



CODE:2701-AG-5-TS-22-23

पञ्जियन 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 $\pi = 22/7$ wherever required if not stated.

EXAMINATION 2022 -23

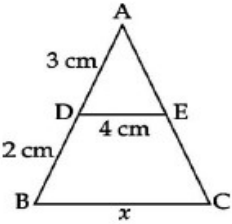
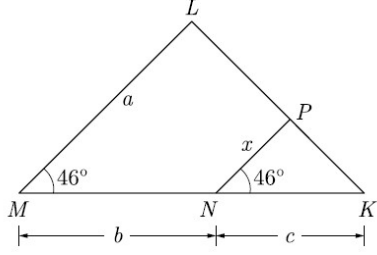
Time : 3 Hours

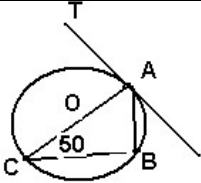
Maximum Marks : 80

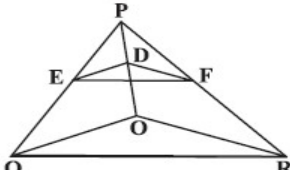
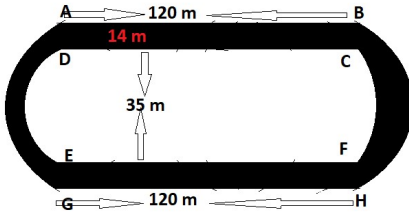
CLASS – X

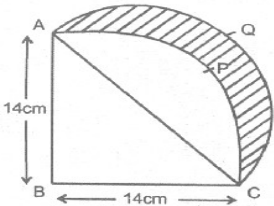
MATHEMATICS


Sr. No.	SECTION – A	Marks allocated
	This section comprises of very short answer type-questions (VSA) of 1 marks each	
Q.1	The coordinates of the point which divides the join of (-6, 10) and (3, -8) in the ratio 2 : 7 is a) (4, -6) b) (-4, 6) c) (1, -3) d) (-1, 3)	1
Q.2	If the roots of $5x^2 - px + 1 = 0$ are real and distinct, then (A) $p > 2\sqrt{5}$ (B) $p < -2\sqrt{5}$ (C) $-2\sqrt{5} < p < 2\sqrt{5}$ (D) $p > 2\sqrt{5}$ or $p < -2\sqrt{5}$	1


Q.3	The values of a and b so that the polynomial $x^3 + ax^2 + bx - 6$ is completely divisible by $x^2 - 4x + 3$ (a) $a = -6, b = 11$ (b) $a = 6, b = 11$ (c) $a = -6, b = -11$ (d) none .	1
Q.4	For what value of p, the following system of equations will be inconsistent: $3px + 6y = \sqrt{50}$; $\sqrt{18}x + \sqrt{24}y = \sqrt{75}$? (a) $p = \sqrt{3}$ (b) $p = \sqrt{2}$ (c) $p \neq \sqrt{3}$ (d) can not be determined .	1
Q.5	If two vertices of a parallelogram are (3, 23) and (-1, 0) and the diagonals intersect at (2, -5), then the other two vertices are (A)(1, -10),(5, -12) (B) (1, -12), (5, 10) (C) (2, -10), (5, -12) (D) (1, -10), (2, -12)	1
Q.6	In the figure given below, if $DE \parallel BC$, then x equals  (a) 3 cm (b) 2 cm (c) 4 cm (d) 6.7 cm	1
Q.7	If $x = r \sin \theta \cos \phi$, $y = r \sin \theta \sin \phi$ and $z = r \cos \theta$, then (a) $x^2 + y^2 + z^2 = r^2$ (b) $x^2 + y^2 - z^2 = r^2$ (c) $x^2 - y^2 + z^2 = r^2$ (d) $z^2 + y^2 - x^2 = r^2$	1
Q.8	$\frac{\tan \theta}{\sec \theta - 1} + \frac{\tan \theta}{\sec \theta + 1}$ is equal to (a) $2 \tan \theta$ (b) $2 \sec \theta$ (c) $2 \operatorname{cosec} \theta$ (d) $2 \tan \theta \sec \theta$	1
Q.9	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.10	In the given figure, x is  (a) $\frac{ab}{a+b}$ (b) $\frac{ac}{b+c}$ (c) $\frac{bc}{b+c}$ (d) $\frac{ac}{a+c}$	1


Q.11	 <p>In the figure given below, AB is a chord of the circle and AOC is its diameter such that $\angle ACB = 50^\circ$, if AT is the tangent to the circle at the point A, then $\angle BAT$ is equal to (A) 65° (B) 60° (C) 50° (D) 40°</p>	1														
Q.12	The diameter of a wheel of a bus is 90cm which makes 315 revolution per minute. Determine its speed in km/hr (a) 35.46km/h (b) 53.46km/h (c) 50.46km/h (d) none .	1														
Q.13	The volume of the largest sphere which is curved out of a cube of side 7cm is: (A) $905\frac{1}{7}\text{cm}^3$ (B) 905cm^3 (C) 805.5cm^3 (D) none of these	1														
Q.14	If mode of a data is 45 and median is 33, then mean is (a) 30(b) 27(c) 33 (d) None of these	1														
Q.15	Two cones have their heights in the ratio 1 : 3 and the radii of their bases are in the ratio 3 : 1, then the ratio of their volumes is (A) 1 : 3 (B) 27 :1 (C) 3 : 1 (D) 1 : 27	1														
Q.16	The sum of lower limit of modal class and median class of the following data is : <table border="1" data-bbox="310 1087 1328 1220"> <tbody> <tr> <td>Classes</td> <td>30-40</td> <td>40-50</td> <td>50-60</td> <td>60-70</td> <td>70-80</td> <td>80-90</td> </tr> <tr> <td>Frequency</td> <td>25</td> <td>30</td> <td>16</td> <td>19</td> <td>17</td> <td>13</td> </tr> </tbody> </table> (A) 110 (B) 130 (C) 90 (D) 120	Classes	30-40	40-50	50-60	60-70	70-80	80-90	Frequency	25	30	16	19	17	13	1
Classes	30-40	40-50	50-60	60-70	70-80	80-90										
Frequency	25	30	16	19	17	13										
Q.17	A card is drawn at random from a pack of 52 cards. The probability that the drawn card is a court card <i>i.e.</i> a jack, a queen or a king, is (a) $\frac{3}{52}$ (b) $\frac{3}{13}$ (c) $\frac{4}{13}$ (d)None of these	1														
Q.18	A sphere is inscribed in a cube, then the ratio of the volume of the sphere to the volume of the cube is (a) $\pi:2$ (b) $\pi:3$ (c) $\pi:4$ (d) $\pi:6$	1														
<p>ASSERTION-REASON BASED QUESTIONS</p> <p>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.</p>																
Q.19	Assertion (A) : Degree of a zero polynomial is not defined.	1														

	Reason (R) : Degree of a non-zero constant polynomial is 0	
Q.20	Assertion (A) : If $\text{LCM} \{p, q\} = 30$ and $\text{HCF} \{p, q\} = 5$, then $p \cdot q = 150$ Reason (R) : $\text{LCM of } (a,b) \times \text{HCF of } (a, b) = a \cdot b$	1
	SECTION – B This section comprises of very short answer type-questions (VSA) of 2 marks each	
Q.21	Solve for x and y: $x + y = a + b; ax - by = a^2 - b^2$.	2
Q.22	 <p>In Fig. $\triangle PQR$, $DE \parallel OQ$ and $DF \parallel OR$. Show that $EF \parallel QR$.</p>	2
Q.23	An athletic track 14 m wide consists of two straight section 120 m long joining semicircular ends whose inner radius is 35 m . calculate the area of shaded region . Also find Length of outer boundary of the track .	2
	 <p style="text-align: center;">OR</p> <p>The wheel of a motorcycle is of radius 35 cm. How many revolutions are required to travel a distance of 11 m?</p>	
Q.24	Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the center.	2
Q.25	If $\sqrt{3} \tan \theta = 3 \sin \theta$, then prove that $\sin^2 \theta - \cos^2 \theta = \frac{1}{3}$.	2
	OR	
	Find the value of A and B if $\cos(3A + B) = \frac{1}{2}$ and $\sin(3A - B) = \frac{1}{2}$, where $0^\circ < A, B < 20^\circ$ and $A \geq B$.	
	SECTION – C (This section comprises of short answer type questions (SA) of 3 marks each)	
Q.26	A and B each have a certain number of mangoes. A says to B, “if you give 30 of your mangoes, I will have twice as many as left with you.” B replies, “if you give me 10, I will have thrice as many as left with you.” How many mangoes does each have?	3
	OR	

	Solve the following system of linear equations graphically : $4x - 3y + 4 = 0$, $4x + 3y - 20 = 0$. Find the area of the region bounded by these lines and the x-axis.	
Q.27	If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, prove that $(m^2 - n^2)^2 = 16 mn$.	3
Q.28	An elastic belt is placed around the rim of a pulley of radius 5 cm. one point on the belt is pulled directly away from the center O of the pulley until it is at P, 10 cm from O. find the length of the belt that is in contact with the rim of the pulley also, find the shaded area. OR ABCP is a quadrant of a circle of radius 14 cm. With AC as diameter, a semicircle is drawn. Find the area of the shaded portion  (figure).	3
Q.29	All the three face cards of spades are removed from a well-shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting (i) black face card (ii) a queen (iii) a black card .	3
Q.30	In a seminar, the number of participants in Hindi, English and mathematics are 60, 84 and 108 respectively. Find the minimum number of rooms required, if in each room, the same number of participants are to be seated and all of them being in the same subject.	3
Q.31	Obtain all the zeroes of the polynomial $F(x) = x^4 - 7x^3 + 10x^2 + 14x - 24$, if two of its zeroes are $+\sqrt{2}$ and $-\sqrt{2}$.	3
	SECTION - D (This section comprises of long answer-type questions (LA) of 5 marks each)	
Q.32	A two-digit number is such that the product of its digits is 14. if 45 is added to the number, the digits interchange their places. Find the number. OR Solve : $\frac{a}{ax-1} + \frac{b}{bx-1} = a+b$.	5
Q.33	In a trapezium ABCD $AB \parallel DC$ and $DC = 2AB$. EF drawn parallel to AB cuts AD in F and BC in E such that $\frac{BE}{EC} = \frac{3}{4}$. Diagonal DB intersects EF at G. Prove that $7FE = 10AB$.	5
Q.34	Two ships are sailing in the sea on the either side of the light-house, the angles of depression of two ships as observed from the top of the light-	5

	<p>house are 60° and 45° . If the distance between the ships is $200\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$, find the height of the light-house.</p> <p style="text-align: center;">OR</p> <p>An aero plane when flying at a height of 5000m above the ground passes vertically above another aero plane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aero planes at that instant.</p>																	
<p>Q.35</p>	<p>An incomplete distribution is given below :</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 12.5%;">Variable</td> <td style="width: 12.5%;">10-20</td> <td style="width: 12.5%;">20-30</td> <td style="width: 12.5%;">30-40</td> <td style="width: 12.5%;">40-50</td> <td style="width: 12.5%;">50-60</td> <td style="width: 12.5%;">60-70</td> <td style="width: 12.5%;">70-80</td> </tr> <tr> <td>Frequency</td> <td>12</td> <td>30</td> <td>-</td> <td>65</td> <td>-</td> <td>25</td> <td>18</td> </tr> </table> <p>You are given that the median value is 46 and the total number of items is 230.</p> <p>i. Using the median formula fill up missing frequencies. ii. Calculate the AM of the completed distribution.</p>	Variable	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Frequency	12	30	-	65	-	25	18	<p>5</p>
Variable	10-20	20-30	30-40	40-50	50-60	60-70	70-80											
Frequency	12	30	-	65	-	25	18											
	<p>SECTION – E</p> <p>(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.)</p>																	
<p>Q.36</p>	<p style="text-align: center;"><u>CASE STUDY:1</u></p> <p>Social Awareness for No-smoking: To raise social awareness about hazards of smoking, a school decided to start ‘No-smoking’ campaign. 10 students are asked to prepare campaign banners in the shape of a triangle. The vertices of one of the triangle are $P(-3,4)$, $Q(3,4)$ and $R(-2,-1)$.</p> <div style="text-align: center;">  </div> <p>Based on the above information, answer the following questions.</p>																	
<p>i.</p>	<p>The coordinates of centroid of ΔPQR are</p> <p>(a) $\left(\frac{2}{3}, \frac{7}{3}\right)$ (b) $\left(\frac{1}{3}, \frac{1}{3}\right)$ (c) $\left(\frac{-2}{3}, \frac{7}{3}\right)$ (d) $\left(\frac{7}{3}, \frac{2}{3}\right)$</p>	<p>1</p>																
<p>ii.</p>	<p>If S be the mid-point of the line joining P and Q, then coordinates of S are</p>	<p>1</p>																

	(a) (4,0) (b) (2,0) (c)(0,2) (d)(0,4)	
iii.	<p>The coordinates of centroid of ΔSTU are</p> <p>(a) $\left(\frac{2}{3}, \frac{7}{3}\right)$ (b) $\left(\frac{1}{3}, \frac{1}{3}\right)$ (c) $\left(-\frac{2}{3}, \frac{7}{3}\right)$ (d) $\left(\frac{7}{3}, \frac{2}{3}\right)$</p> <p>OR</p> <p>If U be the mid-point of the line joining R and P, then coordinates of U are</p> <p>(a) $\left(-\frac{5}{2}, \frac{3}{2}\right)$ (b) $\left(\frac{3}{2}, -\frac{5}{2}\right)$ (c) $\left(\frac{3}{2}, \frac{5}{2}\right)$ (d) $\left(\frac{5}{2}, \frac{3}{2}\right)$</p>	2
Q.37	<p style="text-align: center;">CASE STUDY - 2</p> <p>Kamla and her husband were working in a factory in Seelampur, New Delhi. During the pandemic, they were asked to leave the job. As they have very limited resources to survive in a metro city, they decided to go back to their hometown in Himachal Pradesh. After a few months of struggle, they thought to grow roses in their fields and sell them to local vendors as roses have been always in demand. Their business started growing up and they hired many workers to manage their garden and do packaging of the flowers.</p>  <p>In their garden bed, there are 23 rose plants in the first row, 21 are in the 2nd, 19 in 3rd row and so on. There are 5 plants in the last row.</p>	
i.	How many rows are there of rose plants?	1
ii.	How many plants are there in 6th row.	1
iii.	Also, find the total number of rose plants in the garden.	2
	<p>OR</p> <p>If total number of plants are 80 in the garden, then find number of rows?</p>	
Q.38	<p style="text-align: center;">CASE STUDY – 3</p> <p>One day vinod was going home from school, saw carpenter working on wood. He found that he is carving out a cone of same height and same diameter from a cylinder. The height of the cylinder is 24 cm and base radius is 7 cm. while watching this, some questions came into vinod's mind.</p>	

		
i.	Find the slant height of the conical cavity so formed ?	1
ii.	Find the external curved surface area of the cylinder?	1
iii.	Find the curved surface area of the conical cavity so formed ? OR Find the ratio of curved surface area of cone to curved surface area of cylinder ?	2

	<p>“अच्छे लोग और अच्छी किताबें तुरंत समझ में नहीं आते, उन्हें पढ़ना पड़ता है।”</p>	