5 | PRACTICE PAPER

[Maximum Marks: 80]

General Instructions: As given in Practice Paper 1.

Part – A

SECTION – I

1. The area of a rectangular plot is 528 m². The length of the plot is one metre more than twice the breadth. Formulate the quadratic equation to determine the length and breadth of the plot.

   (a) $2b^2 + b - 528 = 0$ (b) $2b^2 - b - 528 = 0$

   (c) $2b^2 + b + 528 = 0$ (d) $-2b^2 + b + 52 = 0$

2. On simplification : $\dfrac{\sin^4\theta - \cos^4\theta}{\sin^2\theta - \cos^2\theta} =$

   (a) 2   (b) –1   (c) 1   (d) 0

   OR

   On evaluating
   $\sin 30° \cdot \cos 45° + \cos 30° \cdot \sin 45° =$

   (a) $\dfrac{\sqrt{3}+1}{4}$ (b) $\dfrac{\sqrt{2}(\sqrt{3}+1)}{4}$

   (c) $\dfrac{\sqrt{2}(\sqrt{3}-1)}{4}$ (d) 0

3. Volume of two cubes are in the ratio 1 : 64, ratio of their surface area is

   (a) 1 : 2   (b) 1 : 4   (c) 16 : 1   (d) 1 : 16

4. If $\sin A = \dfrac{12}{13}$, then $\cos A =$

   (a) $\dfrac{5}{13}$ (b) $\dfrac{13}{5}$ (c) $\dfrac{12}{13}$ (d) $\dfrac{5}{12}$

5. Mallesh has some cows and some hens in his shed. The total number of legs is 92 and the total number of heads is 29. The number of cows in his shed are

   (a) 20   (b) 15   (c) 17   (d) 12

6. The coordinates of the point which divides the line joining the points A(1, 2) and B(–1, 1) internally in the ratio 1 : 2 is

   (a) (1, 3)   (b) (3, 1)   (c) (1, 1)   (d) $\left(\dfrac{1}{3}, 1\right)$

7. On simplification:
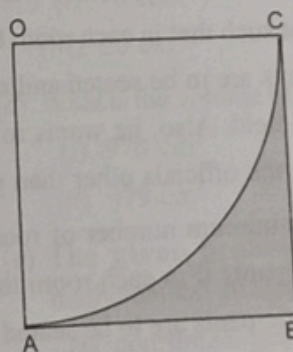
   $(\csc A - \sin A)(\sec A - \cos A)(\tan A + \cot A) =$

   (a) –1   (b) 1   (c) 0   (d) 12

8. Two cubes each with 6 cm edge are joined end to end. The surface area of the resulting cuboid is

   (a) 100 cm²   (b) 160 cm²   (c) 360 cm²   (d) 460 cm²

9. In the below figure, OABC is a square of side 7 cm. OAC is a quadrant of a circle with O as centre. The area of the shaded region is

   OR

   A sector is cut from a circular sheet of radius 100 cm, the angle of the sector being 240°. If another circle of the area same as the sector is formed, then radius of the new circle is

10. Find the probability of throwing a number greater than 2 with a fair die.

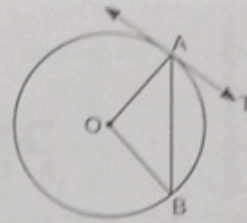11. For what value of k, the terms k, $k + 4$, $3k$ are in AP.

    OR

    How many terms of AP, 18, 16, 14, ... should be taken, so that their sum is zero?

12. The centre of a circle is C(2, – 3) and one end of the diameter is A(3, 5). Find the coordinates of the other end B.

OR

Find the points on the x-axis which are at a distance of $\sqrt{13}$ units from point $(-2, 3)$.

13. If one zero of the polynomial

$f(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of the other, then find k.

14. Find the coordinates of a point A, where AB is diameter of a circle whose centre is $(2, -3)$ and B is the point $(1, 4)$.

15. In figure, O is the centre of a circle, AB is a chord and AT is the tangent at A. If $\angle AOB = 100°$, then find $\angle BAT$.

16. If the less than cumulative frequency of a class is 50 and that of the previous class is 30, then find the frequency of that class.

OR

Mode and mean of a data are $12k$ and $15k$. Find median of the data.

SECTION – II

17. **Case Study – 1**

    SEMINAR

    The department of advance studies in mathematics is organising a seminar. It invited 162 participants from mathematics, 126 participants from science and technology and 90 participants from medical science. Mr. Sharma the coordinator, wants to make the arrangement such that in each room the same number of participants are to be seated and all of them being in the same field. Also, he wants to allot a separate room for all the officials other than participants.

    (a) The minimum number of rooms required for participants if in each room the same number of participants are to be seated and all of them being in the same field

       (i) 36   (ii) 18

       (iii) 21   (iv) 24

    (b) The maximum number of participants to be seated in one room as per given condition is

       (i) 20   (ii) 16

       (iii) 18   (iv) 9

    (c) Total number of rooms required for all the participants and official are

       (i) 21   (ii) 20

       (iii) 23   (iv) 22

    (d) Which of the following statement is always true has any two given number?

       (i) Their HCF may not be a factor of their LCM.

       (ii) Their HCF is always more than their LCM.

       (iii) Their HCF is a factor of their LCM.

       (iv) Their HCF is always a multiple of their product.

    (e) If two positive integers x and y can be expressed as $x = ab^2$ and $y = a^3b$; where a, b being prime numbers, then LCM (x, y) is equal to
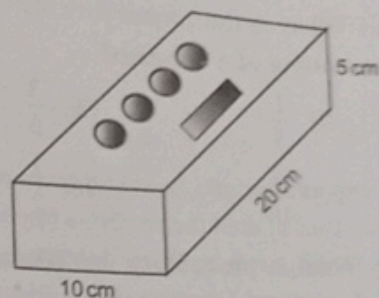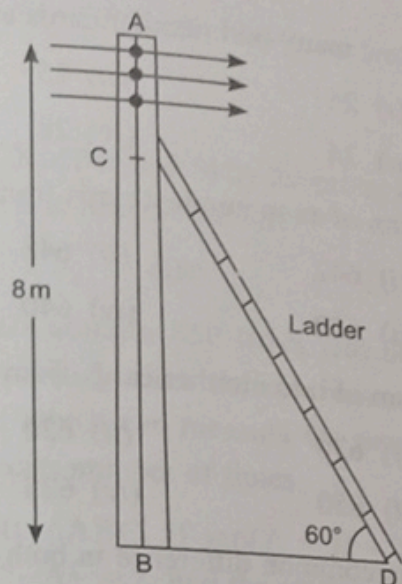
       (i) ab (ii) a^2b^2

       (iii) a^3b^2 (iv) a^2b^3

18. **Case Study – 2**

    ELECTRONIC FAULT

    Due to storm in a area there was an electric fault in a locality.

    The electricians from electricity department sealed the area to repair the fault. He observed that fault was on a pole of height 8 m. He used a ladder inclined at an angle of 60° to the horizontal. Top of the ladder reached a point 1 m below the top of the electric pole.

(a) Length of ladder is

(i) 14 m

(ii) $14\sqrt{3}$ m

(iii) $\dfrac{14\sqrt{3}}{3}$ m

(iv) $\dfrac{7\sqrt{3}}{3}$ m

(b) Distance of foot of ladder from the foot of pole is

(i) 7 m

(ii) $7\sqrt{3}$ m

(iii) $\dfrac{7\sqrt{3}}{3}$ m

(iv) $\dfrac{7}{3}$ m

(c) If length of the ladder is 14 m and BC = 7 m then ∠BDC

(i) 45°

(ii) 50°

(iii) 60°

(iv) 30°

(d) AC =

(i) 2 m

(ii) 1 m

(iii) 1.5 m

(iv) 3 m

(e) If ∠BDC = 30° then $\dfrac{BD}{DC}$ =

(i) 1

(ii) $\sqrt{3}$

(iii) $\dfrac{1}{2}$

(iv) $\dfrac{\sqrt{3}}{2}$

19. Case Study – 3

PEN STAND

A carpenter made a wooden pen stand which is in the shape of a cuboid with four conical depressions to hold pens and a cubical depression to hold staplers.

The dimensions of the cuboid are 20 cm by 10 cm by 5 cm. The radius of each of the depression is 1 cm and depth is 2.1 cm. Dimensions of cubical depression are 5 cm by 2 cm by 2 cm.

(a) How much wood is required to make the cuboid before making the depression?

(i) 100 cm³

(ii) 900 cm³

(iii) 1000 cm²

(iv) 800 cm³

(b) What is volume of one conical depression?

$$\left(\text{Take } \pi = \frac{22}{7}\right)$$

(i) 4.4 cm³

(ii) 2.2 cm³

(iii) $\dfrac{4.4}{3}$ cm³

(iv) 6.6 cm³

(c) What is the volume of cubical depression?

(i) 10 cm³

(ii) 15 cm³

(iii) 20 cm³

(iv) 25 cm³

(d) What is the volume of wood in the entire stand?

(i) 970 cm³

(ii) 975 cm³

(iii) 979 cm³

(iv) 971.2 cm³

(e) The given problems is based on which mathematical concept.

(i) coordinate geometry

(ii) similar triangles

(iii) areas related to circles

(iv) surface areas and volumes

20. Case Study – 4

MCQ TEST

Akshat appears for a multiple choice questions test with four choices one of which is right. He either guesses or copies or knows the answer to a question. Total number of questions in the test is 50.

He knows the answer to 50% of the questions, he guesses the answer of 15 questions and copies the answer of remaining questions.

(a) What is the probability that he knows the answer of a question?

(i) $\dfrac{1}{3}$ (ii) $\dfrac{3}{5}$

(iii) $\dfrac{3}{10}$ (iv) $\dfrac{1}{2}$

(b) What is probability that Akshat guesses the answer of a question?

(i) $\dfrac{1}{2}$ (ii) $\dfrac{1}{4}$

(iii) $\dfrac{3}{10}$ (iv) $\dfrac{3}{5}$

(c) What is the probability that Akshat copies the answer of a question?

(i) $\dfrac{1}{4}$ (ii) $\dfrac{1}{3}$

(iii) $\dfrac{1}{5}$ (iv) $\dfrac{2}{3}$

(d) What is the probability that Akshat does not copy the answer of a question?

(i) $\dfrac{1}{5}$ (ii) $\dfrac{3}{5}$

(iii) $\dfrac{2}{5}$ (iv) $\dfrac{4}{5}$

(e) If Akshat guesses the answer of a question, what is the probability that his answer is correct?

(i) $\dfrac{1}{4}$ (ii) $\dfrac{2}{3}$

(iii) $\dfrac{1}{5}$ (iv) $\dfrac{1}{2}$

21. Case Study – 5

NUMBER CARDS

Number cards from 0 to 50 are placed in a bag. Samita distinguished even cards and odd number cards. She kept the even number cards with herself and gives odd number cards to her younger brother Parneet. They both arranged the cards in the form of sequence.

0, 2, 4, 6 50

1, 3, 5, 7 49

(a) How many even number cards are there?

(i) 25 (ii) 26

(iii) 24 (iv) 20

(b) How many odd number cards are there?

(i) 26 (ii) 25

(iii) 24 (iv) 28

(c) Sum of even number cards from 0 to 50 are

(i) 642 (ii) 648

(iii) 650 (iv) 640

(d) Sum of odd number cards from 0 to 50 are

(i) 630 (ii) 620

(iii) 650 (iv) 625

(e) The common difference in both the cases is

(i) equal (ii) unequal

(iii) 0 (iv) 1

22. Case Study – 6

MY MOTOR BOAT

John has his own motor boat. The speed of John's motor boat is 15 km/h in still water.

He goes 40 km downstream and comes back in 6 hours. The speed of stream is considered to be x km/h

(a) Total speed during downstream is

(i) 15 km/h (ii) $(15 + x)$ km/h

(iii) $(15 - x)$ km/h (iv) $15x$ km/h

(b) Total speed during upstream is

(i) 15 km/h (ii) $(15 + x)$ km/h

(iii) $(15 - x)$ km/h (iv) $15x$ km/h

(c) Time taken during downstream is

(i) $\dfrac{40}{15 + x}$ hours (ii) $\dfrac{40}{15 - x}$ hours

(iii) 6 hours (iv) None of these

(d) Time taken during upstream is

(i) $\dfrac{40}{15 + x}$ hours (ii) $\dfrac{40}{15 - x}$ hours

(iii) 6 hours (iv) 90 hours

(e) Quadratic equation representing above situation is

(i) $x^2 - 25 = 0$ (ii) $x^2 + 25 = 0$

(iii) $25x^2$ (iv) $x^2 + 15 = 0$

| Part – B |

SECTION – III

23. Find the HCF of 336 and 54 by the prime factorisation method. Hence, find their LCM.

OR

Two tankers contain 850 litres and 680 litres of petrol respectively. Find the maximum capacity of a container which can measure the petrol of either tanker in exact number of times.

24. In an acute $\triangle ABC$, if $\tan(A + B - C) = 1$ and $\sec(B + C - A) = 2$, find the angles A, B and C.

OR

Determine the value of x, such that

$$2 \csc^2 30° + x \sin^2 60° - \frac{3}{4} \tan^2 30° = 10$$

25. Which term of the AP. 5, 13, 21, …. is 181?

26. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.

27. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \times CD$.

28. A bag contains 3 red, 5 black and 7 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is

    (i) white (ii) red or white

29. Show that the points A(3, –1) , B (5, –1) and C(3, – 3) are the vertices of a right-angled triangle.

30. Find the roots of the equation

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, x \neq - 4, 7$$

31. From each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in the given figure, Find the area of the remaining portion of the square.
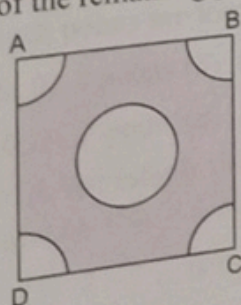
OR

A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in his field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?

32. Prove that: $\dfrac{\tan A}{1 - \cot A} + \dfrac{\cot A}{1 - \tan A} = \sec A \csc A + 1$

33. The sum of digits of a two-digit number is 11. The number obtained by interchanging the digits of the given number exceeds that number by 63. Find the number.

OR

2 chairs and 3 tables cost ₹ 1025 and 3 chairs and 2 tables cost ₹ 1100. What is the difference between cost of one table and one chair?

34. The data below gives the earnings of 350 workers in a cotton mill. Find the average monthly earning of the group:

Monthly earnings (in ₹)	Number of workers
160 – 180	40
180 – 200	54
200 – 220	60
220 – 240	72
240 – 260	45
260 – 280	32
280 – 300	28
300 – 320	15
320 – 340	4

35. In $\triangle ABC$, X is any point on AC. If Y, Z , U and V are the middle points of AX, XC, AB and BC respectively, then prove that UY ‖ VZ and UV ‖ YZ.
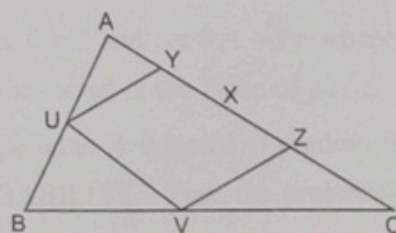
36. In the figure, PQR and QST are two right triangles, right-angled at R and T respectively. Prove that QR × QS = QP × QT.
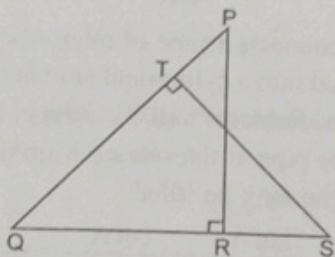
OR

In given figure, two equal circles, with centres O and O', touch each other at X. OO' produced meets the circle with centre O' at A. AC is tangent to the circle with centre O, at the point C. O'D is perpendicular to AC. Find the value of $\dfrac{DO'}{CO}$.

ANSWERS