



CODE:0302- AG-D-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

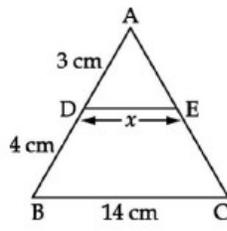
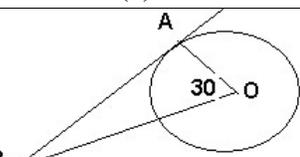
Time : 3 Hours

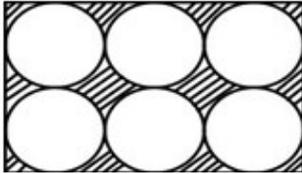
Maximum Marks : 80

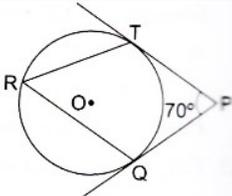
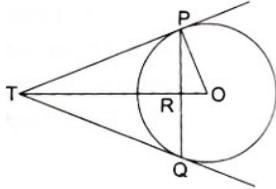
CLASS – X

MATHEMATICS

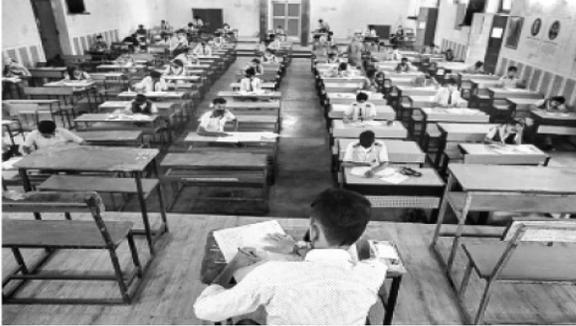
Sr. No.	SECTION – A	Marks allocated
	This section comprises of very short answer type-questions (VSA) of 1 marks each	
Q.1	If p, q are two prime numbers, then LCM(p, q) is (A) 1 (B) P (C) q (D) pq	1
Q.2	The value of k so that the quadratic equation $x^2 - 2x(1 + 3k) + 7(3 + 2k) = 0$ has equal roots is (A) $2, \frac{10}{9}$ (B) $2, -\frac{10}{9}$ (C) $3, \frac{10}{7}$ (D) $-3, \frac{10}{7}$	1
Q.3	$x^3 + 2x^2 + ax + b$ is exactly divisible by $(x^2 - 1)$. Then the value of 'a' and 'b' are (A) a = -1, b = -2 (B) a = 1, b = 2 (C) a = -1, b = 2 (D) a = 1, b = -2	1
Q.4	Solve for x and y : $x + ay = b; ax - by = c$	1

	(a) $x = \frac{ac - b^2}{a^2 + b}$, $y = \frac{ab - c}{a^2 + b}$ (b) $x = \frac{ac + b^2}{a^2 + b}$, $y = \frac{ab + c}{a^2 + b}$ (c) $x = \frac{ac + b^2}{a^2 + b}$, $y = \frac{ab - c}{a^2 + b}$ (d) none	
Q.5	The base PQ of two equilateral triangles PQR and PQR' with side 2a lies along y-axis such that the mid-point of PQ is at the origin. The coordinates of the vertices R and R' of the triangles (a) $(a\sqrt{3}, 0)$ (b) $(-a\sqrt{3}, 0)$ (c) a and b both (d) none of these	1
Q.6	 <p>In figure below if $DE \parallel BC$ then x equals :</p> <p>(a) 6 cm (b) 7 cm (c) 3 cm (d) 4 cm</p>	1
Q.7	If $\tan \theta + \sin \theta = m$ and $\tan \theta - \sin \theta = n$, then $m^2 - n^2$ is equal to a) \sqrt{mn} b) $\sqrt{\frac{m}{n}}$ c) $4\sqrt{mn}$ d) none of these	1
Q.8	A lamp post $5\sqrt{3}$ m high casts a shadow 5 m long on the ground. The Sun's elevation at this point is : (A) 30° (B) 45° (C) 60° (D) 90°	1
Q.9	In $\triangle ABC$ and $\triangle DEF$, if $\angle A = 50^\circ$, $\angle B = 70^\circ$, $\angle C = 60^\circ$, $\angle D = 60^\circ$, $\angle E = 70^\circ$, $\angle F = 50^\circ$, then (a) $\triangle ABC \sim \triangle DEF$ (b) $\triangle ABC \sim \triangle EDF$ (c) $\triangle ABC \sim \triangle FED$ (d) $\triangle ABC \sim \triangle EFD$	1
Q.10	In a $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 2.5$ cm, $BD = 3.0$ cm and $AE = 3.75$ cm, then $AC =$ (a) 7.25 cm (b) 8.25 cm (c) 8.75 cm (d) none	1
Q.11	 <p>In given figure, if AP is a tangent to the circle with center O such that $OP = 4$ cm and $\angle POA = 30^\circ$, then AP is equal to: (A) 4 cm (B) 2 cm (C) $2\sqrt{3}$ cm (D) $4\sqrt{3}$ cm</p>	1
Q.12	If the perimeter of a circle is equal to that of a square, then the ratio of their areas is (a) 22:7 (b) 14:11 (c) 7:22 (d) 11:14	1
Q.13	The radius of a sphere is r cm. it is divided into two equal parts. The whole surface of two parts will be (A) $8\pi r^2 \text{ cm}^2$ (B) $6\pi r^2 \text{ cm}^2$ (C) $4\pi r^2 \text{ cm}^2$ (D) $3\pi r^2 \text{ cm}^2$	1
Q.14	The mean of the median of 2, 8, 3, 7, 4, 6, 7 and the mode of 2, 9, 3, 4, 9, 6, 9, is (a) 9 (b) 8 (c) 6 (d) 7.5.	1

Q.15	The length of the longest rod that can be placed inside a room with dimension $10\text{m} \times 10\text{m} \times 5\text{m}$ is: (A)10m (B)15m (C) $5\sqrt{2}$ m (D)20m	1										
Q.16	Look at the frequency distribution table given below: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Class interval</td> <td style="width: 25%;">35 – 45</td> <td style="width: 25%;">45 – 55</td> <td style="width: 25%;">55 – 65</td> <td style="width: 25%;">65 – 75</td> </tr> <tr> <td>Freq.</td> <td>8</td> <td>12</td> <td>20</td> <td>10</td> </tr> </table> The median of the above distribution is (a) 56.5 (b) 57.5 (c) 58.5 (d) 59	Class interval	35 – 45	45 – 55	55 – 65	65 – 75	Freq.	8	12	20	10	1
Class interval	35 – 45	45 – 55	55 – 65	65 – 75								
Freq.	8	12	20	10								
Q.17	In a throw of a die, what is the probability of getting a number less than 7 (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) None of these	1										
Q.18	The point which lies on the perpendicular bisector of the line segment joining the points A(-2, -5) and B (2, 5) is a) (2, 0) b) (-2, 0) c) (0, 2) d) (0, 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.												
Q.19	ASSERTION : 2 is a rational number . REASON : The square roots of all positive integers are irrationals.	1										
Q.20	ASSERTION : The point (0, 4) lies on y – axis . REASON : The x co-ordinate on the point on y – axis is zero .	1										
SECTION – B												
This section comprises of very short answer type-questions (VSA) of 2 marks each												
Q.21	Solve the system of equations graphically: $2x - 5y + 4 = 0, 2x + y - 8 = 0$.	2										
Q.22	P and Q are points on sides AB and AC respectively of $\triangle ABC$. If AP = 3 cm, PB = 6cm, AQ = 5 cm and QC = 10cm, show that BC = 3PQ.	2										
Q.23	In the given diagram, is a design where in, circles of diameter 2 cms are touching each other. The area of rectangle leaving the areas of circles (shaded area) has to be painted. Find out the area to be painted. (Take $\pi=3.14$) 	2										
OR												
Four cows are tethered at four corners of a square plot of side 50m, so that' they just cant reach one another. What area will be left ungrazed.												

Q.24	 <p>In the given figure , O is the centre of a circle. PT and PQ are tangents to the circle from an external point P. If $\angle TPQ = 70$ then what is the measure of $\angle TRQ$.</p>	2
Q.25	<p>Prove that : $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$</p> <p>OR</p> <p>Prove that : $(\cot \theta - \operatorname{cosec} \theta)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}$</p>	2
<p>SECTION - C</p> <p>(This section comprises of short answer type questions (SA) of 3 marks each)</p>		
Q.26	<p>Find the value of k for which the system of linear equations has an infinite number of solutions: $2x + (k - 2)y = k$, $6x + (2k - 1)y = (2k + 5)$.</p> <p>OR</p> <p>The present age of a woman is 3 years more than three times the age of her daughter. Three years hence, the woman's age will be 10 years more than twice the age of her daughter. Find their present ages.</p>	3
Q.27	<p>Prove that : $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$.</p>	3
Q.28	<p>PQ is a chord of length 4.8 cm of a circle of radius 3cm. The tangents at P and Q intersect at a point T as shown in the figure. Find the length of TP.</p>  <p>OR</p> <p>The radii of two concentric circles are 13 cm and 8 cm . AB is a diameter of the bigger circle . BD is tangent to the smaller circle touching it at D . Find the length of AD .</p>	3
Q.29	<p>A bag contains 18 balls out of which x balls are red.</p> <p>(i) If one ball is drawn at random from the bag, what is the probability that it is red ball.</p> <p>(ii) If 2 more red balls are put in the bag, the probability of drawing a red ball will be $\frac{9}{8}$ times that of probability of red ball coming in part (i). find x.</p>	3
Q.30	<p>A sweetseller has 420 kaju barfis and 130 badam barfis. She wants to stack them in such a way that each stack has the same number, and they take up the least area of the</p>	3

	tray. What is the maximum number of barfis that can be placed in each stack for this purpose?															
Q.31	Find the value of k if the polynomial $f(x) = (2k-3)x^2 + (3k-2)x + (k-5)$ having (i) sum of its zeros = 7 (ii) product of its zeros = 3 (iii) sum of its zeros is four times of product (iv) two zeros are equal in magnitude but opposite in sign (v) one roots are reciprocal of the other .	3														
SECTION – D (This section comprises of long answer-type questions (LA) of 5 marks each)																
Q.32	From the top of a light house, angles of depression of two ships are 45 and 60. The ships are on opposite side of the light house and in line with its foot. If the distance between the ships is 400 m, find the height of the light house. OR A vertical tower stands on a horizontal plane and is surmounted by vertical flag staff of height 5 meters. At a point on the plane, the angle of elevation of the bottom and the top of the flag staff are respectively 30° and 60° find the height of tower.	5														
Q.33	Two poles of height p meters & q meters are a meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{pq}{p+q}$ meters.	5														
Q.34	A solid toy is in the form of a hemisphere surmounted by a cone of same radius. The height of cone is 3cm and the diameter of base is 8cm. determine the volume and surface area of the toy [Use $\pi = \frac{22}{7}$] OR A hemispherical tank full of water is emptied at the rate of $7\frac{1}{7}$ liters per second. How much time will it take to make the tank half empty, if the tank is 3m in radius? (Use $\pi = \frac{22}{7}$)	5														
Q.35	The mean of the following frequency distribution is 62.8 and the sum of all the frequencies is 50. Compute the missing frequency f_1 and f_2 . <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 0 10px;">Class</td> <td style="padding: 0 10px;">0-20</td> <td style="padding: 0 10px;">20-40</td> <td style="padding: 0 10px;">40-60</td> <td style="padding: 0 10px;">60-80</td> <td style="padding: 0 10px;">80-100</td> <td style="padding: 0 10px;">100-120</td> </tr> <tr> <td style="padding: 0 10px;">Frequency</td> <td style="padding: 0 10px;">5</td> <td style="padding: 0 10px;">f_1</td> <td style="padding: 0 10px;">10</td> <td style="padding: 0 10px;">f_2</td> <td style="padding: 0 10px;">7</td> <td style="padding: 0 10px;">8</td> </tr> </table>	Class	0-20	20-40	40-60	60-80	80-100	100-120	Frequency	5	f_1	10	f_2	7	8	5
Class	0-20	20-40	40-60	60-80	80-100	100-120										
Frequency	5	f_1	10	f_2	7	8										
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.)																

<p>Q.36</p>	<p style="text-align: center;"><u>CASE STUDY: 1</u></p> <p>Social Distance in Examination Hall: In an examination hall, students are seated at a distance of 2 m from each other, to maintain the social distance due to CORONA virus pandemic. Let three student sit at point A, B and C whose coordinates are $(4,-3), (7,3)$ and $(8,5)$ respectively.</p>  <p>Based on the above information, answer the following questions.</p>	
<p>i.</p>	<p>The distance between A and C is (a) $\sqrt{5}$ units (b) $4\sqrt{5}$ units (c) $3\sqrt{5}$ units (d) None of these</p>	<p>1</p>
<p>ii.</p>	<p>If an invigilator at the point I, lying on the straight line joining B and C Such that it divides the distance between them in the ratio of 1: 2. Then coordinates of I are (a) $\left(\frac{22}{3}, \frac{11}{3}\right)$ (b) $\left(\frac{23}{3}, \frac{13}{3}\right)$ (c) $(6,1)$ (d) $(9,1)$</p>	<p>1</p>
<p>iii.</p>	<p>The ratio in which B divides the line segment joining A and C is (a) 2:1 (b) 3:1 (c) 1:2 (d) None of these</p> <p style="text-align: center;">OR</p> <p>The pint A, B and C lie on (a) A straight line (b) An equilateral triangle (c) A scalene triangle (d) An isosceles triangle</p>	<p>2</p>
<p>Q.37</p>	<p style="text-align: center;">Case Study - 2</p> <p>Number Card Game- Amit was playing a number card game.in the game some number cards (having both +ve and -ve numbers) are arranged in a row such that they are following an arithmetic progression. On his first turn, Amit picks up 6th and 14th card and finds their sum to be -76. On the second turn, he picks up 8th and 16th card and finds their sum to be -96.</p>  <p>Based on the above information, answer the following questions.</p>	
<p>i.</p>	<p>What is the difference between the numbers on any two consecutive cards? (a) 7 (b) -5 (c) 11 (d) -3</p>	<p>1</p>
<p>ii.</p>	<p>What is the number on the 19th card?</p>	<p>1</p>

	(a) -88 (b) -83 (c) -92 (d) -102	
iii.	<p>What is the number on the 23rd card? (a) -103 (b) -122 (c) -108 (d) -117</p> <p>OR</p> <p>The sum of numbers on the first 15 cards is? (a) -840 (b) -945 (c) -427 (d) -420</p>	2
Q.38	<p style="text-align: center;">CASE STUDY - 3</p> <p>Raj and Ajay are very close friends. Both the families decide to go to Ranikhet by their own cars. Raj's car travels at a speed of x km/h while Ajay's car travels 5 km/h faster than Raj's car. Raj took 4 hours more than Ajay to complete the journey of 400 km.</p> 	
i.	<p>What will be the distance covered by Ajay's car in two hours? a) $2(x+5)$km b) $(x-5)$km c) $2(x+10)$km d) $(2x+5)$km</p>	1
ii.	<p>Which of the following quadratic equation describe the speed of Raj's car? a) $x^2 - 5x - 500 = 0$ b) $x^2 + 4x - 400 = 0$ c) $x^2 + 5x - 500 = 0$ d) $x^2 - 4x + 400 = 0$</p>	1
iii.	<p>What is the speed of Raj's car? a) 20 km/hour b) 15 km/hour c) 25 km/hour d) 10 km/hour</p> <p>OR</p> <p>How much time took Ajay to travel 400 km? a) 20 hour b) 40 hour c) 25 hour d) 16 hour</p>	2

	<i>"शिक्षा भविष्य का पासपोर्ट है, कल के लिए जो आज इसकी तैयारी करते हैं।"</i>	