

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. Find the total surface area of rt. circular cylinder whose base area is  $346.5 \text{ cm}^2$  and whose height is 24 cm.  
 (a)  $2727 \text{ cm}^2$                       (b)  $2772 \text{ cm}^2$                       (c)  $2277 \text{ cm}^2$                       (d)  $7722 \text{ cm}^2$
2.  $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} =$   
 (a)  $\frac{1 + \sin \theta}{\cos \theta}$                       (b)  $\cos \theta + \sin \theta$                       (c)  $\frac{1 + \cos \theta}{\sin \theta}$                       (d)  $\cos^2 \theta - \sin^2 \theta$
3. An observer 1.5 m tall is 28.5 m away from a chimney. The angle of elevation of the top of the chimney from his eye is  $45^\circ$ . What is the height of the chimney?  
 (a) 30m                      (b) 60m                      (c) 45m                      (d)  $(\sqrt{3} - 1)\text{m}$
4. If the median of the distribution given below is 28.5.

| Class-Interval  | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | Total |
|-----------------|------|-------|-------|-------|-------|-------|-------|
| No. of Students | 5    | x     | 20    | 15    | y     | 5     | 60    |

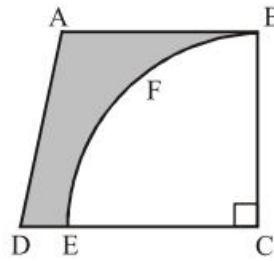
Consider the following.

- (I)  $x=8$                       (II)  $y=7$                       (III)  $x+y=15$                       (IV)  $x-y=1$

Which of the following is correct?

- (a) I and III                      (b) II and IV                      (c) I, II and III                      (d) All of the above

5. In the figure given below, a piece of cardboard, in the shape of a trapezium ABCD, and  $AB \parallel DC$  and  $\angle BCD = 90^\circ$ , quarter circle BFEC is removed. Given  $AB = BC = 3.5$  cm and  $DE = 2$  cm. Calculate the area of the remaining piece of the cardboard.



- (a)  $\frac{51}{8}$  cm<sup>2</sup>                      (b)  $\frac{43}{8}$  cm<sup>2</sup>  
 (c)  $\frac{49}{8}$  cm<sup>2</sup>                      (d)  $\frac{45}{8}$  cm<sup>2</sup>

6. The given figure shows 10 alphabet cards



What is the probability of getting a card labelled ‘S’ when the card is chosen at random?

- (a)  $\frac{1}{5}$                       (b)  $\frac{2}{5}$                       (c)  $\frac{1}{10}$                       (d)  $\frac{1}{6}$
7. If  $x = 2$  and  $x = 0$  are roots of the polynomials  $f(x) = 2x^3 - 5x^2 + ax + b$ . Then values of  $a$  and  $b$  respectively are  
 (a) 2, 0                      (b) 1, 2                      (c) -1, 1                      (d) 0, 3
8. A box contains 60 pens which are blue-inked or black-inked. If a pen is picked at random, the probability of picking a blue-inked pens is  $\frac{2}{5}$ . What is the number of blue-inked pens in the box?  
 (a) 32                      (b) 48                      (c) 30                      (d) 24
9. If  $x = \frac{4}{3}$  is a root of the polynomial  $f(x) = 6x^3 - 11x^2 + kx - 20$ , then find the value of  $k$ .  
 (a) 10                      (b) 19                      (c) -5                      (d) 3
10. Sanjay starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was ₹ 4500 after four years of service and ₹ 5400 after 10 years, find his initial salary and annual increment.  
 (a) 4000, 200                      (b) 3900, 150                      (c) 4500, 100                      (d) 3800, 250

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

11. The decimal expansion of  $\frac{61}{300}$  is \_\_\_\_\_.

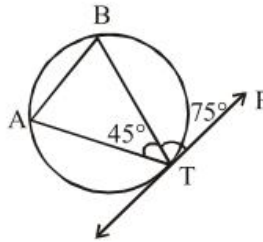
**OR**

L.C.M = \_\_\_\_\_ of highest powers of all the factors.

12. If  $\alpha, \beta$  are the roots of the equation  $x^2 + x\sqrt{\alpha} + \beta = 0$ , then value of  $\alpha$  and  $\beta$  are \_\_\_\_\_.
13. If the centroid of the triangle formed by the points (a, b), (b, c) and (c, a) is at the origin, then  $a^3 + b^3 + c^3$  \_\_\_\_\_.
14. If two cones have their heights in the ratio 1 : 3 and radii in the ratio 3 : 1, then the raio of their volumes is \_\_\_\_\_.
15. If eight times the 8<sup>th</sup> term of an A.P. is equal to 12 times the 12<sup>th</sup> term of the A.P. then its 20<sup>th</sup> term will be \_\_\_\_\_.

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

16. In figure, PT is a tangent to the circle, If  $\angle PTB = 75^\circ$  and  $\angle BTA = 45^\circ$ , find  $\angle ABT$



17. If  $\tan \theta = 2 - \sqrt{3}$ , then find  $\tan(90^\circ - \theta)$ .
18. Find the angle of elevation of the sun when the length of shadow of a vertical pole is equal to its height .
19. Is the area of the largest circle that can be drawn inside a rectangle of length 'a' cm and breadth b cm ( $a > b$ ) is  $\pi b^2 \text{ cm}^2$  ? Why?
20. 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.

**OR**

Find the sum of the deviations of the variate vlaues 3, 4, 6, 7, 8, 14 from their mean.

**SECTION - B**

21. Find the LCM of 66 & 486 by the Prime factorisation method. Hence find their HCF.
22. The sum of the 5<sup>th</sup> and the 9<sup>th</sup> terms of an AP is 30. If its 25<sup>th</sup> term is three times its 8<sup>th</sup> term, find the AP.
23. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, then find the number of blue balls in the bag.
24. Find the area of the triangle ABC with A (1, - 4) and mid-points of sides through A being (2, -1) and (0,-1).

**OR**

Prove that the points (2, - 2), (- 3, 8) and (-1, 4) are collinear.

25. Find the value of a so that the point (3, a) lies on the line represented by  $2x - 3y = 5$ .

**OR**

Solve the following pair of linear equations by substitution method:

$$3x + 2y - 7 = 0$$

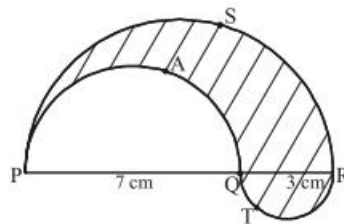
$$4x + y - 6 = 0$$

26. Two dice are thrown simultaneously. What is the probability that the sum of the numbers appearing on the dice is a prime number?

**SECTION - C**

27. Find the HCF of 81 and 237 and express it as a linear combination of 81 and 237.

28. In fig., PSR, RTQ and PAQ are three semicircles of diameters 10 cm, 3 cm and 7 cm respectively. Find the perimeter of the shaded region. [Use  $\pi = 3.14$ ]



29. 150 spherical marbles, each of diameter 1.4 cm, are dropped in a cylindrical vessel of diameter 7 cm containing some water, which are completely immersed in water. Find the rise in the level of water in the vessel.

**OR**

Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere?

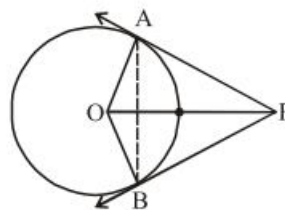
30. The three vertices of a parallelogram ABCD are A(3, -4), B(-1, -3) and C(-6, 2). Find the coordinates of vertex D and find the area of ABCD.
31. If the median for the following frequency distribution is 28.5, find the values of  $x$  and  $y$  :

| Class Interval | Frequencies |
|----------------|-------------|
| 0-10           | 5           |
| 10-20          | $x$         |
| 20-30          | 20          |
| 30-40          | 15          |
| 40-50          | $y$         |
| 50-60          | 5           |
| <b>Total</b>   | <b>60</b>   |

**OR**

The mean of marks scored by 100 students was found to be 40. Later on it was discovered that a score of 53 was misread as 83. Find the correct mean.

32. In the adjoining figure, PA and PB are tangents to a circle with centre O. If OP is equal to the diameter of the circle, prove that  $\Delta ABP$  is an equilateral triangle.



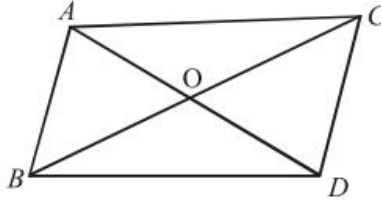
33. Solve:  $2x^2 + 3y^2 = 35$ ;  $\frac{x^2}{2} + \frac{y^2}{3} = 5$

34. 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. Prove that  $\Delta ABC \sim \Delta PQR$ .

**OR**

In the given figure,  $\Delta ABC$  and  $\Delta DBC$  are on the same base  $BC$ .  $AD$  and  $BC$  intersect at  $O$ . Prove that

$$\frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta DBC)} = \frac{AO}{DO}$$



**SECTION - D**

35. On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower.

**OR**

The angles of elevation and depression of the top and the bottom of a tower from the top of a building, 60 m high, are  $30^\circ$  and  $60^\circ$  respectively. Find the difference between the heights of the building and the tower and the distance between them.

36. If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then prove that the two triangles are similar.

**OR**

A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.

37. Prove that 
$$\frac{\tan^2 \theta}{\tan^2 \theta - 1} + \frac{\text{cosec}^2 \theta}{\sec^2 \theta - \text{cosec}^2 \theta} = \frac{1}{\sin^2 \theta - \cos^2 \theta}$$

38. Draw a circle of radius 4 cm. Take a point  $P$  outside the circle. Without using the centre of the circle, draw two tangents to the circle from point  $P$ .

39. If the equation  $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$  has coincident roots show that  $c^2 = a^2(1 + m^2)$  or  $c = \pm a\sqrt{1 + m^2}$ .

40. If four numbers in A.P. are such that their sum is 50 and the greatest number is 4 times the least, then find the numbers.

**OR**

The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of the AP.