CLASS-X
MATHEMATICS

Time : 3 Hours   **Max. Marks : 80**

General Instructions:

- All questions are compulsory.
- The question papercontains 22 questions.
- Questions 1 and 2 in Section A are very short answer type questions carrying 1 mark each.
- Questions 3-8 in Section B are short answer-I type questions carrying 2 marks each.
- Questions 9-16 in Section C are short answer-II type questions carrying 3 marks each.
- Questions 17-22 in Section D are long answer type questions carrying 4 marks each.
- There is no overall choice. However, internal choice has been provided in 2 questions of 2 marks each, 3 questions of 3 marks and 3 questions of 4 marks.

SECTION – A

1) Choose and write the correct option in each of the following questions:

i) For some positive integer m, every positive even integer is of the form
  a) m - 1   **b)** m+1   **c)** 2m   **d)** 2m+1

ii) How many polynomials are there having 4 and -2 as zeroes ?
  a) One   **b)** Two   **c)** Three   **d)** More than three

iii) For what value of c does the pair of equations $cx - y = 2$ and $6x - 2y = 3$ have infinitely many solutions ?
  a) c = 3   **b)** c = - 3   **c)** c = -12   **d)** not possible for any value of c

iv) The sum of the roots of the equation $x^2 - 6x + 2 = 0$ is
  a) 2   **b)** -2   **c)** 6   **d)** -6

v) The 30th term of the AP 10, 7, 4, …….. is
  a) -87   **b)** 87   **c)** 77   **d)** – 77

vi) In which quadrant does the point (-3, 5) lie ?
  a) I   **b)** II   **c)** III   **d)** IV

vii) (sin40^o – cos 50°) = ?
  a) sin10^o **b)** cos10^o **c)** 1   **d)** 0

viii) A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground. At that instant the sun's elevation is
  a) 60° **b)** 30° **c)** 45° **d)** 90°

ix) The class mark of the class 15.5-20.5 is
  a) 15.5   **b)** 20.5   **c)** 18   **d)** 5

x) In a throw of a die, what is the probability of getting a 4 ?
  a) $\dfrac{2}{3}$ **b)** $\dfrac{1}{2}$ **c)** $\dfrac{1}{6}$ **d)** $\dfrac{1}{3}$

2) Answer the following questions:

i) Find the zeroes of the polynomial $p(x) = 4x^2 - 12 + 9$

ii) Find the coordinate where the line $x - y = 8$ will intersect y-axis.

iii) What will be the nature of roots of quadratic equation $2x^2 - 4x + 3 = 0$?

iv) Find the 9th term from the end of the AP 5, 9, 13,….., 185.

v) What is the area of the triangle formed by the points O (0, 0), A (-3, 0) and B (5, 0) ?

vi) Find the mean of the first five natural numbers.

vii) Write the acute angle θ satisfying $\sqrt{3} \sin\theta = \cos\theta$.

viii) Explain why $3 \times 5 \times 7 + 7$ is a composite number.

ix) Is 144 a term of the AP: 3, 7 , 11 , …… ? Justify your answer.

x) If two coins are tossed together simultaneously. Find the probability of getting exactly one head.

SECTION – B

3) Which term of the AP 3, 15, 27, 39……… will be 120 more than its 21st term ?

OR

Find the sum of all two digit natural numbers which are divisible by 4.

4) If $\sin(x - 20)^o = \cos(3x - 10)^o$, then find the value of x.

5) Given that $\sqrt{5}$ is irrational, prove that $3 + \sqrt{5}$ is irrational number.

OR

Find the HCF and LCM of 12, 15 and 21 by the prime factorization method.

6) Find the zeroes of the quadratic polynomial $x^2 - 2$ and verify the relationship between the zeroes and the coefficients.

7) Three unbiased coins are tossed simultaneously. Find the probability of getting

    i) exactly 2 heads   ii) At most two heads

8) Find the ratio in which the line segment joining the points P (3, -6) and Q (5, 3) is divided by the x-axis.

SECTION – C

9) The following data gives the information on the observed lifetimes (in hours) of 225 electrical components:

Life time(in hours)	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

10) Solve for x and y : $\dfrac{b}{a}x + \dfrac{a}{b}y = a^2 + b^2$; $x + y = 2ab$

11) A train travels a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hr it takes 2 hours less in the journey. Find the original speed of the train

OR

Ram takes 6 days less than Bhagat to finish a piece of work. If both of them together can finish the work in 4days, in how many days Bhagat alone can finish the work.

12) For what values of a and b does the following pair of linear equations have an infinite number of

solutions ? $(a-b)x+(a+b)y=3a+b-2$, $2x+3y=7$

13) If the points A(-2 ,1) , B(a, b) and C (4, -1) are collinear and a − b = 1, find the values of a and b.

14) Without using trigonometric tables, prove that:

$$\frac{\sec^2 A - \cot^2(90^o - A)}{\cos ec^2 67^o - \tan^2 23^o} + (\sin^2 40^o + \sin^2 50^o) = 2$$

OR

Given $\tan\theta = \dfrac{4}{5}$, evaluate $\dfrac{2\sin\theta.\cos\theta}{\cos^2\theta - \sin^2\theta}$.

15) If the sum of m terms of an AP is the same as the sum of its n terms, show that the sum of its (m + n)

terms is zero.

OR

An arithmetic progression 5, 12, 19,…….. has 50 terms. Find its last term. Hence, find the sum of its last 15 terms.

16) Show that one and only one out of n , n+ 2, n +4 is divisible by 3, where n is any positive integer.

SECTION –D

17) The following distribution gives the daily income of 50 workers of a factory :

Daily income (Rs.)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Convert the distribution above to a less than type cumulative frequency distribution and draw its

ogive.

18) Two pillars of equal heights stand on either side of a road which is 200 m wide. The angles of elevation of the top of the pillars are 60° and 30° from a point on the road between the pillars. Find the position of the point between the pillars and height of each pillar.

OR

From the top of a hill the angles of depression of two consecutive kilometre stones due east are found to be 45° and 30° respectively. Find the height of the hill.

19) If $p(x) = x^3 - 2x^2 + kx + 5$ is divided by $x - 2$ the remainder is 11. Find k. Hence find all the zeroes of

$x^3 + kx^2 + 3x + 1$.

20) Prove that : $\sqrt{\dfrac{\sec A - 1}{\sec A + 1}} + \sqrt{\dfrac{\sec A + 1}{\sec A - 1}} = 2\cos ecA$

OR

Prove that : $\dfrac{\tan A}{1 - \cot A} + \dfrac{\cot A}{1 - \tan A} = 1 + \sec A \cos ecA = 1 + \tan A + \cot A$

21) The area of a rectangle reduces by 160 m², if its length is increased by 5 m and breadth is reduced by 4 m. However, if length is decreased by 10 m and breadth is increased by 2 m, then its area is decreased by 100 m². Find the dimensions of the rectangle.

22) The sum of the third and fifth terms of an AP is 42 and their product is 432, find the A.P.

OR

In an AP, 6th term is half the 4th term and the 3rd term is 15. How many terms are needed to give a sum that is equal to 66 ?