \frac{QR}{MS} = \frac{PR}{MN}$, then symbolically we write (a) $\Delta PQR \sim \Delta MNS$ (b) $\Delta PQR \sim \Delta SMP$ (c) $\Delta QRP \sim \Delta NSM$ (d) $\Delta QRP \sim \Delta SMN$	1
Q.11	If O is the center of a circle, PQ is chord and the tangent PR at P make an	1

	angle of 60° with PQ, then $\angle POQ$ is equal to : (A) 30° (B) 120° (C) 100° (D) 110°	
Q.12	Two circles touch internally. The sum of their areas is $116\pi cm^2$ and the distance between their centers is 6cm. then the radii of the circles. (a) 10 , 4 (b) 11 , 3 (c) 9 , 5 (d) none	1
Q.13	A solid cylinder has a total surface area of $231 m^2$. Its curved surface area is $\frac{2}{3}$ of the total surface area. The volume of the cylinder is : (A) $269\frac{1}{2}m^3$ (B) $259\ \frac{1}{2}m^3$ (C) $249\frac{1}{2}m^3$ (D) $239\frac{1}{2}m^3$	1
Q.14	The median of the first 8 prime numbers is (a) 7 (b) 9 (c) 11 (d) 13	1
Q.15	A field is in the form of a circle. A fence is to be erected around the field. The cost of fencing would be Rs. 2640 at the rate of Rs. 12 per meter. Then the field is to be thoroughly ploughed at the cost of Rs. 0.50 per m^2. What is the amount required to plough the field ? (a) Rs. 2925 (b) Rs. 1925 (c) Rs. 925 (d) none	1
Q.16	If the mode of some data is 7 and their mean is also 7, then their median is (A) 10 (B) 9 (C) 8 (D) 7	1
Q.17	In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green? (a) $\frac{2}{3}$ (b) $\frac{13}{21}$ (c) $\frac{1}{3}$ (d) $\frac{8}{21}$	1
Q.18	Two cubes each of volume $8 cm^3$ are joined end to end, then the surface area of the resulting cuboid is: (A)$80 cm^2$ (B) $64 cm^2$ (C)$40 cm^2$ (D) $8 cm^2$	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 (A):** 6^n ends with the digitzero,where n is natural number. **REASON (R):** Any number ends with digit zero, if its prime factor is of the form $2^m \times 5^n$, where m , n are natural numbers.	1
Q.20	**ASSERTION (A):** Centroid of a triangle formed by the points (a, b), (b, c) and (c, a) is at origin, Then a + b + c = 0 **REASON (R):** Centroid of a ΔABC with vertices A(x_1 , y_1), B (x_2 , y_2) and	1

	C(x_3 , y_3) is given by $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$	
	SECTION – B **This section comprises of very short answer type-questions (VSA) of 2 marks each**	
Q.21	Solve the system of equations graphically: 2x + 3y = 2, x – 2y = 8 .	2
Q.22	If the diagonal of a quadrilateral divide each other proportionally, then it is a trapezium.	2
Q.23	In circle of radius 6cm, chord of length 10 cm makes an angle of 110° at the center of circle find (i) Circumference of the circle (ii) Area of the circle (iii) Length of arc (iv) The area of sector OR In figure, OACB is a quadrant of a circle with center O and radius 3.5 cm.  If OD= 3 cm, find the area of shaded region.	2
Q.24	Two concentric circles are of radii 5 cm and 3 cm and center at O. two tangents PA and PB are drawn to two circles from an external point P such that AP = 12 cm (see figure) ,find the length of BP. 	2
Q.25	If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\cos\theta$, OR Prove that : $2\left(\sin^6\theta + \cos^6\theta\right) - 3\left(\sin^4\theta + \cos^4\theta\right) + 1 = 0$.	2
	SECTION – C **(This section comprises of short answer type questions (SA) of 3 marks each)**	
Q.26	One says, "Give me a hundred, friend! I shall then become twice as rich as you". The other replies, "If you give me ten, I shall be six times as rich as you". Tell me what is the amount of their (respective) capital? OR Solve for x and y: $\frac{bx}{a} + \frac{ay}{b} = a^2 + b^2; x + y = 2ab$.	3

Q.27	Prove that $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\cos ec^2 A}{\sec^2 A - \cos ec^2 A} = \frac{1}{1 - 2\cos^2 A}$	3
Q.28	Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the center. OR In the given figure, PA and PB are two tangents drawn to a circle with center O and radius r. if OP = 2r, show that ΔAPB is equilateral. 	3
Q.29	Two dice are thrown simultaneously at the same time. Find the probability of getting different number on both the dice.	3
Q.30	A merchant has 120 liters of oil of one kind, 180 liters of another kind and 240 liters of third kind. He wants to sell the oil by filling the three kinds of oil in tins of equal capacity. What should be the greatest capacity of such a tin?	3
Q.31	The angle of elevation of the top of a tower at a point on the level ground is 30°. After walking a distance of 100 m towards the foot of the tower along the horizontal line through the foot of the tower on the same level ground, the angle of elevation of the top of the tower is 60°. Find the height of the tower.	3
	SECTION – D **(This section comprises of long answer-type questions (LA) of 5 marks each)**	
Q.32	Determine the value of m for which the equation $5x^2 - 4x + 2 + m(4x^2 - 2x - 1) = 0$ will have (a) equal roots, (b) product of roots as 2, (c) sum of roots as 6.(d) equal in magnitude but opposite in sign (e) one roots is reciprocal of the other . OR Solve for x: $\left(\frac{4x-3}{2x+1}\right) - 10\left(\frac{2x+1}{4x-3}\right) = 3, x \neq -\frac{1}{2}, \frac{3}{4}$.	5
Q.33	In the given figure  , PA, QB and RC are each perpendicular to AC. Prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$.	5

Q.34 A circular piece of land is 40m in diameter. A well of 16 m diameter has been dug to a depth of 28m and the earth dug out is spread evenly over the remaining area. How much has the level of ground been raised? **5**

OR

The interior of a building is in the form of a right circular cylinder of radius 7 m and height 6m, surmounted by a right circular cone of same radius and of vertical angle 60°. Find the cost of painting the building from inside at the rate of Rs. 30/m^2.

Q.35 The following table shows age distribution of persons in a particular region. Find the median age. **5**

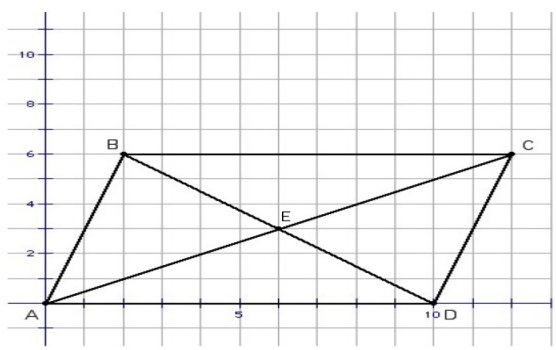
Age (in years)	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60	Below 70
No. of persons	2	5	9	12	14	15	16

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



Four friends Abhay, Ash, Debi and Chen planted their samplings of Lily, Rose, Tulip and Orchid respectively as shown in the following figure. Jen also wanted to plant his sampling of aster in this area. The assistant instructed all five of them to plant their samplings in a arranged manner. So, they ended up planting their samplings in the rectangular shape . Here Lily, Rose, Tulip, Orchid and Aster are as Sampling A, B, C, D and E respectively. Refer to the image and information given above and answer the following questions.

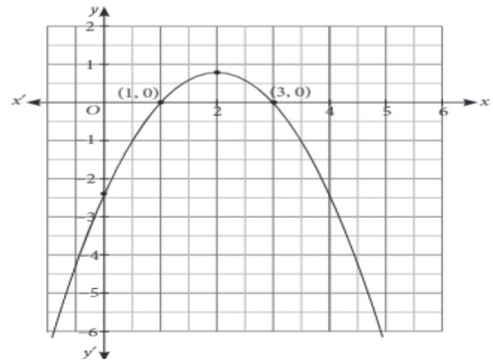
i. Find the distance between lily and Tulip's sampling. **1**

(a) 13.42 UNITS (b) 12.56 UNITS (c) 14.86 UNITS (d) NONE

ii. Find the distance between Aster and Orchid's sampling. **1**

(a) 6 units (b) 4 units (c) 5 units (d) 8 units

iii.	Find the distance between Aster and Lily's sampling. (a) 6.5 units (b) 6.71 units (c) 9.6 units (d) 5.3 units OR Find the distance between Lily and Orchid's sampling. (a) 10 units (b) 12 units (c) 13 units (d) 9 units	2
Q.37	**Case Study - 2** **Application of A.P. in Day to Day Life-** Do you know, we can find A.P. in many situations in our day to day life. One such example is a tissue paper roll, in which the first term is the diameter of the core of the roll and twice the thickness of the paper is the common difference. If the sum of first *n* rolls of tissue on a roll is $S_n = 0.1n^2 + 7.9n$, then answer the following questions. 	
i.	Find S_{n-1} . (a) $0.1n^2 - 0.2n - 7.8$ (b) $0.1n^2 - 7.9n$ (c) $0.1n^2 + 7.7n - 7.8$ (d) None of these	1
ii.	Find the radius of the core. (a) 8 cm (b) 4cm (c) 16 cm (d) Can't be determined	1
iii.	$S_2 =$ ___ ? (a) 16.2 (b) 8.2 (c) 2.8 (d) 4.8 OR Find the thickness of each tissue sheet. (a) 2 cm (b) 1 cm (c) 1 mm (d) 2 mm	2
Q.38	**CASE STUDY - 3** Priya visited temple in Gwalior. On the way she sees the Agra Fort. The entrance gate of the fort has a shape of quadratic polynomial (parabolic). The mathematical representation of the gate is shown in figure. Based on the above informations, answer the following questions.	

	 	
i.	Find the zeroes of the polynomial represented by the graph. (a) -1 , 3 (b)1 , 3 (C)1 , - 3 (d) 0 , 1	1
ii.	What will be the expression for the polynomial represented by the graph? (a) x^2+4x-5 (b) x^2-4x+5 (C) $-x^2+4x-3$ (d) x^2+5x-4	1
iii.	If one zero of a polynomial $p(x)$ is 7 and product of its zeroes is -35 , then $p(x)$= (a) $-x^2+2x+35$ (b) $x^2+2x+35$ (C) $x^2+12x-35$ (d) $x^2-12x-35$ OR What will be the value of the polynomial, represented by the graph, when $x=4$? (a) -2 (b) 3 (C) -3 (d) NONE	2
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	“शिक्षा कभी भी व्यर्थ नहीं होती भले ही वो किसी भी तरह की ग्रहण की गई हो ।”	

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