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Roll No.

- Please check that this question paper contains **11** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **30** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

MATHEMATICS

Time allowed : 3 hours   *Maximum Marks : 80*

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General Instructions :

(i)   *All* questions are compulsory.

(ii)   *The question paper consists of **30** questions divided into four sections —
          A, B, C and D.*

(iii)   *Section A contains **6** questions of **1** mark each. Section B contains
          6 questions of **2** marks each, Section C contains **10** questions of **3** marks each
          and Section D contains **8** questions of **4** marks each.*

(iv)   *There is no overall choice. However, an internal choice has been provided in
          two questions of **1** mark each, **two** questions of **2** marks each, **four** questions of
          3 marks each and **three** questions of **4** marks each. You have to attempt only
          one of the alternatives in all such questions.*

(v)   *Use of calculators is **not** permitted.*

SECTION A

Question numbers 1 to 6 carry 1 mark each.

1.   If HCF (336, 54) = 6, find LCM (336, 54).

2.   Find the nature of roots of the quadratic equation $2x^2 - 4x + 3 = 0$.

3.   Find the common difference of the Arithmetic Progression (A.P.)
      $$\frac{1}{a}, \ \frac{3-a}{3a}, \ \frac{3-2a}{3a}, \ \dots \quad (a \neq 0)$$

4.   Evaluate :

$$\sin^2 60° + 2 \tan 45° - \cos^2 30°$$

OR

If $\sin A = \dfrac{3}{4}$, calculate sec A.

5.   Write the coordinates of a point P on x-axis which is equidistant from the points A(– 2, 0) and B(6, 0).

6.   In Figure 1, ABC is an isosceles triangle right angled at C with AC = 4 cm. Find the length of AB.
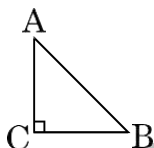

Figure 1

OR

In Figure 2, DE ∥ BC. Find the length of side AD, given that AE = 1·8 cm, BD = 7·2 cm and CE = 5·4 cm.
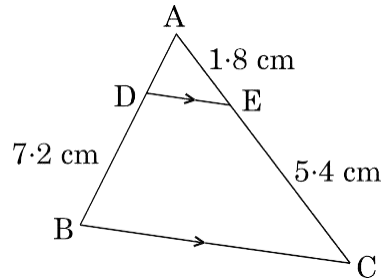

Figure 2

SECTION B

Question numbers 7 to 12 carry 2 marks each.

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

8. Find a relation between x and y if the points A(x, y), B(– 4, 6) and C(– 2, 3) are collinear.

    OR

    Find the area of a triangle whose vertices are given as (1, – 1) (– 4, 6) and (– 3, – 5).

9. The probability of selecting a blue marble at random from a jar that contains only blue, black and green marbles is $\frac{1}{5}$. The probability of selecting a black marble at random from the same jar is $\frac{1}{4}$. If the jar contains 11 green marbles, find the total number of marbles in the jar.

10. Find the value(s) of k so that the pair of equations x + 2y = 5 and3x + ky + 15 = 0 has a unique solution.

11. The larger of two supplementary angles exceeds the smaller by 18°. Find the angles.

OR

Sumit is 3 times as old as his son. Five years later, he shall be two and a half times as old as his son. How old is Sumit at present ?

12. Find the mode of the following frequency distribution :

Class Interval :	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55
Frequency :	25	34	50	42	38	14

SECTION C

Question numbers 13 to 22 carry 3 marks each.

13. Prove that $2 + 5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

OR

Using Euclid's Algorithm, find the HCF of 2048 and 960.

14. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that AP × PC = BP × DP.

OR

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.

15. In Figure 3, PQ and RS are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting PQ at A and RS at B. Prove that ∠ AOB = 90°.

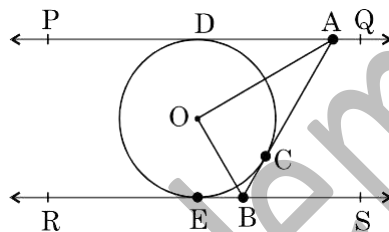*Figure 3*

16. Find the ratio in which the line x – 3y = 0 divides the line segment joining the points (– 2, – 5) and (6, 3). Find the coordinates of the point of intersection.

17. Evaluate :

$$\left(\frac{3 \sin 43°}{\cos 47°} \right)^2 - \frac{\cos 37° \cosec 53°}{\tan 5° \tan 25° \tan 45° \tan 65° \tan 85°}$$

18. In Figure 4, a square OABC is inscribed in a quadrant OPBQ. If OA = 15 cm, find the area of the shaded region. (Use π = 3·14)
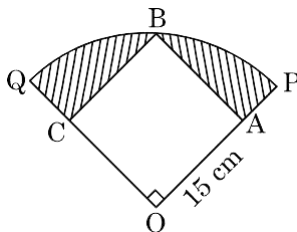

Figure 4

OR

In Figure 5, ABCD is a square with side $2\sqrt{2}$ cm and inscribed in a circle. Find the area of the shaded region. (Use π = 3·14)
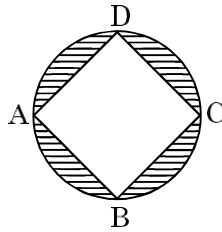

Figure 5

19.   A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 20 cm and the diameter of the cylinder is 7 cm. Find the total volume of the solid. (Use $\pi = \dfrac{22}{7}$)

20.   The marks obtained by 100 students in an examination are given below :

Marks :	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65
Number of Students :	14	16	28	23	18	8	3

Find the mean marks of the students.

21. For what value of k, is the polynomial $f(x) =$

$3x^4 - 9x^3 + x^2 + 15x + k$

completely divisible by $3x^2 - 5$?

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.

22. Write all the values of p for which the quadratic equation $x^2 + px + 16 = 0$ has equal roots. Find the roots of the equation so obtained.

SECTION D

Question numbers 23 to 30 carry 4 marks each.

23. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

24. Amit, standing on a horizontal plane, finds 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, finds 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.

25. 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 gm mass. (Use π = 3·14)

26. Construct an equilateral Δ ABC with each side 5 cm. Then construct another triangle whose sides are $\dfrac{2}{3}$ times the corresponding sides of Δ ABC.

OR

Draw two concentric circles of radii 2 cm and 5 cm. Take a point P on the outer circle and construct a pair of tangents PA and PB to the smaller circle. Measure PA.

27. Change the following data into 'less than type' distribution and draw its ogive :

Class Interval :	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Frequency :	7	5	8	10	6	6	8

28. Prove that :

$$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\,\mathrm{cosec}\,\theta$$

OR

Prove that :

$$\frac{\sin\theta}{\cot\theta+\mathrm{cosec}\,\theta} = 2 + \frac{\sin\theta}{\cot\theta-\mathrm{cosec}\,\theta}$$

29. **.**Which term of the Arithmetic Progression –7, –12, –17, –22, … will be –82 ? Is –100 any term of the A.P. ? Give reason for your answer.

OR

How many terms of the Arithmetic Progression 45, 39, 33, … must be taken so that their sum is 180 ? Explain the double answer.

30. In a class test, the sum of Arun's marks in Hindi and English is 30. Hadhe 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.