Sample Question Paper

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Section 'A'

Question numbers 1 to 10 carry 1 mark each. For each of these questions four alternative choices have been provided of which only one is correct. Select the correct choice.

1. $n^2 - 1$ is divisible by 8, if n is :

    (a) an integer. (b) a natural number. (c) an odd integer. (d) an even integer.

2. If two positive integers a and b are written as $a = x^3 y^2$ and $b = xy^3$; x, y are prime numbers, then HCF (a, b) is :

    (a) xy. (b) xy^2. (c) $x^3 y^3$. (d) $x^2 y^2$

3. If the zeroes of the quadratic polynomial $ax^2 + bx + c, a \neq 0$ are equal, then :

    (a) c and a have opposite signs (b) c and b have opposite signs

    (c) c and a have the same sign (d) c and b have the same sign

4. Which of the following equations has the sum of its roots as 3?

    (a) $2x^2 - 3x + 6 = 0$ (b) $-x^2 + 3x - 3 = 0$ (c) $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$ (d) $3x^2 - 3x + 3 = 0$

OR

For what value of k, the roots of equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots.

    (a) 2 (b) 3 (c) 1 (d) –2

5. The point which divides the line segment joining the points $(7, -6)$ and $(3, 4)$ in ratio 1:2 internally lies in the :

    (a) I quadrant (b) II quadrant (c) III quadrant (d) IV quadrant

OR

The perimeter of a triangle with vertices $(0, 4)$, $(0, 0)$ and $(3, 0)$ is :

    (a) 5 (b) 12 (c) 11 (d) $7 + \sqrt{5}$

6. If in two triangles DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true?

    (a) $\dfrac{EF}{PR} = \dfrac{DF}{PQ}$ (b) $\dfrac{DE}{PQ} = \dfrac{FE}{RP}$ (c) $\dfrac{DE}{QR} = \dfrac{DF}{PQ}$ (d) $\dfrac{EF}{RP} = \dfrac{DE}{QR}$

7. Two circles touch each other externally at P. AB is a common tangent to the circles touching them at A and B. The value of $\angle APB$ is :

    (a) 30° (b) 45° (c) 60° (d) 90°

8. Area of a sector of angle p (in degrees) of a circle with radius R is :

    (a) $\dfrac{p}{180} \times 2\pi R$ (b) $\dfrac{EF}{RP} = \dfrac{DE}{QR}$ (c) $\dfrac{p}{360} \times 2\pi R$ (d) $\dfrac{p}{720} \times 2\pi R^2$

9. A surahi is the combination of :
   (a) a sphere and a cylinder
   (b) a hemisphere and a cylinder
   (c) two hemispheres
   (d) a cylinder and a cone

10. The probability expressed as a percentage of a particular occurrence can never be :
    (a) less than 100
    (b) less than 0
    (c) greater than 1
    (d) anything but a whole number

OR

If a card is selected from a deck of 52 cards, then the probability of its being a red ace card is :

(a) $\dfrac{3}{26}$ (b) $\dfrac{3}{13}$ (c) $\dfrac{2}{13}$ (d) $\dfrac{1}{2}$

Question numbers 11 to 20 carry 1 mark each.

11. Find *HCF* of the numbers given below :

    $k, 2k, 3k, 4k$ and $5k$, where k is a positive integer.

12. Write the smallest number which is divisible by both 306 and 657.

13. Two lines are given to be parallel. The equation of one of the lines is $4x + 3y = 14$, then find the equation of a second line.

14. Find the common difference of Arithmetic Progression (A.P.)

OR

Find how many integers between 200 and 500 are divisible by 8.

15. Find the co-ordinates of a point A, where AB is diameter of a circle whose centre is (2, –3) and B is the point (1, 4).

OR

Find the perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0).

16. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle (in cm) which touches the smaller circle.

17. Find A, if $\tan 2A = \cot (A - 24°)$.

OR

[AI] In a triangle ABC, write $\cos \left(\dfrac{B+C}{2} \right)$ in terms of angle A.

18. A cylinder, a cone and a hemisphere have same base and same height. Find the ratio of their volumes.

19. A steel wire when bent in the form of a square encloses an area of 121 cm^2. If the same wire is bent in the form of a circle, then find the circumference of the circle.

20. Following distribution gives cumulative frequencies of 'more than type' :

Marks obtained	More than or equal to 5	More than or equal to 10	More than or equal to 15	More than or equal to 20
Number of students (cumulative frequency)	30	23	8	2

Change the above data to a continuous grouped frequency distribution.

Section 'B'

Question numbers 21 to 26 carry 2 marks each.

21. Show that every positive odd integer is of the form $(4q + 1)$ or $(4q + 3)$, where q is some integer.

22. In the given figure, $OA \times OB = OC \times OD$, show that $\angle A = \angle C$ and $\angle B = \angle D$.
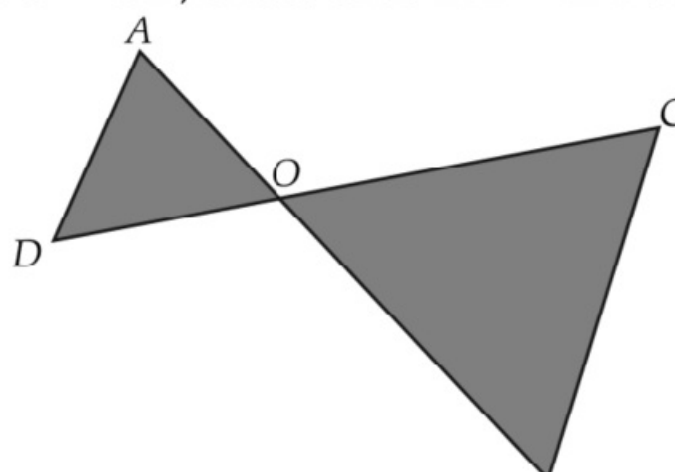
23. Evaluate : $\dfrac{\sin 90°}{\cos 45°} + \dfrac{1}{\operatorname{cosec} 30°}$

OR

Express the trigonometric ratio of sec A and tan A in terms of sin A.

24. From the top of a 7 m high building the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45° Find the height of the tower.

25. In the given figure, ABCD is a rectangle of dimensions 21 cm × 14 cm. A semi-circle is drawn with BC as diameter. Find the area of the shaded region in the figure.
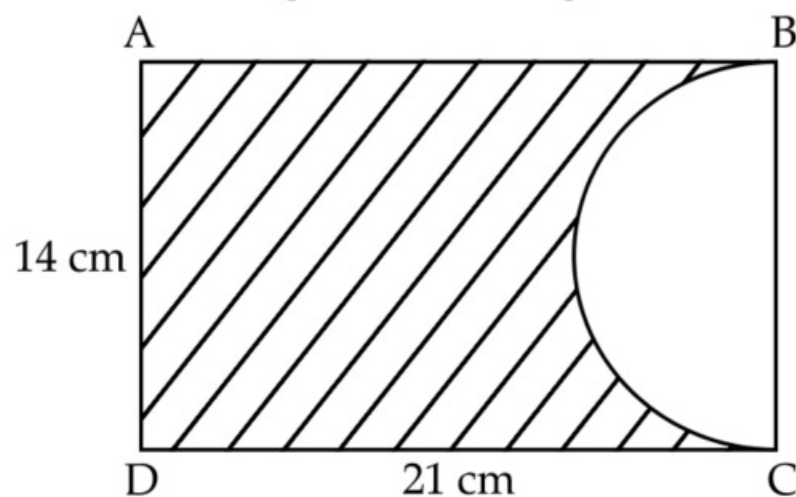
26. Find the value of λ, if the mode of the following data is 20 :

15, 20, 25, 18, 13, 15, 25, 15, 18, 17, 20, 25, 20, λ, 18.

OR

The mean and median of 100 observations are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110 not 100. Find the true mean and median.

Section 'C'

Question numbers 27 to 34 carry 3 marks each.

AI **27.** Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeros equal to half of their product.

OR

Find the zeroes of the quadratic polynomial $7y^2 - \dfrac{11}{3}y - \dfrac{2}{3}$ and verify the relationship between the zeroes and the coefficients.

28. Represent the following pair of linear equations graphically and hence comment on the condition of consistency of this pair.

$$x - 5y = 6,\ 2x - 10y = 12.$$

OR

A fraction becomes $\dfrac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\dfrac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction.

29. If $ad \neq bc$, then prove that the equation.

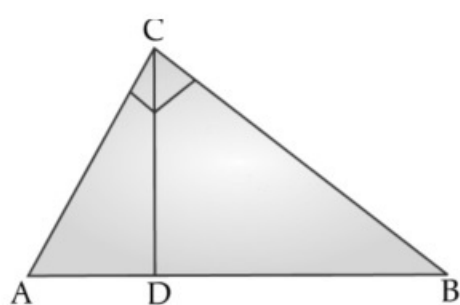$(a^2 + b^2)x^2 + 2(ac + bd)x + (c^2 + d^2) = 0$ has no real roots.

30. Find the sum of n terms of the series

$$\left(4 - \frac{1}{n}\right) + \left(4 - \frac{2}{n}\right) + \left(4 - \frac{3}{n}\right) + \ldots\ldots$$

31. Diagonals of a trapezium PQRS intersect each other at the point O, PQ ∥ RS and PQ = 3RS. Find the ratio of the areas of triangles POQ and ROS.

OR

In Figure, $\angle ACB = 90°$ and $CD \perp AB$, prove that $CD^2 = BD \times AD$.

32. Prove that the lengths of two tangents drawn from an external point to a circle are equal.

33. Prove that : $\dfrac{\cos A}{1-\tan A} + \dfrac{\sin A}{1-\cot A} = \sin A + \cos A$.

34. Two different dice are thrown together. Find the probability number obtained have :

    (i) even sum and

    (ii) even product.

Section 'D'

Question numbers 35 to 40 carry 4 marks each.

35. In a class test, the sum of Arun's marks in Hindi and English is 30. He had got 2 marks more in Hindi and 3 marks less in English, the product of the marks would have been 210. Find his marks in the two subjects.

36. The area of a triangle is 5 sq. units. Two of its vertices are (2, 1) and (3, –2). If the third vertex is $\left(\dfrac{7}{2}, y\right)$, find the value of y.

<div align="center">OR</div>

The co-ordinates of the points A, B and C are (6, 3), (–3, 5) and (4, – 2) respectively. $P(x, y)$ is any point in the plane. Show that $\dfrac{\text{ar }(\Delta PBC)}{\text{ar }(\Delta ABC)} = \left|\dfrac{x+y-2}{7}\right|$

37. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm, and taking B as centre draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

38. A man in a boat rowing away from a light house 100 m high takes 2 minutes to change the angle of elevation of the top of the light house from 60° to 30°. Find the speed of the boat in metres per minute. [Use $\sqrt{3} = 1.732$]

<div align="center">OR</div>

Amit, standing on a horizontal plane, find a bird flying at a distance of 200 m from him at an elevation of 30°. Deepak standing on the roof of a 50 m high building, find the angle of elevation of the same bird to be 45°. Amit and Deepak are on opposite sides of the bird. Find the distance of the bird from Deepak.

AI 39. The height of a cone is 30 cm. From its topside a small cone is cut by a plane parallel to its base. If volume of smaller cone is $\dfrac{1}{27}$ of the cone then at what height it is cut from the base ?

<div align="center">OR</div>

A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (Use π = 3.14)

40. Find the mode of the following frequency distribution :

Class-Interval	f
25 – 35	7
35 – 45	31
45 – 55	33
55 – 65	17
65 – 75	11
75 – 85	1