Year of Quality education **18th**

Code No. **Series AG-5** **CLASS X** **TMG-D/79/89**

- Please check that this question paper contains 3 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 30 questions.

General Instructions: -

1. All questions are compulsory.
2. The question paper consists of 30 questions divided into three sections A, B ,C and D . Section A contains 10 questions of 1 marks each, Section B is of 5 questions of 2 marks each, Section C is of 10 questions of 3 marks each and Section D is of 5questions of 6 marks each.
3. Write the serial number of the question before attempting it.
4. If you wish to answer any question already answered, cancel the previous answer.
5. In questions where internal choices is provided. You must attempt only one choice.

MATHEMATICS

Time Allowed : 3 hours **Maximum Marks : 80**

SECTION A

1. Find the value of k for which the pair of linear equations 2x+3y = 7 , 4x + k y = 14 has infinite number of solution .
2. Show that $3\sqrt{2}$ is irrational.
3. For what value of k the quadratic equation $x^2 - kx + 4 = 0$ has equal roots ?
4. If 3 cos θ = 1 show that $\frac{6\sin^2\theta + \tan^2\theta}{4\cos\theta} = 10$.
5. Which term of the sequences 114,109,104 ……is the first negative term ?
6. A cylinder, a cone and a hemisphere are of equal base and have same height .What is the ratio in their volumes ?
7. In a ΔABC, D and E are points on the sides AB and AC respectively such that DE // BC . If AD = 8x -7, DB = 5x – 3, AE= 4x – 3 and EC = (3x-1), find the value of x.
8. ABC is an isosceles triangle with AC= BC. If $AB^2 = 2AC^2$, prove that Δ ABC is right triangle.
9. Cards each marked with one of the numbers 4,5,6…..20 are placed in a box and mixed thoroughly One card is drawn at random from the box. What is the probability of getting an even prime number ?
10. Find the zeroes of the polynomial $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$.

SECTION B

11. Find the HCF of 96 and 404 by the prime factorization method. Hence, find their LCM.
12. If $\tan\theta = \frac{a}{b}$ show that $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \frac{a^2 - b^2}{a^2 + b^2}$.
13. Find a point on the y-axis which is equidistant from the points A(6,5) and B (-4,3).

Resi.: D-79 Vasant Vihar ; Office : 89-Laxmi bai colony
Ph. :2337615; 4010685®, 2630601(O) Mobile : 9425109601(P); 9300618521;9425110860(O);9301994837;9993461523;9425772164

14. In Δ ABC, $\angle B = 2\angle C$ and the bisector of $\angle B$ intersects AC at D. Prove that $\frac{BD}{DA} = \frac{BC}{BA}$.

15. It is known that a box of 600 electric bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. What is the probability that it is non- defective bulb?

OR

One card is drawn from a well shuffled deck of 52 playing cards. Find the probability of getting (i) a non-face card (ii) a black king or a red queen.

SECTION C

16. There is a circular path around a sports field . Sonia takes 18 minutes to drive one round of the field , while ravi takes 12 minutes for the same . Suppose they both start the same point and at the same time and go in the same direction . After how many minutes will they meet again at the starting point .

OR

Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m.

17. If two zeros of the polynomials $x^4 + 3x^3 - 20x^2 - 6x + 36$ are $\sqrt{2}$ and $-\sqrt{2}$, find the other zeroes of the polynomial.

18. Find graphically the co-ordinates of the vertices of a triangle whose sides have the equations: x - 2y = 4; x = 4 and x - y = 3.Also find its area .

19. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows : Rs 200 for I day, Rs 250 for II day, Rs 300 for III day and so on. If the contractor pays Rs 27,750 as penalty, find the number of days for which the construction work is delayed.

20. Prove that : $\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \frac{1 + \sin A}{\cos A}$.

OR

Prove that : $(\sin\alpha + \cos ec\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = \tan^2\alpha + \cot^2\alpha + 7$.

21. Using A (4,-6), B(3,-2) and C(5,2),verify that a median of the triangle ABC divides it into two triangles of equal areas.

22. Find the ratio in which the join of points (1, 3), (2, 7) is divided by the line 3x + y = 9. Also find the point of division .

23. Draw a circle of 3 .4 cm radius. Take a point P out side the circle. Draw two tangents to the circle from the point P without using the center .

24. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre of the circle.

25. The area of an equilateral triangle is $49\sqrt{3}\ cm^2$.taking each vertex as centre; a circle is drawn with radius equal to half the length of the side of the triangle. Find the area of the triangle not included in the circles.

OR

The difference between outsides and insides surface of a cylindrical metallic pipe 14 cm long is 44 sq. cm. If the pipe is made of 99 cubic cm of metal, find the outer and inner radii of the pipe.

SECTION D

Resi.: D-79 Vasant Vihar ; Office : 89-Laxmi bai colony
Ph. :2337615; 4010685®, 2630601(O) Mobile : 9425109601(P); 9300618521;9425110860(O);9301994837;9993461523;9425772164

26. A train travels 360 km at a uniform speed. If the speed had been 5km/hr more, it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

A man rowing at the rate of 5 km/hr in still water takes thrice as much time in rowing 40 km up the river as in 40 km down . Find the rate at which the river flows.

27. A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45° how soon after this, will the car reach the tower?

OR

The angle of elevation of top of a tower from two point on the level ground, at distances a and b units (a>b) from the base of the tower and in the same straight line with it, are complementary .prove that the height of the tower is $\sqrt{ab}$ unites.

28. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. Using the above, solve the following : A ladder reaches a window which is 12 m above the ground on one side of the street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 9 m high. Find the width of the street if the length of the ladder is 15 m .

29. A right triangle whose sides are 3cm and 4cm (other than hypotenuse) is made to revolve about its hypotenuse. Find the volume and surface area of the double cone thus formed.

30. The following table shows the marks obtained by 100 students of class X in a school during a particular academic session. Find the mode of this distribution.

Marks	No. of students
Less than 10	7
Less than 20	21
Less than 30	34
Less than 40	46
Less than 50	66
Less than 60	77
Less than 70	92
Less than 80	100

****

Resi.: D-79 Vasant Vihar ; Office : 89-Laxmi bai colony
Ph. :2337615; 4010685®, 2630601(O) Mobile : 9425109601(P); 9300618521;9425110860(O);9301994837;9993461523;9425772164