

**Time Allowed : 3 Hours**

**Maximum Marks : 80**

**General Instructions:**

- I. All questions are compulsory.
- II. The question paper consists of 40 questions divided into four sections A, B, C and D.
- III. Section A contains 20 objective questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 8 questions of 3 marks each. Section D contains 6 questions of 4 marks each.
- IV. There is no overall choice. However, an internal choice has been provided in 2 questions of section A, 2 questions of section B, 3 questions of section C and 3 questions of section D. You have to attempt only one of the alternatives in all such questions.
- V. Use of calculators is not permitted.

**SECTION - A**

**(Q. 1 – Q. 10) Multiple choice type questions. Select the correct option.**

1. The decimal expansion of  $\frac{21}{45}$  is :
  - (a) terminating
  - (b) non-terminating and repeating
  - (c) non-terminating and non-repeating
  - (d) none of these
2. If  $A + B = 90^\circ$  then  $\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}$  is equal to
  - (a)  $\cot^2 A$
  - (b)  $\cot^2 B$
  - (c)  $-\tan^2 A$
  - (d)  $-\cot^2 A$
3. Which of the following lists of numbers does not form an A.P.?
  - (a)  $-1.2, -3.2, -5.2, -7.2, \dots$
  - (b)  $0, -4, -8, -12, \dots$
  - (c)  $1^2, 3^2, 5^2, 7^2, \dots$
  - (d)  $1^2, 5^2, 7^2, \dots$
4. In an A.P. if  $a = 5, a_n = 81$  and  $S_n = 860$ , then  $n$  is
  - (a) 10
  - (b) 15
  - (c) 20
  - (d) 25
5. In an A.P., if  $a_{20} - a_{12} = -24$ , then its common difference is
  - (a) 3
  - (b)  $-3$
  - (c) 8
  - (d)  $-8$
6. The sum of the third and seventh terms of an A.P. is 6 and their product is 8, then common difference is:
  - (a)  $\pm 1$
  - (b)  $\pm 2$
  - (c)  $\pm \frac{1}{2}$
  - (d)  $\pm \frac{1}{4}$
7. If  $2a^2 - 2ab + b^2 + 6a + 9 = 0$ , then  $(a + b) + ab$  equals
  - (a) 1
  - (b) 2
  - (c) 3
  - (d) 4
8. Which of the following satisfy the equation  $a^2b^2x^2 + b^2x - a^2x - 1 = 0$ 
  - (a)  $\frac{1}{a^2}$
  - (b)  $\frac{1}{b^2}$
  - (c)  $\frac{-1}{b^2}$
  - (d) None of these
9. The equation  $x + \sqrt{x - 2} = 4$  has
  - (a) two real roots
  - (b) one real and one imaginary root
  - (c) two imaginary roots
  - (d) one real root
10. If the points  $(a, 0), (0, b)$  and  $(1, 1)$  are collinear then which of the following is true :
  - (a)  $\frac{1}{a} + \frac{1}{b} = 2$
  - (b)  $\frac{1}{a} - \frac{1}{b} = 1$
  - (c)  $\frac{1}{a} - \frac{1}{b} = 2$
  - (d)  $\frac{1}{a} + \frac{1}{b} = 1$

**(Q. 11 – Q. 15) Fill in the blanks.**

11. If  $112 = q \times 6 + r$ , then the possible values of  $r$  are \_\_\_\_\_ .
12. HCF of 1500 and 600 is \_\_\_\_\_ .

13. Value of 'k' for the equations  $(k-1)x - y = 5$  and  $(k+1)x + (1-k)y = 3k+1$  have infinite number of solutions is \_\_\_\_\_ .
14. If  $\tan\theta = \frac{x \sin\phi}{1-x \cos\phi}$  and  $\tan\phi = \frac{y \sin\theta}{1-y \cos\theta}$ , then the value of  $\frac{x}{y}$  is \_\_\_\_\_ .
15. The angles of elevation of the top of a tower from two points at a distance of 9 m and 16 m from the base of the tower and in the same straight line in the same direction with it are complementary. Then height of the tower is \_\_\_\_\_ .

OR

From the top of a tower, which is 240 meters high, if the angle of depression of a point on the ground is  $30^\circ$ , the distance of the point from the foot of the tower is \_\_\_\_\_ .

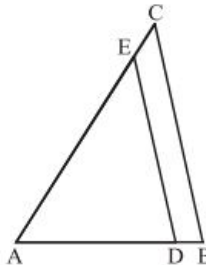
(Q. 16 – Q. 20) Answer the following questions.

16. Find the roots of the equation:  $4x^2 + 4\sqrt{3}x + 3 = 0$

OR

Determine value of p for which the quadratic equation  $2x^2 + px + 8 = 0$  has real roots.

17. In Fig.  $DE \parallel BC$ . If  $AD = x$ ,  $DB = x-2$ ,  $AE = x+2$  and  $EC = x-1$ , find the value of x.



18. If  $x = a \cos^2\theta + b \sin^2\theta$  then find  $(x-a)(b-x)$ .
19. Divisor is 10 times of quotient and 10 times of remainder. If quotient is 10, then what is dividend ?
20. Find out the value of  $\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta}$

### SECTION - B

21. Use Euclid's algorithm to find the HCF of 6812 and 28916.
22. Find the relation between x and y if the points A(x, y), B(-5, 7) and C(-4, 5) are collinear.

OR

Find the value of a, if the distance between the points A(-3, -14) and B(a, -5) is 9 units.

23. From a normal pack of cards, a card is drawn at random, find the probability of getting a jack or a king.
24. Find the value of K for which the system of equations has no solution.  
 $3x + y = 1$ ;  $(2K-1)x + (K-1)y = (2K+1)$

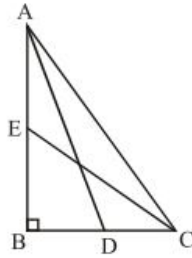
OR

Aruna has only ₹ 1 and ₹ 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is ₹ 75, then find the numbers of ₹ 1 and ₹ 2 coins.

25. Which term of the progression  $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$  is the first negative term?
26. In a single throw of two dice, find the probability of getting a sum of 10

### SECTION - C

27. If  $\alpha, \beta$  are the roots of the polynomial  $f(x) = 2x^2 + 5x + k$  satisfying the relation  $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$ , then find the value of k for this to be possible.
28. In the figure, ABC is a right triangle, right angled at B. AD and CE are two medians drawn from A and C respectively. If  $AC = 5$  cm and  $AD = \frac{3\sqrt{5}}{2}$  cm, find the length of CE.



**OR**

In  $\triangle ABC$ ,  $AD \perp BC$  and point  $D$  lies on  $BC$  such that  $2DB = 3CD$ . Prove that  $5AB^2 = 5AC^2 + BC^2$

29. If  $\cos \theta + \sqrt{3} \sin \theta = 2 \sin \theta$ . Show that  $\sin \theta - \sqrt{3} \cos \theta = 2 \cos \theta$ .
30. If  $A(-3, 5)$ ,  $B(-2, -7)$ ,  $C(1, -8)$  and  $D(6, 3)$  are the vertices of a quadrilateral  $ABCD$ , find its area.

**OR**

$ABCD$  is a rectangle formed by the points  $A(-1, -1)$ ,  $B(-1, 4)$ ,  $C(5, 4)$  and  $D(5, -1)$ .  $P, Q, R$  and  $S$  are the mid-points of  $AB, BC, CD$  and  $DA$ , respectively. Is the quadrilateral  $PQRS$  a square? a rectangle? or a rhombus? Justify your answer.

31. A boy is cycling such that the wheels of the cycle are making 140 revolutions per minute. If the diameter of the wheel is 60 cm, calculate the speed per hour with which the boy is cycling.
32. The numbers 5, 7, 10, 12,  $2x - 8$ ,  $2x + 10$ , 35, 41, 42, 50 are arranged in ascending order. If their median is 25 then find the value of  $x$ .
33. Prove that the line segment joining the points of contact of two parallel tangents of a circle, passes through its centre.
34. A well of diameter 4 m is dug 14 m deep. The earth taken out is spread evenly all around the well to form a 40 cm high embankment. Find the width of the embankment.

**OR**

A sphere of diameter 12.6 cm is melted and recast into a right circular cone of height 25.2 cm. Find the diameter of the base of the cone.

**SECTION - D**

35. Solve the equation by using quadratic formula :  $(x + 4)(x + 5) = 3(x + 1)(x + 2) + 2x$

**OR**

If the roots of the equation  $(c^2 - ab)x^2 - 2(a^2 - bc)x + (b^2 - ac) = 0$  are equal, prove that either  $a = 0$  or  $a^3 + b^3 + c^3 = 3abc$

36. If the areas of two similar triangles are equal, prove that they are congruent.
37. The angle of elevation of the top of a tower at a distance of 120 m from a point  $A$  on the ground is  $45^\circ$ . If the angle of elevation of the top of a flagstaff fixed at the top of the tower, at  $A$  is  $60^\circ$ , then find the height of the flagstaff.

[Use  $\sqrt{3} = 1.73$ ]

**OR**

The side  $BC$  of  $\triangle ABC$  is bisected at  $D$ ;  $O$  is any point in  $AD$ ,  $BO$  and  $CO$  are produced to meet  $AC$  and  $AB$   $E$  and  $F$  respectively and  $AD$  is produced to  $X$  so that  $D$  is the mid-point of  $OX$ . Prove that  $AO : AX = AF : AB$  and  $EF \parallel BC$

38. The mean of three positive numbers is 10 more than the smallest of the numbers and 15 less than the largest of the three. If the median of the three numbers is 5, then find the means of squares of the numbers.
39. Draw a right triangle  $ABC$  in which  $AB = 6$  cm,  $BC = 8$  cm and  $\angle B = 90^\circ$ . Draw  $BD$  perpendicular from  $B$  on  $AC$  and draw a circle passing through the points  $B, C$  and  $D$ . Construct tangents from  $A$  to this circle.
40. The diameter of the internal and external surfaces of a hollow spherical shell are 6 cm and 10 cm, respectively.

If it is melted and recast into a solid cylinder of length  $2\frac{2}{3}$  cm. Find the diameter of the cylinder.

**OR**

A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm.