CODE:2001- AG-4-TS-22-23 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	Rational number between $\sqrt{2}$ & $\sqrt{3}$. (a) $\frac{3}{2}$ (b) $\frac{4}{3}$ (c) $\frac{4}{5}$ (d) $\frac{3}{5}$.	1
Q.2	A cyclist takes 2 hours less to cover a distance of 200 km, if he increases his speed by 5 km/hr. then his original speed is	1

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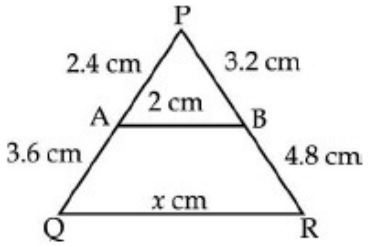
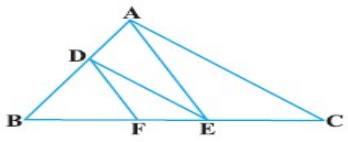
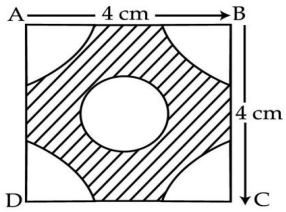
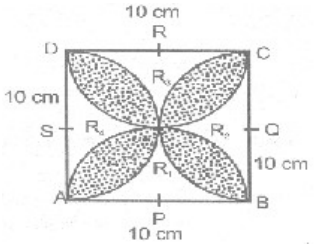
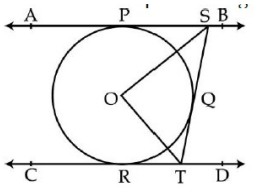
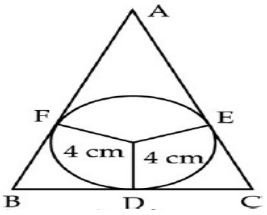
	a) 26 km/hr b) 20 km/hr c) 24 km/hr d) 25 km/hr	
Q.3	The zeros of a quadratic polynomial $f(x) = x^2 - 7x + k$ are $\alpha and\ \beta$ such that $\alpha - \beta = 3$.Then the value of k (a) 9 (b) -10 (c) 10 (d) none .	1
Q.4	For what value of k, do the equations $3x - y + 8 = 0$ and $6x - ky = -16$ represent coincident lines? (a)$\frac{1}{2}$ (b)$-\frac{1}{2}$ (c) 2 (d) -2	1
Q.5	If the line segment joining the points (3, -4) and (1, 2) is trisected at points P(a, -2) and Q $\left(\frac{5}{3}, b\right)$. Then , a) $a = \frac{8}{3}, b = \frac{2}{3}$ b) $a = \frac{7}{3}, b = 0$ c) $a = \frac{2}{3}, b = \frac{1}{3}$ d) $a = \frac{1}{3}, b = 1$	1
Q.6	In the given figure, value of x (in cm) is :  (a) 4 (b) 5 (c) 6 (d) 8	1
Q.7	Prove that : $\sin A(1 + \tan A) + \cos A(1 + \cot A) =$ (a) $\sec A + \operatorname{cosec} A$ (b) $\sec A - \operatorname{cosec} A$ (c) $\operatorname{cosec} A - \sec A$ (d) none	1
Q.8	The length of the shadow of a 20 m tall pole on the ground when the sun's elevation is 45^0 is a) 20 m b) $20\sqrt{2}$ m c) 40 m d) $20\sqrt{3}$ m	1
Q.9	If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80^0, then find $\angle POA$ a) 40^0 b) 100^0 c) 50^0 d) 60^0	1
Q.10	If $\Delta PQR \sim \Delta XYZ$, $\angle Q = 50°$ and $\angle R = 70°$, then $\angle X + \angle Y$ is equal to: (a) 70° (b) 50° (c) 120° (d) 110°	1
Q.11	The distance between two parallel tangents of a circle of radius 3 cm is a) 6 cm b) 3 cm c) 4.5 cm d) 12 cm	1
Q.12	A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. The total area cleaned at each sweep of the blades	1

	(a) $1254.9cm^2$ (b) $254.9cm^2$ (c) $125.9cm^2$ (d) none	
Q.13	A right cylindrical vessel is full of water. How many right cones having the same radius and height as those of the right cylinder will be needed to store that water? (a)2 (b) 3 (c)4 (d) 6	1
Q.14	The median of the observations 11 , 12 , 14 , 18 , x +2 , x + 4 , 30 , 32 , 35 , 41 .arranged in ascending order is 24 . then the value of x . (a) 22 (b) 21 (c) 20 (d)none of these	1
Q.15	If a right circular cone of height 24cm has a volume of $1232cm^3$, then find its curved surface area. (a)$154cm^2$ (b)$270cm^2$ (c)$550\,cm^2$ (d)$740\,cm^2$	1
Q.16	The mean of 2, 7, 6 and x is 15 and mean of 18, 1, 6, x and y is 10. What is the value of y ? (a) 5 (b) 10 (c) -20 (d) 30	1
Q.17	A box contains 54 marbles each of which is blue, green or white. The probability of selecting a blue marble at random from the box is 1/3 and the probability of selecting a green marble at random is 4/9. The number of white marbles in the box are : a) 10 b) 12 c) 14 d) 16	1
Q.18	The area of the base of a cone is 770 cm^2 and the curved surface area is 814 cm^2, then its volume is (a)$615\sqrt{5}cm^3$ (b)$\frac{616}{\sqrt{5}}cm^3$ (c)$616\sqrt{3}cm^3$ (d)$616\sqrt{2}cm^3$	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 :** $(2-\sqrt{3})$ is one zero of the quadratic polynomial then other zero will be $(2+\sqrt{3})$. **Reason :** Irrational zeros (roots) always occurs in pairs.	1
Q.20	**Assertion (A) :** Two identical solid cubes of side 5 cm are joined end to end. The total surface area of the resulting cuboid is 300 cm^2 . **Reason (R) :** Total surface area of a cuboid is 2(lb + bh + lh)	1
	SECTION – B **This section comprises of very short answer type-questions (VSA) of 2 marks each**	
Q.21	Solve for x and y: 4x + 6y = 3xy, 8x + 9y = 5xy .	2

Q.22	In Fig.  , DE ‖ AC and DF ‖ AE. Prove that $\frac{BF}{EF}=\frac{BE}{EC}$.	2
Q.23	For each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in fig. Find the area of the remaining portion of the square. (use π = 3.14)  OR Find the area of the shaded region in the adjoining figure,  where PQRS is a square of side 10 cm and semicircles are drawn with each side of the square as diameter.	2
Q.24	In figure, AB and CD are two parallel tangents to a circle with center O, ST is tangents segment between the two parallel tangents touching the circle at Q. show that $\angle SOT = 90^\circ$ 	2
Q.25	If $\tan\theta=\frac{20}{21}$, show that $\frac{(1-\sin\theta+\cos\theta)}{(1+\sin\theta+\cos\theta)}=\frac{3}{7}$ OR Evaluate : $4(\sin^4 60^o + \cos^4 30^o) - 3(\tan^2 60^o - \tan^2 45^o) + 5\cos^2 45^o$	2
	SECTION – C **(This section comprises of short answer type questions (SA) of 3 marks each)**	
Q.26	Solve the system of equations graphically: 3x + 2y = 12, 5x – 2y = 4 . OR Places A and B are 160 km apart on a highway. A car starts from A and	3

	another car starts from B simultaneously. If they travel in the same direction, they meet in 8 hours. But, if they travel towards each other, they meet in 2 hours. Find the speed of each car.	
Q.27	Prove that : $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}}+\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}=2\operatorname{cosec}\theta$.	3
Q.28	AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30^\circ$. If the tangent at C intersects AB produced at D, prove that BC = BD. OR In the figure, the radius of in circle of ΔABC is 4cm and segments into which one side BC divided by the point of contact D are 6 cm and 8 cm. find AB and AC.  	3
Q.29	Find the probability that 5 Sundays occur in the month of November of a randomly selected year.	3
Q.30	Prove that $\sqrt{3}$ is an irrational number.	3
Q.31	On dividing $3x^3 + x^2 + 2x + 5$ is divided by a polynomial g(x), the quotient and $(3x - 5)$ and $(9x + 10)$ respectively. Find g(x).	3
	SECTION – D **(This section comprises of long answer-type questions (LA) of 5 marks each)**	
Q.32	If the price of a book is reduced by ₹ 5, a person can buy 4 more books for ₹ 600. Find the original price of the book. OR If -4 is a root of the quadratic equation $x^2 + kx - 4 = 0$, and the quadratic equation $x^2 + px + k = 0$ has equal roots, find the value of p and k.	5
Q.33	With the vertices A, B and C of a triangle ABC as centres, arcs are drawn with radii 5 cm each as shown in Fig. . If AB = 14 cm, BC = 48 cm and CA = 50 cm, then find the area of the shaded region. (Use $\pi = 3.14$).	5
Q.34	A right triangle whose side are 15cm and 20cm is made to revolve about its hypogenous. Find the volume and the surface area of the double cone so formed. (Use $\pi = 3.14$) OR Water in a canal, 30 dm wide and 12 dm deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?	5

Q.35 The mean of the following frequency distribution is 57.6 and the sum of the observation is 50. Find the missing frequency f_1 and f_2. 5

Cl	0-20	20-40	40-60	60-80	80-100	100-120
F	7	f_1	12	f_2	8	5

SECTION – E

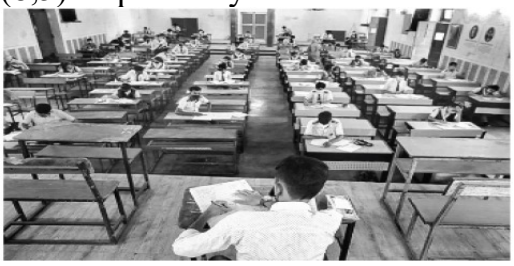
(This section comprises of 3 case study / passage – based questions of 4 marks each with two sub parts (i),(ii),(iii) of marks 1, 1, 2 respectively.The third case study question has two sub – parts of 2 marks each.)

Q.36

CASE STUDY: 1

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.



Based on the above information, answer the following questions.

i. The distance between *A* and *C* is 1

(a) $\sqrt{5}$ units (b) $4\sqrt{5}$ units (c) $3\sqrt{5}$ units (d) None of these

ii. 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 1

(a) $\left(\frac{22}{3},\frac{11}{3}\right)$ (b) $\left(\frac{23}{3},\frac{13}{3}\right)$ (c) $(6,1)$ (d) $(9,1)$

iii. The ratio in which *B* divides the line segment joining *A* and *C* is 2

(a) $2:1$ (b) $3:1$ (c) $1:2$ (d) None of these

OR

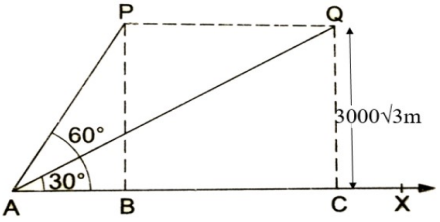
The pint *A*, *B* and *C* lie on

(a) A straight line (b) An equilateral triangle (c) A scalene triangle (d) An isosceles triangle

Q.37

CASE STUDY – 2

Elpis technology is a TV manufacturer company. It produces smart TV sets not only for the Indian market but also exports them to many foreign countries. Their TV sets have been in demand every time but due to the covid-19 pandemic, they are not getting sufficient spare parts, especially chips to accelerate the production. They have to work in a limited capacity due to the lack of raw

	materials. 	
i.	They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find an increase in the production of TV every year.	1
ii.	They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find the production in the 10^{th} year.	1
iii.	They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find in which year production of TV is 1000. OR They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find the total production in first 7 years.	2
Q.38	**CASE STUDY – 3** At a given instance, ATC finds that the angle of elevation of an airplane from a point on the ground is 60^0. After a flight of 30 seconds, it is observed that the angle of elevation changes to 30^0. The height of the plane remains constantly as $3000\sqrt{3}$ m. Use the above information to answer the questions that follow -	MathType 6.0 Equation
i.	Draw a neat labeled figure to show the above situation diagrammatically.  P and Q are the two positions of the plane flying at a height of $3000\sqrt{3}$ m. A is the point of observation.	1
ii.	What is the speed of the plane in km/hr .	1
iii.	What is the distance travelled by the plane in 30 seconds ? **OR** Keeping the height constant, during the above flight, it was observed that after $15\left(\sqrt{3}-1\right)$ seconds, the angle of elevation changed to 45^0 . How much is the distance travelled in that duration .	2
	"समय और शिक्षा का सही उपयोग ही व्यक्ति को सफल बनाता है।"	