

2017
MATHEMATICS

Total marks : 80

Time : 3 hours

General Instructions:

- i) Approximately 15 minutes is allotted to read the question paper and revise the answers.
- ii) The question paper consists of 22 questions.
- iii) All questions are compulsory.
- iv) Internal choice has been provided in some questions.
- v) Marks allocated to every question are indicated against it.

N.B: Check that all pages of the question paper is complete as indicated on the top left side.

SECTION - A**1. Choose the correct answer from the given alternatives.**

- (a) If α and β are the zeros of $3x^2 + 2x - 5$ then the value of $\alpha\beta$ is **1**
- (i) $\frac{2}{3}$ (ii) $-\frac{2}{3}$ (iii) $\frac{5}{3}$ (iv) $-\frac{5}{3}$
- (b) The pair of equations $x = l$ and $y = m$ represent lines which are **1**
- (i) parallel (ii) coincident
- (iii) intersecting at (l, m) (iv) parallel to x -axis
- (c) The nature of the roots of the equation $4x^2 + 4\sqrt{3}x + 3 = 0$ are **1**
- (i) real and equal (ii) real and distinct
- (iii) not real and equal (iv) not real and distinct
- (d) Which term of the A.P. 72, 63, 54, ... is 0? **1**
- (i) 8th (ii) 9th (iii) 10th (iv) 11th
- (e) In the right ΔABC right angled at B, the value of $\cos(A + C)$ is **1**
- (i) 1 (ii) $\frac{1}{2}$ (iii) $\frac{1}{\sqrt{2}}$ (iv) 0
- (f) The midpoint of the join of $(a + b, 2b - a)$ and $(b - a, 3a)$ is **1**
- (i) $(a + b, b)$ (ii) $(b, a + b)$ (iii) $(a, a + b)$ (iv) (a, b)
- (g) The angle between the tangent and the radius at the point of contact is **1**
- (i) 0° (ii) 45° (iii) 90° (iv) 180°

- (h) The sum of the length of arcs of two quadrants of a circle of radius r is **1**
(i) πr (ii) $2\pi r$ (iii) πr^2 (iv) $\frac{1}{2}\pi r$
- (i) If the volumes of two spheres are in the ratio $343 : 27$, then the ratio of their radii will be **1**
(i) $343 : 27$ (ii) $64 : 9$ (iii) $7 : 3$ (iv) $3 : 7$
- (j) In a throw of a die, what is the probability of getting a prime number? **1**
(i) $\frac{1}{3}$ (ii) $\frac{1}{2}$ (iii) $\frac{2}{3}$ (iv) 1

Section – B

2. Use Euclid’s Division Algorithm to find the HCF of 405 and 2520. **2**
3. For what value of k does the quadratic equation $9x^2 + 8kx + 16 = 0$ have equal roots? **2**
4. Find k if the points $(0, k)$, $(1, 2)$ and $(-2, -1)$ are collinear. **2**
5. Given that $\Delta ABC \sim \Delta PQR$, if $AB = 14\text{cm}$, area of $\Delta ABC = 196\text{cm}^2$ and area of $\Delta PQR = 529 \text{ cm}^2$, then find PQ. **2**
6. If a wheel rotates 500 times to cover a distance of 2200 m, find the radius of the wheel in centimetres. **2**

Section – C

7. **a.** Find the quadratic polynomial whose zeros are 7 and -5 and verify the relation between the zeros and the coefficients. **3**
Or
- b.** If 1 is a zero of the polynomial $7x - x^3 - 6$, find its other zeros.
8. **a.** Solve the following quadratic equation by factorization method:
$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}; \text{ where } a \neq 0, b \neq 0, x \neq 0$$
3
Or
- b.** Solve the following system of equations using the elimination method:
$$3x + 4y = 10,$$
$$x - y = 1$$

9. a. Find the 25th term of an A.P. whose 9th term is -6 and common difference is $\frac{5}{4}$

Or

3

- b. The first and the last terms of an A.P. are 8 and 350 respectively. If its common difference is 9, how many terms are there and what is their sum?

10. If $7 \sec \theta = 25$, evaluate $\frac{1 - \sin^2 \theta}{1 - \cos^2 \theta}$ with the help of a right triangle. **3**

11. a. The shadow of a vertical tower on a level ground increases by 10 m when the altitude of the sun changes from 45° to 30°. Find the height of the tower. [Use $\sqrt{3} = 1.73$]

Or

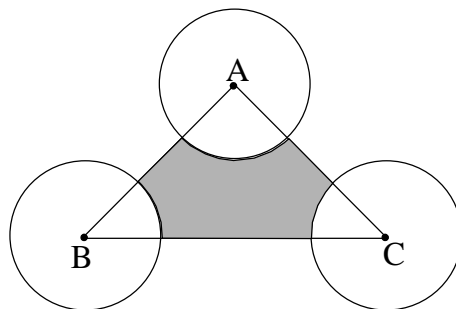
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- b. Evaluate $\frac{\sec^2 54^\circ - \cot^2 36^\circ}{\operatorname{cosec}^2 57^\circ - \tan^2 33^\circ} + 2\sin^2 38^\circ \sec^2 52^\circ - \sin^2 45^\circ$

12. A(x, 7), B(-2, -1) and C(8, -1) be the vertices of ΔABC . $AD \perp BC$ and D divides BC in the ratio 3 : 7. If the length of AD is 8 units, find the coordinates of A. **3**

13. Draw a ΔABC in which $AB = 5$ cm, $BC = 6$ cm and $AC = 7.5$ cm. Construct a $\Delta AB'C'$ similar to ΔABC with scale factor 5 : 7. (Traces of construction only is required.) **3**

14. a. In the adjoining figure, ABC is an equilateral triangle of side 21 cm. Three circles of equal radii 7 cm are drawn on its three vertices. Find the area of the shaded region. [Use $\sqrt{3} = 1.73$]



Or

3

- b. The surface area of a solid sphere is 9856 cm². The sphere is melted and recast into a cone of height 112 cm. Find the radius of the base of the cone so formed.

15. Calculate the median for the following frequency distribution 3

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	3	6	8	15	10	8

16. Cards marked with 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 the drawn card is : (i) divisible by 5, (ii) a perfect square. 3

Section – D

17. a. John scored 40 marks in a test, getting 3 marks for each correct answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each wrong answer, then John would have scored 50 marks. How many questions were there in the test? Solve by forming simultaneous linear equations.

Or

5

- b. A passenger train takes 2 hours less for a journey of 300 km if its speed is increased by 5 km/hr from its usual speed. Find the usual speed of the train. Solve by forming quadratic equations.

18. a. An aeroplane flying horizontally at a height of 2500 m above the ground is observed at an elevation of 60° . After 15 seconds, the elevation is observed to be 30° . Find the speed of the aeroplane in km/hr. [Use $\sqrt{3} = 1.73$]

Or

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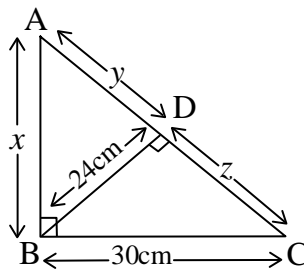
- b. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of each pole and the distances of the point from the poles. [Use $\sqrt{3} = 1.73$]

19. a. State and prove Pythagoras theorem.

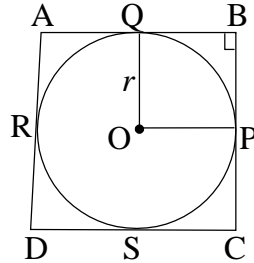
Or

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- b. In the adjoining figure, find x , y and z .



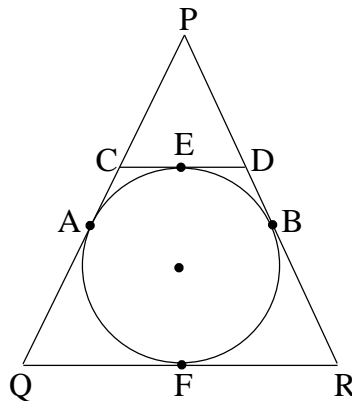
20. a. In the figure given below, a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90^\circ$. If $AD = 23$ cm, $AB = 29$ cm and $DS = 5$ cm, find the radius of the circle.



Or

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- b. In the figure given below, a circle is inscribed in ΔPQR touching the sides PQ, QR and PR at A, F and B respectively. CD is a tangent to the circle at E and bisects the sides PQ and PR at C and D respectively. Prove that perimeter of the quadrilateral CQRD is three times of the base QR of the triangle.



21. a. A chord of length $35\sqrt{2}$ cm is drawn in a circle of diameter 70 cm. Find the area of the minor and major segments of the circle.

Or

5

- b. An oil funnel consists of a 7 cm long cylindrical portion attached to a frustrum of a cone. If the perimeters of the top and bottom of the funnel are 20π cm & 8π cm and the total height is 15 cm, find the total outer surface area of the funnel.

22. a. Construct a 'less than ogive' for the following frequency distribution:

Capital (in ` lakhs)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of companies	2	3	7	11	15	7	2	3

Or

5

- b. The mean of the following frequency distribution is 62.8 and the sum of all frequencies is 50. Find the missing frequencies f_1 and f_2 using step-deviation method, taking assumed mean = 50.

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	f_1	10	f_2	7	8
