

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. Three wheels can complete respectively 60, 36, 24 revolutions per minute. There is a red spot on each wheel that touches the ground at time zero. After how much time, all these spots will simultaneously touch the ground again?
(a) 3 second (b) 4 second (c) 5 second (d) 7 second
2. If the difference of the roots of the equation $x^2 - bx + c = 0$ be 1, then
(a) $b^2 - 4c + 1 = 0$ (b) $b^2 + 4c = 0$ (c) $b^2 - 4c - 1 = 0$ (d) $b^2 - 4c = 0$
3. Consider the following statements :
 - I. The value of $\sin A$ or $\cos A$ never exceeds 1.
 - II. The value of $\sec A$ or $\operatorname{cosec} A$ is always equal to 1.
 - III. The value of $\sin \theta + \cos \theta$ for $\theta = 0^\circ$ is 1.
 - IV. The value of $\sin \theta$ is $\left(a + \frac{1}{a}\right)$, where 'a' is a positive number.

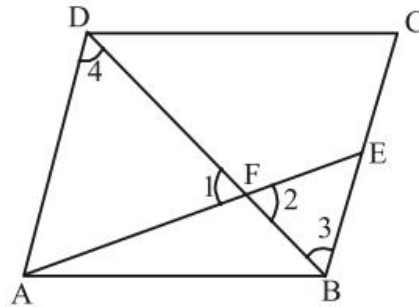
Which of the statements given above is/are correct?

- (a) 'I' and 'III' (b) 'II' and 'IV'
 - (c) Neither 'I' nor 'III' (d) Neither 'II' nor 'IV'
4. Find the mean of the following frequency distribution.

Class Interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	8	12	10	11	9

- (a) 25.3 (b) 25.2 (c) 24 (d) 25.5
5. The numbers 28, 2, 'x', 'y', 4 are in arithmetic progression. What are the respective values of 'x' and 'y'?
(a) 10, 16 (b) 20, 18 (c) 18, 16 (d) 16, 10

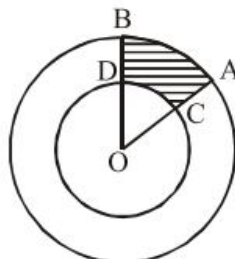
6. The diagonal BD of a parallelogram ABCD intersects the segment AE at the point F, where E is any point on the side BC. Then



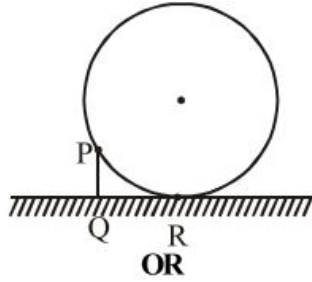
- (a) $\frac{EF}{FA} = \frac{FB}{DF}$ (b) $DF \times EF = FB \times FA$ (c) $DF \times EF = (FB)^2$ (d) None of these
7. Two vertices of a ΔABC are given by $A(6, 4)$ & $B(-2, 2)$ and its centroid is $G(3, 4)$. Find the coordinates of the third vertex C of ΔABC .
 (a) $(5, 6)$ (b) $(3, 5)$ (c) $(5, -3)$ (d) $(3, 2)$
8. A circus artist is climbing from the ground along a rope stretched from the top of vertical pole and tied at the ground. The height of the pole is 12m. and angle made by the rope with ground level is 30° . Calculate the distance covered by the artist in climbing to the top of the pole.
 (a) 20m (b) 10m (c) $15\sqrt{3}$ m (d) 24m
9. Find $\frac{1 + \cos A}{\sin A} + \frac{\sin A}{1 + \cos A}$
 (a) $2 \operatorname{cosec} A$ (b) $\operatorname{cosec}^2 A$ (c) $\sec^2 A$ (d) $\sin A$
10. How many spherical ball can be made out of a solid cube of lead whose edge is 44 cm, each ball being 4 cm. in diameter ?
 (a) 2451 (b) 2541 (c) 1254 (d) 1452

(Q. 11 – Q. 15) Fill in the blanks.

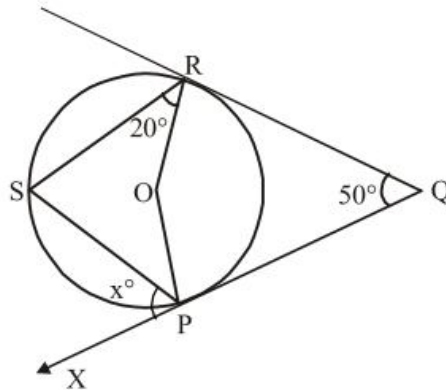
11. A right triangle has hypotenuse of length p cm and one side of length q cm. If $p - q = 1$, then the length of the third side of the triangle is _____.
12. The volume of a cylinder is $448 \pi \text{ cm}^3$ and height 7 cm, then lateral surface area is _____.
13. The figure shows two concentric circles with centre O and radii 3.5 m and 7 m. If $\angle BOA = 40^\circ$, the area of the shaded region = _____.



14. A weather forecast centre predicts that it will rain for 3 days in a duration of 20 days. The probability of rain on a particular day = _____.
15. A ball is in the rest position against a step PQ . If $PQ = 10$ cm and $QR = 15$ cm, then the diameter of the ball is _____.



In the diagram, PQ and QR are tangents to the circle centre O, at P and R respectively. Find the value of x.



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

- 16. The height of a tower is h and the angle of elevation of the top of the tower is α . On moving a distance $h/2$ towards the tower, the angle of elevation becomes β . What is the value of $\cot\alpha - \cot\beta$?
- 17. If the areas of two similar triangles are in the ratio $49 : 16$, then what is the ratio of their corresponding medians?
- 18. Solve: $\sec^2 \theta + \tan^2 \theta = \frac{5}{3}; \theta < 90^\circ$
- 19. The area swept by the minute hand of a clock in 5 minutes is $\frac{154}{3} \text{ cm}^2$. Find the length of minute hand.
- 20. Find the missing frequency if the mean of following distribution is 1.46.

x :	0	1	2	3	4	5
f :	46	?	38	25	10	5

OR

Is it correct to say that an ogive is graphical representation of a frequency distribution ? Give reason.

SECTION - B

- 21. Show that $5 - \sqrt{3}$ is irrational.
- 22. Cards marked with numbers 13, 14, 15,, 60 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on drawn card is
 - (i) divisible by 5
 - (ii) a number which is a perfect square.
- 23. If p, q, r are in A.P. then find the value of $p^3 + r^3 - 8q^3$.

OR

Find the number of terms of the AP 18, $15\frac{1}{2}$, 13,, $-49\frac{1}{2}$ and find the sum of all its terms.

24. For all real values of c , the pair of equations

$$\begin{aligned} x - 2y &= 8 \\ 5x - 10y &= c \end{aligned}$$

have a unique solution. Justify whether it is true or false.

25. If the coordinates of points A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the coordinates of P such that $AP = \frac{3}{7} AB$, where P lies on the line segment AB.

OR

Prove that the points $(7, 10)$, $(-2, 5)$ and $(3, -4)$ are the vertices of an isosceles right triangle.

26. A piggy bank contains hundred 50p coins, fifty ₹ 1 coins, twenty ₹ 2 coins and ten ₹ 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin (i) will be a 50 p coin ? (ii) will not be a ₹ 5 coin?

SECTION - C

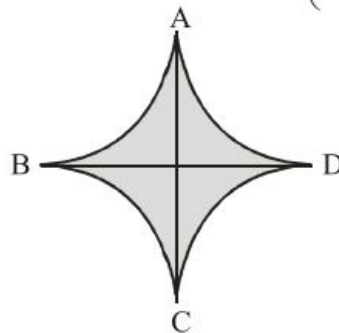
27. Show that any positive odd integer is of the form $6q + 1$ or $6q + 5$, where q is some integer.
 28. What must be subtracted from $x^3 - 6x^2 - 15x + 80$, so that the result is exactly divisible by $x^2 + x - 12$.
 29. If $a \cos \theta + b \sin \theta = m$ and $a \sin \theta - b \cos \theta = n$, prove that $a^2 + b^2 = m^2 + n^2$

OR

If $x = r \sin A \cos C$, $y = r \sin A \sin C$, $z = r \cos A$, Prove that : $r^2 = x^2 + y^2 + z^2$

30. Calculate the area of the shaded portion.

The quadrants shown in the figure are each of radius 7 cm. (Take $\pi = \frac{22}{7}$)



31. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of the base of each cone and cylinder is 8 cm. The cylindrical part is 240 cm high and the conical part is 36 cm high. Find the weight of the Pillar if one cubic cm. of iron weights 7.8 gms.

OR

A cylinder whose height is two-third of its diameter has the same volume as a sphere of radius 4 cm. Calculate the radius of the base of the cylinder.

32. The numerator of a fraction is 4 less than the denominator. If the numerator is decreased by 2 and the denominator is increased by 1, then the denominator is eight times the numerator. The fraction is $\frac{a}{b}$. Find $\frac{a+b}{2}$.
 33. Find the values of k so that the area of the triangle with vertices $(1, -1)$, $(-4, 2k)$ and $(-k, -5)$ is 24 sq. units.

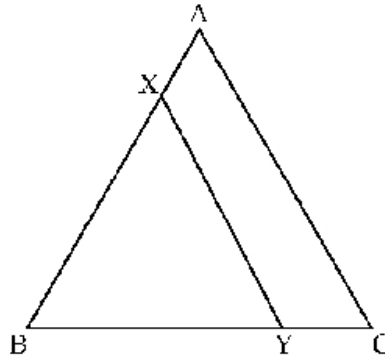
OR

If the point $P(x, y)$ is equidistant from the points A $(a + b, b - a)$ and B $(a - b, a + b)$. Prove that $bx = ay$.

34. If from an external point P of a circle with centre O, two tangents PQ and PR are drawn such that $\angle QPR = 120^\circ$, prove that $2PQ = PO$.

SECTION - D

35. The ratio of the sums of first m and first n terms of an A.P. is $m^2 : n^2$. Show that the ratio of its m^{th} and n^{th} terms is $(2m - 1) : (2n - 1)$.
36. In the given figure, the line segment XY is parallel to side AC of ΔABC and it divides the triangle into two parts of equal area. Prove that $AX : AB = (2 - \sqrt{2}) : 2$.



OR

If the corresponding sides of two triangles are proportional (i.e., in the same ratio), then prove that their corresponding angles are equal and hence the two triangles are similar.

37. At a point A, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30° . The angle of depression of the reflection of the cloud in the lake, at A is 60° . Find the distance of the cloud from A.

OR

A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45° . The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30° . Find the speed of flying of the bird. (Take $\sqrt{3} = 1.732$)

38. Solve the quadratic equation $(x^2 - 5x)^2 - 7(x^2 - 5x) + 6 = 0$.
39. Construct a triangle with sides 5 cm, 5.5 cm and 6.5 cm. Now construct another triangle, whose sides are $\frac{3}{5}$ times the corresponding sides of the given triangle.
40. Following table gives the ages in years of militants operating in a certain area of a country:

Age (in years)	40-43	43-46	46-49	49-52	52-54
Number of militants	31	58	60	K	27

If mean of the above distribution is 47.2, find how many militants in the age groups 49-52 are active in the area?

OR

The following tables gives production yield per hectare wheat of 100 farms of a village.

Production yield (in kg / he)	Number of farms
50 – 55	2
55 – 60	8
60 – 65	12
65 – 70	24
70 – 75	38
75 – 80	16

Change the distribution to a more than type distribution and draw its ogive :