CODE:1301- AG-3-TS-22-23
पंजियन 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

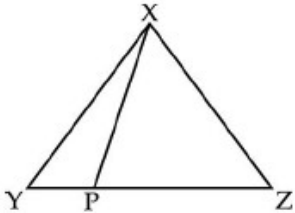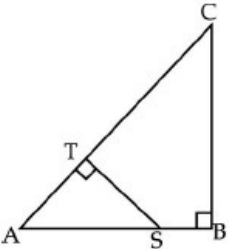8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.
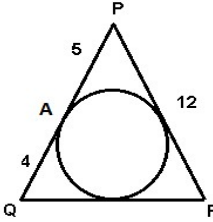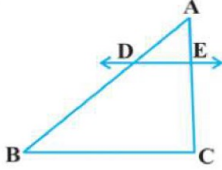
EXAMINATION 2022 -23
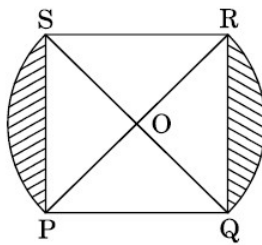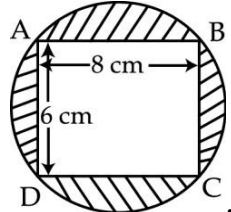
Time : 3 Hours	Maximum Marks : 80
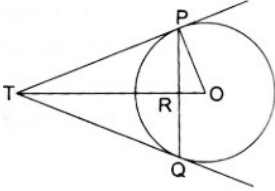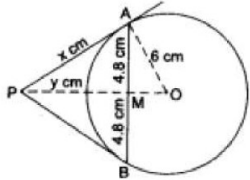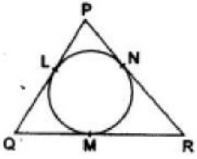
CLASS – X   MATHEMATICS

Sr. No.	SECTION – A	Marks allocated
	This section comprises of very short answer type-questions (VSA) of 1 marks each	
Q.1	There are 156, 208 and 260 students in Groups A, B, C respectively. Buses are to be hired to take them for a field trip. The minimum number of buses to be hired if the same number of students should be accommodated in each bus a) 24 b) 12 c) 36 d) NONE	1
Q.2	If α, β are the zeros of the quadratic equation $ax^2 + bx + c = 0$ then $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2} =$	1

	(a) $\dfrac{b^2 - 2ac}{a^2}$ (b) $\dfrac{b^2 - 2ac}{c^2}$ (c) $\dfrac{b^2 + 2ac}{a^2}$ (d) $\dfrac{b^2 + 2ac}{c^2}$	
Q.3	If the sum of the zeros of the polynomials $(2k+1)x^2 - 3(k+2)x + 5$ is 3, then k = (a) 1 (b) $-\dfrac{1}{3}$ (c) - 1 (d) none of these	1
Q.4	The value of k for which the system of linear equation kx + 4y = k – 4 & 16x + ky = k has infinite solution (A) $k = 8$ (B) $k \neq 8$ (C) k = 0 or 8 (D) K=0	1
Q.5	If the co – ordinates of the middle point of the line segment joining the points (2, 1) and (1, -3) be (α, β), then which of the following is true? (A) $\alpha + \beta - 1 = 0$ (B) $6\alpha + \beta = 8$ (C) $\alpha + 6\beta - 8 = 0$ (D) $\alpha + \beta - 8 = 0$	1
Q.6	In the given figure $\angle YXZ = \angle XPZ$, then $\dfrac{ZX}{ZY}$ is equal to : (a) $ZY \times ZP$ (b) XZ^2 (c) $\dfrac{PZ}{XZ}$ (d) PZ^2	1
Q.7	Prove that : $\dfrac{\tan^2 A}{1 + \tan^2 A} + \dfrac{\cot^2 A}{1 + \cot^2 A} =$ (a) -1 (b) 1 (c) 0 (d) none	1
Q.8	If $a\cos\theta + b\sin\theta = 4$ and $a\sin\theta - b\cos\theta = 3$, then $a^2 + b^2 =$ (a) 7 (b) 12 (c) 25 (d) none of these	1
Q.9	In the given figure, $\angle T$ and $\angle B$ are right angles. If the lengths of AT, BC and AS (in centimeters) are 15, 16 and 17 respectively, then the lengths of TC (in centimeters) is : (a) 18 (b) 16 (c) 19 (d) 12	1

Q.10	The points A(-4, 0), B(4, 0) and C (0, 3) are the vertices of a a) isosceles triangle b) scalene triangle c) equilateral triangle d) right triangle	1
Q.11	 In figure ΔPQR is circumscribing a circle if PA = 5 cm. AQ = 4 cm PR = 12 cm then the length of QR is (A)13 cm (B) 11 cm (C) 14 cm (D) 12 cm	1
Q.12	The inner perimeter of a racetrack is 400m and the outer perimeter is 488 m. The length of each straight portion is 90m. The cost of developing the track at the rate of Rs 12.50 m^2 (a) $Rs.$6216 (b) $Rs.$77700 (c) $Rs.$7770 (d) none	1
Q.13	The radius of the largest right circular cone that can be cut out from a cube of edge 4.2cm is: (A)4.2 (B) 8.4 (C) 1.05 (D) 2.1	1
Q.14	In the following frequency distribution table, write the values of (a, b, c , d)is	1

Marks	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Frequency	4	3	b	7	4	3	1
Cumulative frequency	4	a	13	c	d	27	28

(a)   (7, 6, 20, 24)   (b)   (6, 7, 20, 24)
(c)   (7, 20, 24, 20)   (d)   (6, 7, 24, 20)

Q.15	A cylinder and a cone are of same base radius and of same height. The ratio of The volume of cylinder to that of the cone is : (A)3:1 (B)1:3 (C) 2:3 (D)1:1	1
Q.16	Relation between mean, mode & median (a) Mode = 3Median – 2Mean (b) Mean = 3Median – 2Mode (c)Median = 3Mode – 2Mean (d) None of these	1
Q.17	The probability of getting a perfect square number from the numbers 1 to 10 is: (A)$\frac{3}{10}$ (B) $\frac{1}{2}$ (C) $\frac{2}{5}$ (D) $\frac{1}{5}$	1
Q.18	Water flows at the rate of 10meter per minute from a cylindrical pipe 5mm in diameter. How long will it take to fill up a conical vessel whose diameter at the base is 40cm and dept 24cm? (A)48 minutes 12 sec.(B)51 minutes 12 sec(C)52 minutes 10 sec. (D) None	1
	ASSERTION-REASON BASED QUESTIONS	

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	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) :** For any two positive integers a and b, HCF(a,b) $\times$ LCM(a, b) = a $\times$ b **Reason (R):**The HCF of two numbers is 5 and their product is 150. Then their LCM is 40.	1
Q.20	**Assertion (A) :** D and E are points on the sides AB and AC respectively of a $\triangle ABC$ such that $DE \| BC$ then the values of x is 11, when AD = 4cm, DB= (x – 4)cm, AE = 8cm and EC = (3x – 19)cm. **Reason (R):** If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side. 	1
	### SECTION – B **This section comprises of very short answer type-questions (VSA) of 2 marks each**	
Q.21	Solve for x and y: 152x - 378y = -74 ,-378 x + 152 y = - 604 .	2
Q.22	D and E are respectively the points on the sides AB and AC of a $\triangle ABC$ such that AB = 12 cm, AD = 8 cm, AE = 12 cm and AC = 18 cm, show that DE ∥ BC.	2
Q.23	In figure , PQRS is a square lawn with side PQ = 42 meters. Two circular flower beds are there on the sides PS and QR with center at O, the intersection of its diagonals. Find the total area of the two flower beds (shaded parts). OR In fig. , find the area of the shaded region. (Use π =3.14).	2

Q.24	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.	2
Q.25	If 3 cos θ = 1 show that $\dfrac{6 \sin^2 \theta + \tan^2 \theta}{4 \cos \theta} = 10$. <center>OR</center> Evaluate : $4(\sin^4 30° + \cos^2 60°) - 3(\cos^2 45° - \sin^2 90°) - \sin^2 60°$.	2

<center>**SECTION – C**</center>

(This section comprises of short answer type questions (SA) of 3 marks each)

Q.26	Solve graphically the system of equations : $2x – 5y + 4 = 0$, $2x + y - 8 = 0$. Find the coordinates of the vertices of the triangle formed by these two lines and the y-axis. <center>OR</center> A boat goes 12 km upstream and 40 km downstream in 8 hours. It can go 16 km upstream and 32 km downstream in the same time. Find the speed of the boat in still water and the speed of the stream .	3
Q.27	Prove that : $\dfrac{\sin A}{1+\cos A} + \dfrac{1+\cos A}{\sin A} = 2\cos ecA$.	3
Q.28	In the given figure, AB is a chord of length 9.6 cm of a circle with centre O and radius 6 cm. The tangents at A and B intersect at P. Find the length of PA. <center>OR</center> In the given figure, a circle is inscribed in a triangle PQR. If PQ = 10 cm, QR = 8 cm and PR = 12 cm, find the lengths of QM, RN and PL. 	3
Q.29	Cards marked with number 5,6,7……….30 are placed in a box and mixed thoroughly and once card is drawn at random from the box. What is the probability that the number on the card is (i)A prime number? (ii) A multiple of 3 or 5?	3

	(iii)Neither divisible by 5 nor by 10?	
Q.30	What is the greatest number that divides 442,569, 696 leaving remainder 1,2 and 3 respectively.	3
Q.31	What must be added to the polynomial $f(x) = x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$?	3

SECTION – D

(This section comprises of long answer-type questions (LA) of 5 marks each)

Q.32	In a class test, the sum of the makes obtained by a student in mathematics and science is 28. Had he got 3 marks more in mathematics and 4 marks less in science, the product of the marks would have been 180. Find his marks in two subjects. OR For what value of k, $(4 - k)x^2 + (2k + 4)x + (8k + 1)$ is a perfect square.	5
Q.33	The pth terms of an A.P is $\frac{1}{q}$ and q^{th} term is $\frac{1}{p}$. Show that $T_{pq} = 1$ & $S_{pq} = \frac{pq+1}{2}$.	5
Q.34	A semicircular thin sheet of metal of diameter 28cm is bent and an open conical cup is made. Find the capacity of the cup. OR A well of diameter 2 m is dug 14 m deep. The earth taken out of its is spread evenly all around it to a width of 5 m to from an embankment. Find the height of the embankment.	5
Q.35	<table><tr><td>Marks</td><td>Number of students</td></tr><tr><td>25 or more than 25</td><td>52</td></tr><tr><td>35 or more than 35</td><td>47</td></tr><tr><td>45 or more than 45</td><td>37</td></tr><tr><td>55 or more than 55</td><td>17</td></tr><tr><td>65 or more than 65</td><td>8</td></tr><tr><td>75 or more than 75</td><td>2</td></tr><tr><td>85 or more than 85</td><td>0</td></tr></table> Calculate the mode of the following frequency distribution table :	5

	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** **Spreading Awareness on Plastic Use:** Students of residential society undertake to work for the campaign "Say no to Plastics". Group A took region under the coordinates (3,3), (6,y), (x,7) and (5,6) and group B took the region under the coordinates (1,3), (2,6), (5,7) and (4,4). Based on the above information, answer the following questions.	
i.	If the region covered by group A forms a parallelogram, where the coordinates are taken in the given order, then (a) $x = 8, y = 4$　　　(b) $x = 4, y = 8$　　　(c) $x = 2, y = 4$　　　(d) $x = 4, y = 2$	1
ii.	Perimeter of the region covered by group A is (a) $\sqrt{10}$ units　　(b) $\sqrt{13}$ units　　(c) $\left(\sqrt{10} + \sqrt{13}\right)$ units　　(d) None of these	1
iii.	If the coordinates of the region covered by group B, taken in the same order from a quadrilateral, then the length of the each diagonals is (a) $4\sqrt{2}$ units, $2\sqrt{2}$ units　　　　(b) $6\sqrt{2}$ units, $\sqrt{2}$ units (c) $3\sqrt{2}$ units, $2\sqrt{2}$ units　　　　(d) None of these OR If the region covered by group B forms a parallelogram, where the coordinates are taken in the given order, then the perimeter of this region is (a) $\sqrt{10}$ units　　　(b) $2\sqrt{10}$ units　　　(c) $3\sqrt{10}$ units　　　(d) $4\sqrt{10}$ units	2
Q.37	**CASE STUDY – 2** An ice-cream seller used to sell different kinds and different shapes of ice-cream like rectangular shaped with one end hemispherical, cone-shaped and rectangular brick, etc. One day sheetal and her brother came to his shop. Sheetal purchased an ice-cream which has the following shape: ice-cream cone as the union of a right circular cone and a hemisphere that has the same (circular) base as the cone. The height of the cone is 9cm and the radius of its base is 2.5 cm. her brother purchased rectangular brick shaped ice cream with length 9 cm, width 4 cm and thickness 2 cm.	

i.	The volume of the ice-cream without hemispherical end.	1
ii.	Find the volume her brother ice cream ?	1
iii.	The volume of the ice-cream with a hemispherical end. OR Whose quantity of ice cream is more and by how much?	2
Q.38	**CASE STUDY – 3** Vijay lives in a flat in a multi-story building. Initially, his driving was rough so his father keeps eye on his driving. Once he drives from his house to Faridabad. His father was standing on the top of the building at point A as shown in the figure. At point C, the angle of depression of a car from the building was 60^0. After accelerating 20 m from point C, vijay stops at point D to buy ice cream and the angle of depression changed to 30^0. 	
i.	Find the value of x.	1
ii.	Find the distance between top of the building and a car at position D?	1
iii.	Find the height of the building AB. OR Find the distance between top of the building and a car at position C?	2
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	अपने महान लक्ष्यों को तय कीजिये और तब तक नहीं रूके तब तक पा न लें।।	