

General Instructions:

1. This question paper has 5 sections A to E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment of 4 marks each.
7. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$, wherever required if not stated.

Section – A

Section A consists of 20 questions of 1 mark each.

1. The point of intersection of the lines $x = -3$ and $y = 0$ is:
a. $(0, -3)$ b. $(-3, 0)$ c. $(0, 0)$ d. none of these
2. If 2 is a root of the equation $x^2 + bx + 12 = 0$, then the value of b is:
a. -8 b. 8 c. -2 d. none of these
3. If $\sec \theta - \tan \theta = \frac{1}{3}$, then the value of $\sec \theta + \tan \theta$ is:
a. $-\frac{1}{3}$ b. 9 c. -9 d. none of these
4. The quadratic polynomial whose roots are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ is:
a. $x^2 + 4x + 1$
b. $x^2 - 4x + 1$
c. $x^2 - 4x - 1$
d. none of these
5. The HCF of 96 and 408 is 24, then LCM is:
a. 408 b. 1632 c. 816 d. none of these
6. If $\sin A = \frac{1}{2}$, then the value of $\cos A$ is _____.

7. In the given A.P., find the missing term: $\sqrt{2}, \underline{\hspace{2cm}}, 4\sqrt{2}$
8. Is $x + 2$ a factor of $2x^2 + 3x + 1$?
9. The value of $(1 + \cos A)(1 - \cos A)\operatorname{cosec}^2 A$ is:
 a. 1 b. 2 c. 3 d. 5
10. Is the pair of equations: $x + 2y - 4 = 0$; $2x + 4y - 2 = 0$ consistent?
11. If $a_n = 5 - 3n$ for an A.P., find the common difference.

OR

The angles of a quadrilateral are in A.P. whose common difference is 10° . Find the measure of the angles of the quadrilateral.

12. If α and $\frac{1}{\alpha}$ are the zeroes of the polynomial $4x^2 - 2x + (k - 4)$, then find the value of k .
13. If the lengths of the diagonals of a rhombus are 24 cm and 32 cm, then find the length of the side of the rhombus.
14. If $\tan A = \sqrt{2}$, find the value of $\sin A \cdot \cos A$
15. $\Delta ABC \sim \Delta PQR$ such that $\angle A = 31^\circ$ and $\angle R = 69^\circ$, then the value of $\angle Q$ is:
 a. 70° b. 100° c. 90° d. 80°
16. $\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of ΔABC and ΔPQR respectively and $AB^2 : PQ^2 = 4 : 9$, then $AM : PN =$
 a. $3 : 2$ b. $16 : 81$ c. $4 : 9$ d. $2 : 3$
17. Solve by factorisation: $9x^2 - 3x - 20 = 0$.
18. The midpoint of the line segment joining the points $(3, m)$ and $(5, 1)$ lies on the line $x + y = 5$, find the value of m .
19. Show that the points $(1, 1)$, $(3, -2)$ and $(-1, 4)$ are collinear.
20. If the points $(4, 3)$ and $(x, 5)$ are on the circle with centre $(2, 3)$, find the value of x .

Section – B

Questions 21 to 25 carry 2 marks each.

21. For which value of k will the following equations have infinitely many solutions?
 $3x + y = 1$, $(2k - 1)x + (k - 1)y = 2k + 1$

OR

For which value of k , will the following equations have infinitely many solutions?

$$kx + 3y = k - 3, \quad 12x + ky = k.$$

22. Find the value of k for which the quadratic polynomial $kx^2 + x + k$ has equal zeroes.
23. Find the point on the y - axis which is equidistant from the points $(5, -2)$ and $(-3, 2)$.

OR

Find the coordinates of one of the points of trisection of the line segment joining the points $(12, 0)$ and $(-6, 15)$.

24. Find the value of x , given that $\sin 2x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$.
25. There are 312, 260 and 156 students in class X, XI and XII respectively. Buses are to be hired to take these students to a picnic. Find the maximum number of students who can sit in a bus if each bus takes equal number of students. Also find the number of buses required.

Section – C

Question number 26 to 31 carry 3 marks each.

26. Find the value of $\left(\frac{\tan 20^\circ}{\operatorname{cosec} 70^\circ}\right)^2 + \left(\frac{\cot 20^\circ}{\operatorname{sec} 70^\circ}\right)^2 + 2 \tan 15^\circ \tan 45^\circ \tan 75^\circ$.
27. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$.
28. Prove that $\frac{5\sqrt{3}}{\sqrt{2}}$ is an irrational number.
29. A train travels 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train.

OR

The ratio of the incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each saves ₹ 200 per month, find their monthly incomes.

30. If α, β are the zeroes of the polynomial $f(x) = x^2 - (k - 6)x + (2k + 1)$, find the value of k , if the sum of the zeroes equals the product of zeroes.
31. If d is the HCF of 45 and 27, find the value of x, y satisfying $d = 27x + 45y$.

OR

Show that any positive integer is of the form $3q$ or $3q + 1$ or $3q + 2$, for some integer.

Section – D

Question number 32 to 35 carry 5 mark each.

32.State Basic Proportionality theorem and prove that in ΔABC , if $DE \parallel BC$,

$$\text{then } \frac{AB}{AD} = \frac{AC}{AE}.$$

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

OR

$$\left(\frac{1 + \tan^2 A}{1 + \cot^2 A}\right) = \left(\frac{1 - \tan A}{1 - \cot A}\right)^2 = \tan^2 A$$

34.Prove that $\sqrt{5}$ is an irrational number. Hence prove that $2\sqrt{5} + 1$ is an irrational number.

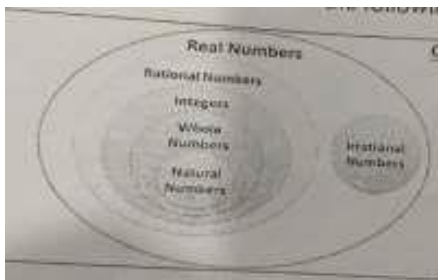
35.The following data gives the distribution of the total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly expenditure.

Expenditure	Number of families
1000 – 1500	24
1500 – 2000	40
2000 – 2500	33
2500 – 3000	28
3000 – 3500	30
3500 – 4000	22
4000 – 4500	16
4500 – 5000	7

Section – E

Questions 36 to 38 carry 4 marks each.

36.Kumar has made a project on real numbers, where he finely explained the applicability of exponential laws and divisibility conditions on real numbers. He also included some assessment questions at the end of his project as listed below. Answer the following questions:



- (i) Two bells toll at intervals of 12 and 15 minutes respectively. If they toll together at 9 a.m., after how much time will they next toll together.
- (ii) HCF of two numbers is 27 and their LCM is 162. If one number is 54, find the other.
- (iii) If the HCF of 85 and 153 is expressible in the form $85n - 153$, then find the value of n .

37. A parabola is the graph that results from $p(x) = ax^2 + bx + c$. Parabolas are symmetric about a vertical line known as axis of symmetry. The axis of symmetry runs through the maximum or minimum point of the parabola which is called the vertex.

Answer the following questions:

- (i) If the highway overpass is represented by $x^2 - 2x - 8$, then its zeroes are:
 - a. $(2, -4)$
 - b. $(4, -2)$
 - c. $(-2, -2)$
 - d. $(-4, -4)$
- (ii) The highway overpass is represented graphically:

Zeroes of a polynomial can be expressed graphically. Number of zeroes of the polynomial is equal to the number of points where the graph of the polynomial:

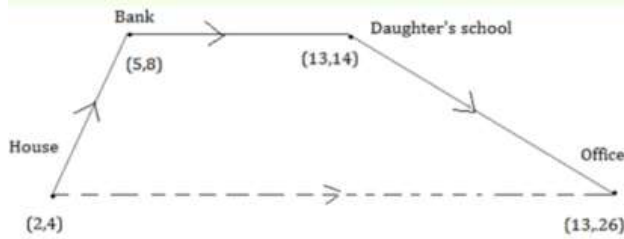
 - a. intersects $x - axis$
 - b. intersects $y - axis$
 - c. intersects $y - axis$ and $x - axis$
 - d. none of these
- (iii) Graph of a quadratic polynomial is a:
 - a. straight line
 - b. circle
 - c. parabola
 - d. ellipse

OR

The representation of highway underpass whose one zero is 6 and the sum of the zeroes is 0, is:

- a. $x^2 - 6x + 2$
- b. $x^2 - 36$
- c. $x^2 - 6$
- d. $x^2 - 3$

38. Ayush starts walking from his house to office. Instead of going to the office directly, he goes to a bank first, from there to his daughter's school and then reaches the office. (Assume that all the distances covered are in a straight line). If the house is situated at (2, 4), bank at (5, 8), school at (13, 14) and office at (13, 26) and coordinates are in kilometres, then:



- (i) What is the distance between the house and bank?
 - a. 5 km b. 10 km c. 12 km d. 27 km
- (ii) What is the distance between the bank and daughter's school?
 - a. 5 km b. 10 km c. 12 km d. 27 km
- (iii) What is the total distance travelled by Ayush to reach the office?
 - a. 15 km b. 2.4 km c. 12 km d. 27 km

OR

What is the distance between the house and the office?

- a. 27 km b. 15 km c. 24.6 km d. 12 km