

Time Allowed : 3 Hours

Maximum Marks : 80

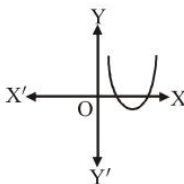
**General Instructions:**

- 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 graph of  $y = f(x)$  is shown in the figure. What type of polynomial  $f(x)$  is?



- (a) cubic                      (b) quadratic                      (c) linear                      (d) none of these
2. Which of the following is the other name for a pair of linear equations in two variables?
- (a) Consistent equations                      (b) Simultaneous equations
- (c) Inconsistent equations                      (d) Dependent equations
3. Which of the following statement is false?
- (a) All isosceles triangles are similar.                      (b) All equilateral triangles are similar.
- (c) All circles are similar.                      (d) None of the above
4. In the adjoining figure, the bottom of the glass has a hemispherical raised portion. If the glass is filled with orange juice, the quantity of juice which a person will get is



- (a)  $135 \pi \text{ cm}^3$                       (b)  $117 \pi \text{ cm}^3$                       (c)  $99 \pi \text{ cm}^3$                       (d)  $36 \pi \text{ cm}^3$

5. If  $\cos A = \frac{3}{5}$ , find the value of  $9 \cot^2 A - 1$ .
- (a) 1                      (b)  $\frac{16}{65}$                       (c)  $\frac{65}{16}$                       (d) 0
6. In order to divide a line segment  $AB = 6$  cm, in the ratio 3 : 5, we draw a ray  $AX$  making an acute angle  $\angle BAX$ . Along  $AX$  mark off... points  $A_1, A_2, A_3$  etc. such that  $AA_1 = A_1A_2 = \dots$ . The number of points is
- (a) 3                      (b) 5                      (c) 8                      (d) 2
7. In an Arithmetic sequence of terms,  $S_n$  represents sum to  $n$  terms, then what is  $S_n - S_{n-1}$ ?
- (a)  $t_1 + t_2 + \dots + t_{n-1}$       (b)  $S_{n-2}$                       (c)  $\sum_{n=1}^{n-2} t_n$                       (d)  $t_n$
8. The area enclosed by the circumferences of two concentric circle is  $346.5 \text{ cm}^2$ . If the circumference of the inner circle is 88 cm, calculate the radius of the outer circle.
- (a) 16.5 cm                      (b) 18 cm                      (c) 17.5 cm                      (d) 18 cm
9. If the diameter of the sphere is doubled, the surface area of the resultant sphere becomes  $x$  times that of the original one. Then  $x$  would be
- (a) 2                      (b) 3                      (c) 4                      (d) 8
10. Find a point on the x-axis which is equidistant from the points (5, 4) and (-2, 3).
- (a) (2, 0)                      (b) (0, 3)                      (c) (-2, 2)                      (d) (3, 0)

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

11. The sum of a rational and an irrational number is \_\_\_\_\_.
12. The value of  $\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$  is \_\_\_\_\_.
13. 20th term from the end of the A.P. 3, 8, 13,....., 253 is \_\_\_\_\_.

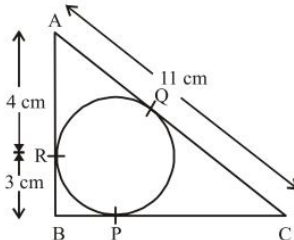
**OR**

Find the next term of A.P.  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \dots$  ?

14. If in an isosceles triangle 'a' is the length of the base and 'b' is the length of one of the equal side, then its area is \_\_\_\_\_.
15. If ABC and EBC are two equilateral triangles such that D is mid-point of BC, then the ratio of the areas of triangles ABC and BDE is \_\_\_\_\_.

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

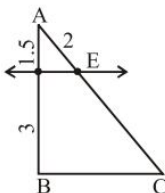
16. Find the roots of the equations  $x^2 - 3x + 2 = 0$
17. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of  $\pi$ .
18. How many tangents can be drawn to two non-intersecting circles?
19. In figure,  $\Delta ABC$  is circumscribing a circle. Find the length of BC.



20. ABC and DEF are two similar triangles such that  $BC = 4\text{cm.}$ ,  $EF = 5\text{ cm.}$ , and area of  $\triangle ABC = 64\text{ cm.}^2$ . Find the area of  $\triangle DEF$ .

OR

In the given figure,  $DE \parallel BC$  and all dimensions are given in centimetres. Find the value of CE.



### SECTION - B

21. Prove that  $\sqrt{5}$  is irrational.

OR

Find the LCM and HCF of 8, 9 and 25 by applying the prime factorisation method.

22. If the seventh term of an AP is  $\frac{1}{9}$  and its ninth term is  $\frac{1}{7}$ , find its 63<sup>rd</sup> term.

OR

Find the sum of:  $34 + 32 + 30 + \dots + 10$

23. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen.
24. Determine the values of  $m$  and  $n$  so that the following system of linear equations have infinite number of solutions :

$$(2m - 1)x + 3y - 5 = 0$$

$$3x + (n - 1)y - 2 = 0$$

25. If the point A (0, 2) is equidistant from the points B (3, p) and C (p, 5), find p. Also find the length of AB.
26. Two different dice are tossed together. Find the probability that the product of the two numbers on the top of the dice is 6.

### SECTION - C

27. Prove that  $\frac{1}{3 + \sqrt{11}}$  is irrational.

28. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $x^2 + 4x + 3$ , find the polynomial whose zeroes are  $1 + \frac{\beta}{\alpha}$  and  $1 + \frac{\alpha}{\beta}$ .

29. Find the coordinates of points which trisect the line segment joining  $(1, -2)$  and  $(-3, 4)$ .

**OR**

Find the area of the triangle formed by the points A  $(5, 2)$ , B  $(4, 7)$  and C  $(7, -4)$ .

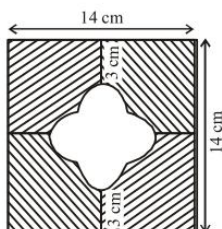
30. Prove that  $\tan^2 \theta + \cot^2 \theta + 2 = \sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \operatorname{cosec}^2 \theta$

**OR**

If  $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ , then find the value of  $\theta$ .

31. Solve the system of equations:  $ax + by = 1$ ,  $bx + ay = \frac{2ab}{a^2 + b^2}$ .

32. In figure find the area of the shaded region [Use  $\pi = 3.14$ ]



33. The data regarding marks obtained by 48 students of a class in a class test is given below. Calculate the modal marks of students.

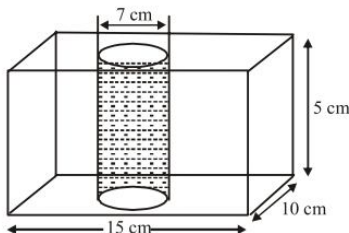
Marks Obtained	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
Number of students	1	0	2	0	0	10	25	7	2	1

34. How many silver coins, 1.75 cm in diameter and of thickness 2 mm, must be melted to form a cuboid of dimensions 5.5 cm  $\times$  10 cm  $\times$  3.5 cm?

**OR**

In figure, from a cuboidal solid metallic block of dimensions 15 cm  $\times$  10 cm  $\times$  5 cm, a cylindrical hole of

diameter 7 cm is drilled out. Find the surface area of the remaining block. [Use  $\pi = \frac{22}{7}$ ]



35. If  $\sec \theta + \tan \theta = p$ , show that  $\sec \theta - \tan \theta = \frac{1}{p}$ . Hence, find the values of  $\cos \theta$  and  $\sin \theta$ .

**OR**

If  $3 \cot A = 4$ , check whether  $\frac{1 - \tan^2 A}{1 + \tan^2 A} = \cos^2 A - \sin^2 A$  or not.

36. A thief runs away from a police station with a uniform speed of 100 m/minute. After one minute, a policeman runs behind the thief to catch him. He goes at a speed of 100 m/minute in first minute and increases his speed by 10 m/min in each succeeding minute. How many minutes will the policeman take to catch the thief?
37. Construct a  $\Delta ABC$  in which  $AB = 5$  cm,  $BC = 6$  cm and  $AC = 7$  cm. Now, construct a triangle similar to  $\Delta ABC$  such that each of its sides is two-third of the corresponding sides of  $\Delta ABC$ .
38. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then other two sides are divided in the same ratio.

**OR**

If a line divides any two sides of a triangle in the same ratio, then prove that the line is parallel to the third side.

39. Two ships are there in the sea on either side of a light house in such a way that the ships and the light house are in the same straight line. The angles of depression of two ships as observed from the top of the light house are  $60^\circ$  and  $45^\circ$ . If the height of the light house is 200m, find the distance between the two ships. [Use  $\sqrt{3} = 1.73$ ].

**OR**

The angle of elevation of an aeroplane from a point on the ground is  $60^\circ$ . After a flight of 30 seconds the angle of elevation becomes  $30^\circ$ . If the aeroplane is flying at a constant height of  $3000 \sqrt{3}$  m, find the speed of the aeroplane.

40. If the mean of the following data is 14.7, find the value of  $p$  and  $q$ .

Class	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30	30 – 36	36 – 42	Total
Frequency	10	$p$	4	7	$q$	4	1	40