

SECTION – A

1 x 10 = 10

- Find the sum and product of the zeros of the polynomial  $x^2 - 2x - 8$ .
- What is the ratio of the areas of a circle and an equilateral triangle whose diameter and a side are respectively equal.
- Use Euclid's division algorithm to find the H.C.F. of 135 and 225.
- If  $\sec \alpha = \frac{5}{4}$ , find the value of  $\frac{\tan \alpha}{1 + \tan^2 \alpha}$ .
- Which term of the sequence  $20, 19 \frac{1}{4}, 18 \frac{1}{2}, 17 \frac{3}{4}, \dots$  is the first negative term?
- Two dice are thrown simultaneously. Find the probability that the total of the numbers are the dice is 13.
- Find the value of K for which the system of equations  $Kx - y = 2, 6x - 2y = 3$  has no solutions.
- What is the radius of a circle when the distance between two parallel tangents to a circle is 10 cm?
- Determine the value of K for which the quadratic equation  $4x^2 - 3Kx + 1 = 0$  has equal roots.
- Without using trigonometric tables, evaluate  $\frac{\cos^2 20^\circ + \cos^2 70^\circ}{\sin^2 59^\circ + \sin^2 31^\circ}$

SECTION – B

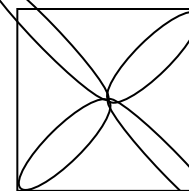
5 x 2 = 10

- If 1 and -3 are the zeros of the polynomial  $x^3 - ax^2 - 13x + b$ , find the values of 'a' and 'b'.
- The first term, common difference and last term of an A.P. are 12, 6 and 252 respectively. Find the sum of all terms of this A.P.
- Prove that  $6 + \sqrt{2}$  is irrational.
- How many lead shots each 0.3 cm in diameter can be made from a cuboids of dimensions 9 cm x 11 cm x 12 cm?
- (a) The perimeter of a sector of a circle of radius 5.6 cm is 27.2 cm. Find the area of the sector.  
(OR)  
(b) A steel wire when bent in the form of a square encloses an area of 121 sq.cm. If the same wire is bent into the form of a circle, find the area of the circle.

SECTION – C

10 x 3 = 30

- If -5 is a root of the quadratic equations  $2x^2 + px - 15 = 0$  and the quadratic equation  $p(x^2 + x) + k = 0$  has equal roots, find the value of k.
- A bag contains 5 red balls, 8 white balls, 4 green balls and 7 black balls. If one ball is drawn at random, find the probability that it is  
(a) black (b) red (c) not green
- In an equilateral  $\Delta ABC$ , AD is the altitude drawn from A to the side BC, prove that  $3AB^2 = 4AD^2$
- Prove that the parallelogram circumscribing a circle is a rhombus.



- Find the area of the shaded region where ABCD is a square of side 10 cm and semicircles are drawn with each side of the square as diameter.
- A boat goes 16 km upstream and 24 km downstream in 6 hours. It can go 12 km upstream and 36 km downstream in the same time. Find the speed of the boat in still water and the speed of the stream.  
(OR)  
Two water taps can fill a tank in  $9 \frac{3}{8}$  hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.
- Draw the graph of  $4x - 3y + 4 = 0$  and  $4x + 3y - 20 = 0$ . Find the area of the region bounded by these lines and the x-axis.
- If the second term of an A.P. is 4 and the seventh term is -11. Find its 16<sup>th</sup> term.

24. (a) Prove that  $\sqrt{\frac{\sec \theta - 1}{\sec \theta + 1}} + \sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} = 2 \operatorname{cosec} \theta$

(OR)

(b) Prove that  $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

25. Solve the system of equations for x and y

(a)  $ax + by = a - b$  and  $bx - ay = a + b$

(OR)

(b) Solve for x : -  $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$  ( $a \neq 0, b \neq 0, x \neq 0$ )

**SECTION – D**

**5 x 6 = 30**

26. (a) The angle of elevation of a stationary cloud from a point 2500 metres above a lake is  $30^\circ$  and the angle of depression of its reflection in the lake is  $45^\circ$ . What is the height of the cloud above the lake level?

(OR)

(b) A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of  $30^\circ$ . A girl standing on the roof of a 20 metres high building, finds the angle of elevation of the same bird to be  $45^\circ$ . Both the boy and the girl are on opposite sides of the bird. Find the distance of the bird from the girl.

27. (a) A vessel is in the form of an inverted cone. Its height is 8 cm and radius of the top which is open is 5 cm. It is filled with water upto the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel.

(OR)

(b) The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be  $\frac{1}{27^{th}}$  of the volume of the given cone, at what height above the base is the section made?

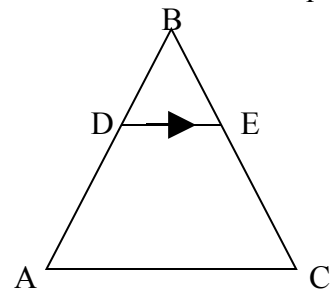
28. If the mean of the following distribution is 19.92, find the missing frequencies  $f_1$  and  $f_2$ .

C – I	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24	24 – 28	28 – 32	32 – 36
F	2	$f_1$	15	25	18	12	$f_2$	3

Total = 100

29. (a) Prove that the ratio of the areas of similar triangle is equal to the ratio of the squares of their corresponding sides.

(b) Use the above in the following. In the given figure, D divides AB such that  $AD : DB = 3 : 2$  and E is a point on BC such that  $DE \parallel AC$ . Find the ratio of areas of  $\Delta BAC$  and  $\Delta BDE$ .



30. Construct a  $\Delta ABC$ , similar to a given isosceles triangle PQR with  $QR = 6$  cm  $PR = PQ = 5$  cm such that each of its sides is  $\frac{6}{7}$  of the corresponding sides of  $\Delta PQR$ . Write the steps of construction.