General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 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.

Section-A

1. If $37800 = 5^a \times 2^b \times 3^c \times 7^d$, then $a + b + c + d$ is

   a) 9   b) 8   c) 10   d) 6

2. For what value of k will $k + 9, 2k - 1$ and $2k + 7$ are the consecutive term of an A.P.

   a) 2   b) 7   c) 9   d) 18

3. If zeros of the polynomial $x^2 + ax - b$ be the reciprocal of each other, then b is equal to

   a) 1   b) - 1   c) a   d) 1/a

4. A quadratic polynomial whose sum and product of zeros are $\frac{1}{4}$ and -1 respectively is

   a) $4x^2 + x - 4$ b) $4x^2 - x - 4$ c) $4x^2 + 4x - 1$ d) none of these

5. The zeros of the polynomial $p(x) = x^2 + 4x + 3$ are given by

   a) 1,3   b) −1,3   c) 1,-3   d) −1,−3

6. The pair of equations $x = 0$ and $x = -7$ has

   a) One solution   b) two solutions   c) many solutions   d) no solutions

7. The value of k for which the lines $5x + 7y = 3$ and $15x + 21y = k$ coincide is

   a) 9   b) 5   c) 7   d) 18

8. The nature of roots of the equation $x^2 - 4x + 3\sqrt{2} = 0$ are

   a) real roots   b) equal roots   c) not real roots   d) real and equal both

9. The sum of two numbers is 48. If one of them is x, then the other will be

   a) $48 - x$ b) $x - 48$ c) $x(x - 48)$ d) none of these

A-1

10. Sum of first n natural numbers is

a) $\frac{n}{2}$ b) $\frac{n(n-1)}{2}$ c) $\frac{n+1}{2}$ d) $\frac{n(n+1)}{2}$

11. Three coins are tossed simultaneously. Find the probability of getting atleast two heads

a) $\frac{7}{8}$ b) $\frac{1}{2}$ c) $\frac{3}{8}$ d) none of these

12. If 10th term of $\sqrt{3}$, $\sqrt{12}$, $\sqrt{27}$ …… is

a) $\sqrt{300}$ b) $12\sqrt{5}$ c) $3\sqrt{10}$ d) $\sqrt{30}$

13. Sum of the series $2 + 5 + 8 + \cdots + 182$ is

a) 5612   b) 8612   c) 7612   d) 9012

14. A coin is tossed 150 times with 120 tails. Which of the following is the probability of getting a head

a) $\frac{4}{5}$ b) $\frac{3}{5}$ c) 1/5   d) none of these

15. The discriminant of $4x^2 - ax + 2 = 0$ is

a) $32 - a^2$ b) $a^2 + 32$ c) $-a^2 - 32$ d) $a^2 - 32$

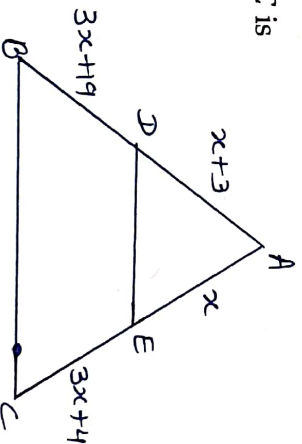16. If two dice are thrown simultaneously, the probability of getting a doublet is

a) $\frac{5}{36}$ b) $\frac{1}{6}$ c) $\frac{1}{36}$ d) none of these

17. If $\triangle ABC$ and $\triangle DEF$, $\frac{AB}{DE} = \frac{BC}{FD}$ which of the following makes the two triangle similar?

a) $\angle A = \angle D$ b) $\angle B = \angle D$ c) $\angle B = \angle E$ d) $\angle A = \angle F$

18. In figure, the value of x for which $DE \parallel BC$ is

a) 4
b) 1
c) 3
d) 2

19. Statement A (Assertion) : If the system of linear equations $3x + 5y - 4 = 0$ and $15x + 20y - 7 = 0$ is consistent

Statement R (Reason) : The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ Represents intersecting lines, if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

a) Both A and R are true and Reason (R) is correct explanation of A
b) Both A and R are true but Reason (R) is not the correct explanation of A
c) A is true but R is false

A - 2

d) A is false but R is true

20. Statement A (Assertion) : The point $(0, 4)$ lies on $y - axis$

Statement R (Reason) : The x —coordinate of the point on y —axis is zero

a) Both A and R are true and Reason (R) is correct explanation of A

b) Both A and R are true but Reason (R) is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

Section – B

21. Prove that $5 - 3\sqrt{2}$ is an irrational number.

22. If $x = 1$ is one of the zero of the quadratic polynomial $ax^2 - 3(a - 1)x - 1$, find the value of a.

23. In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third and so on. There are 5 rose plants in the last row. How many rows are there in the flower bed?
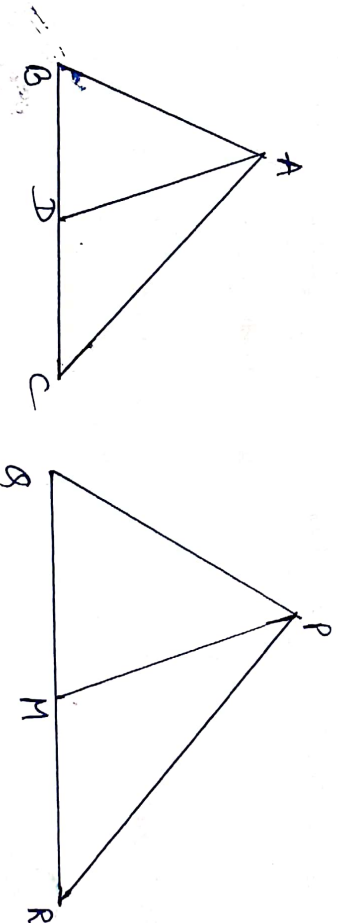
24. Find the quadratic polynomial, whose zeros are in the ratio $2 : 3$ and their sum is 15.

25. Find k for which the pair of linear equations

$kx + 2y = 3$
$3x + 6y = 10$ has a unique solution

Section – C

26. Sides AB and BC and median AD of a $\triangle ABC$ are respectively proportional to sides PQ and QR and median PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$
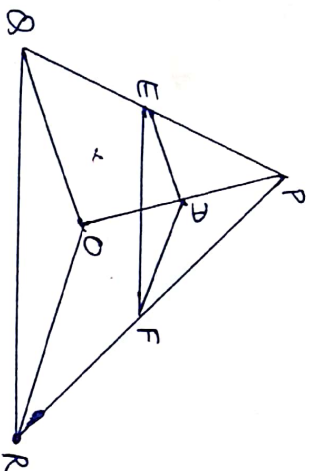

27. If the sum of the first 14 terms of an A.P. is 1050 and its first term is 10, find the 20th term.

28. Find the value of k for which the roots are real and equal in the quadratic equation

$(2k + 1)x^2 - 2(k - 1)x + 1 = 0$

A – 3

29. In the given figure $DE \parallel OQ$ and $DF \parallel OR$, show that $EF \parallel QR$

30. If α, β are the zeros of the polynomial $4x^2 - 5x - 1$ find the value of $\alpha^2\beta + \alpha\beta^2$

31. Solve for x and y

$x + y = 7$

$5x + 12y = 7$

Section – D

32. Two years ago, Salim was thrice as old as his daughter and six years later, he will be four years older than twice her age. How old they are how?

33. If 2 is the zero of the polynomial $4x^2 + 2x - 5a$, find the value of a and hence verify the relationship between zeros and the coefficients of the polynomial.

34. Prove that if a line is drawn parallel to one side of a triangle to interest the other two sides in distinct points, the other two sides are divided in the same ratio.

35. One card is drawn from a pack of 52 cards. Find the probability that the card drawn is

a) an ace   b) red and king   c) either red or king   d) a face card   e) '10' of black suit

Section – E

Case Study :

36. The graphs of quadratic polynomial are parabolic vaguely 'U' shaped and have a highest or lowest point called the vertex. They may open up or down. They are symmetrical curves. The graph of a quadratic polynomial is given below:
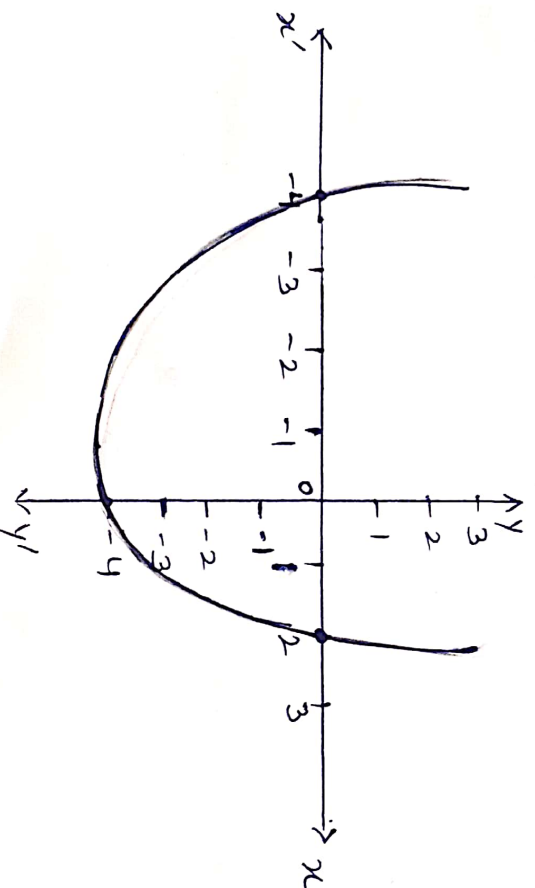

A–4

Based on the above information, answer the following questions:

1. The graph shown above is that of

   a) line   b) parabola   c) ellipse   d) circle

2. The zeroes of the polynomial for the given graph are

   a) $(-4, 0), (2, 0)$ b) $(4, 0), (-2, 0)$ c) $4, -2$ d) $-4, 2$

3. The polynomial representing above graph is

   a) $8 - 2x - x^2$ b) $x^2 + 2x - 8$ c) $x^2 - 2x - 8$ d) $8 + 2x - x^2$

37. The figure shows a big equilateral triangle in which multiple other equilateral triangles may be seen. Observe the pattern.
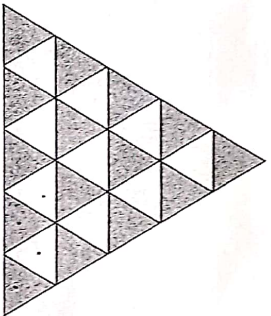
Based on the above figure, answer the following questions:

1. How many triangles will be there in the 15th row?

   a) 28   b) 29   c) 30   d) 31

2. In which row will the number of triangles be 47?

   a) 22   b) 23   c) 24   d) 25

3. How many small triangles will be there in the figure consisting of 10 rows?

   a) 90   b) 100   c) 110   d) 95

38. Two students A and B went to a library to return some books. The library has a fixed charge for the first two days and an additional charge for each day thereafter. Student A was issued a book for 10 days and was charged Rs. 94 whereas, student B was issued a book for 8 days and was charged Rs. 78.

Based on the above information, answer the following questions:

1. The fixed charge on each book is

   a) Rs. 10   b) Rs. 15   c) Rs. 30   d) Rs. 35

2. The additional charge on a book for each extra day is

   a) Rs. 6   b) Rs. 7   c) Rs. 8   d) Rs. 9

3. If another student C was issued a book for 4 days, the total amount paid by him will be

   a) Rs. 32   b) Rs. 46   c) Rs. 45   d) Rs. 38

A-5

BUDHA DAL PUBLIC SCHOOL PATIALA
FIRST TERM EXAMINATION (16 September 2024)
Class – X
Paper-Mathematics Standard (Set-B)

Time: 3hrs.

M.M. 80

General Instructions:
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 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.

Section-A

1. $13 \times 4 + 26$ is a
   a) irrational number   b) composite number   c) prime number   d) none of these

2. The sum of exponents of prime factors in the prime factorization of 31500 is
   a) 2   b) 8   c) 6   d) 5

3. The product and sum of the zeros of the polynomial $3x^2 - 2\sqrt{2}x + 2$ are respectively
   a) $-\frac{2}{3}, -\frac{2\sqrt{2}}{3}$ b) $2, -2\sqrt{2}$ c) $\frac{2}{3}, \frac{2\sqrt{2}}{3}$ d) none of these

4. If the product of the zeros of quadratic polynomial $3x^2 + 5x + k$ is $-\frac{2}{3}$, then k is
   a) -3 b) -2 c) 2 d) 3

5. The zeros of the polynomial $p(x) = x^2 + ax - b$ be the reciprocal of each other, then b is equal to
   a) 1 b) -1 c) a d) $1/a$

6. The pair of equations $x = 3$ and $y = 5$ graphically represents lines which are
   a) parallel   b) intersecting at $(5,3)$ c) coincident   d) intersecting at $(3,5)$

7. The value of k, for which the system of linear equations $x + 2y = 3$; $5x + ky + 7 = 0$ is inconsistent is
   a) $-\frac{14}{3}$ b) $\frac{2}{5}$ c) 5 d) 10

8. The number of solutions of $3^{x+y} = 243$ and $243^{x-y} = 3$ is
   a) 0 b) 1 c) 2 d) infinite

9. Sum of first n natural numbers is
   a) $\frac{n}{2}$ b) $\frac{n(n-1)}{2}$ c) $\frac{n+1}{2}$ d) $\frac{n(n+1)}{2}$

B-1

10. The sum of two numbers is 48. If one of them is x, then the other will be

   a) $48 - x$ b) $x - 48$ c) $x(x - 48)$ d) none of these

11. The discriminant of $4x^2 - ax + 2 = 0$ is

   a) $32 - a^2$ b) $a^2 + 32$ c) $-a^2 - 32$ d) $a^2 - 32$

12. A coin is tossed 150 times with 120 tails. Which of the following is the probability of getting a head

   a) $\frac{4}{5}$ b) $\frac{3}{5}$ c) $\frac{1}{5}$ d) none of these

13. The 10th term of $\sqrt{3}$, $\sqrt{12}$, $\sqrt{27}$ ..... is

   a) $\sqrt{300}$ b) $12\sqrt{5}$ c) $3\sqrt{10}$ d) $\sqrt{30}$

14. If two dice are thrown simultaneously, the probability of getting a doublet is

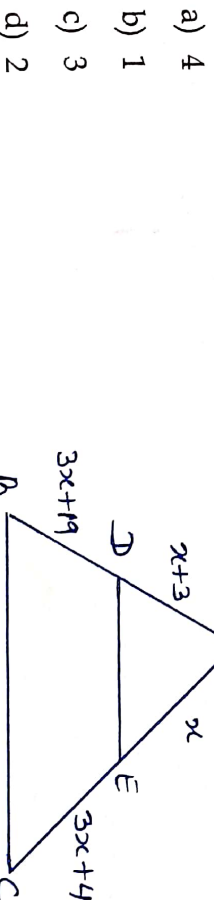   a) $\frac{5}{36}$ b) $\frac{1}{6}$ c) $\frac{1}{36}$ d) none of these

15. Sum of the series $2 + 5 + 8 + \cdots + 182$ is

   a) 5612   b) 8612   c) 7612   d) 9012

16. In $\triangle ABC$ and $\triangle DEF$, $\frac{AB}{DE} = \frac{BC}{FD}$ which of the following makes the two triangle similar?

   a) $\angle A = \angle D$ b) $\angle B = \angle D$ c) $\angle B = \angle E$ d) $\angle A = \angle F$

17. In figure, the value of x for which $DE \parallel BC$ is

   a) 4

   b) 1

   c) 3

   d) 2

18. Three coins are tossed simultaneously. Find the probability of getting atleast two heads

   a) $\frac{7}{8}$ b) $\frac{1}{2}$ c) $\frac{3}{8}$ d) none of these

19. Statement A (Assertion) : If the system of linear equations $3x + 5y - 4 = 0$ and

      $15x + 20y - 7 = 0$ is consistent

   Statement R (Reason) : The pair of linear equations $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$

   Represents intersecting lines, if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

   a) Both A and R are true and Reason (R) is correct explanation of A

   b) Both A and R are true but Reason (R) is not the correct explanation of A

   c) A is true but R is false

   d) A is false but R is true

20. **Statement A (Assertion)** : The point $(0, 4)$ lies on $y-$ axis

Statement R (Reason) : The $x-$ coordinate of the point on $y-$ axis is zero

a) Both A and R are true and Reason (R) is correct explanation of A

b) Both A and R are true but Reason (R) is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

Section – B

21. If $x = 1$ is one of the zero of quadratic polynomial $ax^2 - 3(a-1)x - 1$, find the value of a

22. Find the 9th term from the end of an A.P. 5, 9, 13, …….. 185

23. Prove that $5 - 3\sqrt{2}$ is an irrational number.

24. Find k for which the pair of linear equations

$$kx + 2y = 3$$
$$3x + 6y = 10$$ has a unique solution

25. Find the quadratic polynomial, whose zeros are in the ratio $2 : 3$ and their sum is 15.

Section – C

26. In the given figure $DE \parallel OQ$ and $DF \parallel OR$

Show that $EF \parallel QR$
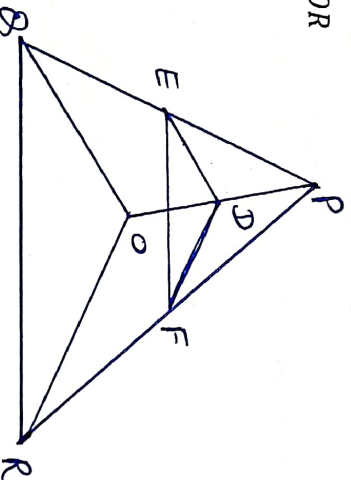
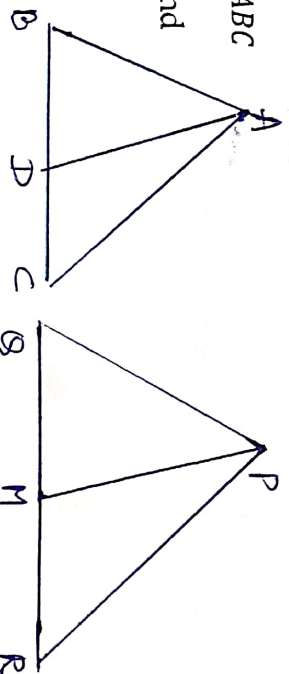27. A fraction becomes 1/3 when 2 is subtracted from the numerator and it becomes ½ when 1 is subtracted from the denominator. Find the fraction.

28. Find the value of k for which the roots are real and equal in the quadratic equation

$$kx(x - 2\sqrt{5}) + 10 = 0$$

29. Sides AB and BC and the median AD of $\triangle ABC$ are respectively proportional to sides PQ and QR and median PM of $\triangle PQR$.

Show that $\triangle ABC \sim \triangle PQR$

B-3

30. If α, β are the zeros of the polynomial $4x^2 - 5x - 1$ find the value of $\alpha^2\beta + \alpha\beta^2$

31. Solve for x and y

$$x + y = 7$$
$$5x + 12y = 7$$

Section – D

32. Find the number of natural numbers between 101 and 999 which are divisible by both 2 and 5.

33. One card is drawn from a pack of 52 cards. Find the probability that the card drawn is

   a) an ace   b) red and king   c) either red or king   d) a face card   e) '10' of black suit

34. If 2 is the zero of the polynomial $4x^2 + 2x - 5a$, find the value of a and hence verify the relationship between zeros and coefficients of the polynomial.

35. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Section – E

Case Study :

36. Two students A and B went to a library to return some books. The library has a fixed charge for the first two days and an additional charge for each day thereafter. Student A was issued a book for 10 days and was charged Rs. 94 whereas, student B was issued a book for 8 days and was charged Rs. 78.

Based on the above information, answer the following questions:

1. The fixed charge on each book is

   a) Rs. 10   b) Rs. 15   c) Rs. 30   d) Rs. 35

2. The additional charge on a book for each extra day is

   a) Rs. 6   b) Rs. 7   c) Rs. 8   d) Rs. 9

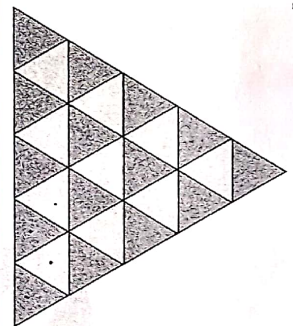3. If another student C was issued a book for 4 days, the total amount paid by him will be

   a) Rs. 32   b) Rs. 46   c) Rs. 45   d) Rs. 38

37. The graphs of quadratic polynomial are parabolic vaguely 'U' shaped and have a highest or lowest point called the vertex. They may open up or down. They are symmetrical curves. The graph of a quadratic polynomial is given below:
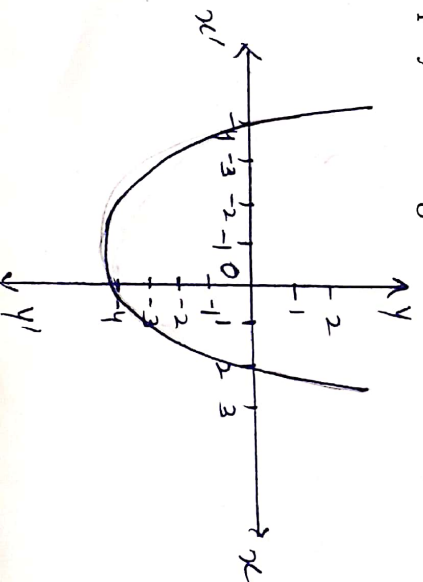
Based on the above information, answer the following questions:

1. The graph shown above is that of

   a) line   b) parabola   c) ellipse   d) circle

2. The zeroes of the polynomial for the given graph are

   a) $(-4,0),(2,0)$ b) $(4,0),(-2,0)$ c) $4,-2$ d) $-4,2$

3. The polynomial representing above graph is

   a) $8-2x-x^2$ b) x^2+2x-8 c) x^2-2x-8 d) $8+2x-x^2$

38. The figure shows a big equilateral triangle in which multiple other equilateral triangles may be seen. Observe the pattern.

Based on the above figure, answer the following questions:

1. How many triangles will be there in the 15th row?

   a) 28   b) 29   c) 30   d) 31

2. In which row will the number of triangles be 47?

   a) 22   b) 23   c) 24   d) 25

3. How many small triangles will be there in the figure consisting of 10 rows?

   a) 90   b) 100   c) 110   d) 95

B-5