



MATHEMATICS (X)

Time: 3 Hours

MM: 80

General Instructions:

- (i) This question paper consists of four sections- Section A, Section B, Section C & Section D.
- (ii) Section A consists of six questions (Q.no. 1-6) of one mark each.
- (iii) Section B consists of eight questions (Q no. 7-14) of two marks each.
- (iv) Section C consists of ten questions (Q no. 15-24) of three marks each.
- (v) Section D consists of seven questions (Q no. 25-31) of four marks each including two case study based questions.
- (vi) Internal choice is given in each section.

SECTION-A

- 1. Express 156 as product of prime factors.
- 2. Find the zeroes of the polynomial x^2-3 .
- 3. Check $x^2-2x+(-2)(3-x)$ is a quadratic equation or not ?
- 4. Find discriminant of $2x^2 + x - 6 = 0$.
- 5. Write the general form of a pair of linear equations.
- 6. Find a quadratic polynomial if sum and product of its zeroes is 4,1.
Or
Is $x=-3$ is a factor of $2x^2-5x+3=0$?

SECTION-B

- 7. Explain why $3 \times 5 \times 7 + 7$ is a composite number.
OR
Check whether 6^n can end with the digit 0 for any natural number n.
- 8. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the line representing the following pair of linear equations intersect at a point, are parallel or coincident:
 $9x+3y+12=0$
 $18x+6y+24=0$
- 9. Solve the following pair of linear equations:
 $7x+15y=2$
 $x+2y=3$
- 10. Represent the following situation in the form of quadratic equation :
Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age.
- 11. Find the nature of roots of the following quadratic equation:
 $3x^2-4\sqrt{3}x+4=0$.
- 12. Find the value of k for the following quadratic equation so that it has two equal roots:
 $kx(x-2)+6=0$
- 13. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the line representing the following pair of linear equations are consistent or inconsistent.
 $5x-3y=11$; $-10x+6y=22$.
- 14. For what value of k, (-4) is a zero of the polynomial $x^2 - x - (2k+2)$?

SECTION-C

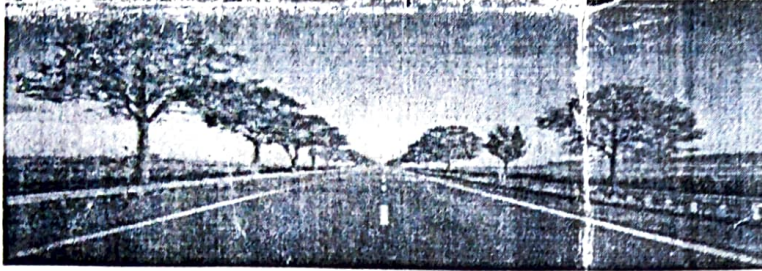
- 15. Solve $2x+3y=11$ and $2x-4y=-24$ and hence find the value of 'm' for which $y=mx+3$.
- 16. Prove that $3+2\sqrt{5}$ is irrational, it is given that $\sqrt{5}$ is irrational.
- 17. Solve the following pair of linear equations:
 $3x-5y-4=0$ and $9x=2y+7$
OR
The ratio of incomes of two persons is 9:7, and the ratio of their expenditures is 4:3. If each of them saves Rs.200 per month, find their monthly incomes.?
- 18. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$.
- 19. For which value of k will the following pair of linear equations have no solution?
 $3x+y=1$ and $(2k-1)x+(k-1)y=2k+1$

20. Find the roots of the following quadratic equation:
 $x - \frac{1}{x} = 3, x \neq 0.$
21. Find the HCF and LCM of 6, 72 and 120 using the prime factorization method.
22. Write the polynomial, the product and the sum of whose zeroes are $-\frac{9}{2}$ and $-\frac{3}{2}$ respectively.
23. Solve: $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}, a+b \neq 0$
24. Find two consecutive positive integers, sum of whose squares is 365.

SECTION - D

CASE STUDY 1

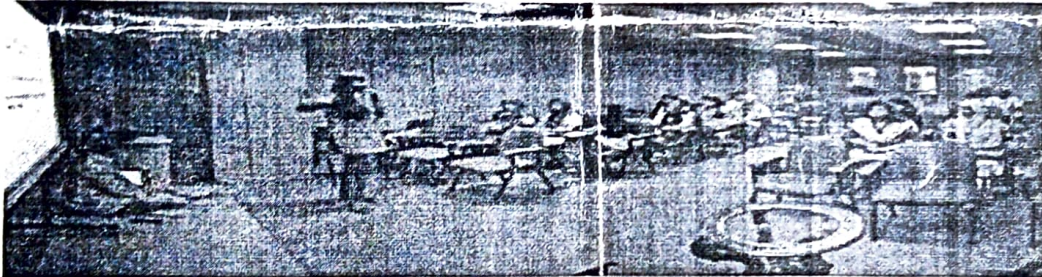
25. Raj and Ajay are very close friends. Both the families decide to go to Ranikhet by their own cars. Raj's car travels at a speed of x km/h while Ajay's car travels 5 km/h faster than Raj's car. Raj took 4 hours more than Ajay to complete the journey of 400 km.



- Write the quadratic equation to find speed of Raj's car.
- What is the speed of Raj's car?
- How much time took Ajay to travel 400 km?

CASE STUDY 2

26. A seminar is being conducted by a city Educational Organisation, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively.



- In each room the same number of participants are to be seated and all of them being in the same subject. Find maximum number of participants that can be accommodated in each room.
 - What is the minimum number of rooms required during the event?
 - What is the LCM of 60, 84 and 108.
27. Prove that $\sqrt{5}$ is irrational.
28. A fraction becomes $\frac{9}{11}$, if 2 is added to both the numerator and the denominator. If 3 is added to both the numerator and the denominator it becomes $\frac{5}{6}$. Find the fraction.
29. Draw the graphs of the equations $x-y+1=0$ and $3x+2y-12=0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis and shade the triangular region.
30. In the centre of a rectangular plot of land of dimensions 120m x 100 m, a rectangular portion is to be covered with trees so that the area of the remaining part of the plot is 10500 m². Find the dimensions of the area to be planted.
- OR
- Solve for x : $9x^2 - 9(a+b)x + 2a^2 + 5ab + 2b^2, x \neq 2, x \neq -2.$
31. Find the zeroes of the polynomial $4x^2 - 3x - 1$ and verify the relationship between the zeroes and the coefficients of the polynomial.