

Total No. of Printed Pages—12

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MATHEMATICS

(FOR CANDIDATES WITH INTERNAL ASSESSMENT)

Full Marks : 80

Pass Marks : 24

(FOR CANDIDATES WITHOUT INTERNAL ASSESSMENT)

Full Marks : 100

Pass Marks : 30

Time : 3 hours

(FOR ALL CATEGORIES OF CANDIDATES)

General Instructions :

- (i) This Question Paper comprises of 32 questions divided into six Sections A, B, C, D, E and F.
- (ii) Marks allocated to every question are indicated against each.
- (iii) Question Nos. **1** to **30** (Section—A to Section—E) are to be answered by all candidates.
- (iv) Question Nos. **31** and **32** of Section—F are to be answered by **Candidates without Internal Assessment.**

(2)

- (v) In question on construction, the drawing should be neat and exactly as per the given measurements.
- (vi) Questions, which are meant for Visually Handicapped (Blind) Students, should be answered by them only.
- (vii) Use of Calculator/Mobile Phone is not permitted.

SECTION—A

(Marks : 8)

(Question Nos. 1 to 8 carry 1 mark each)

1. Express the decimal 11.225 as a rational number. 1
2. What is the degree of a biquadratic polynomial? 1
3. Find the first term 'a' and common difference 'd' of the A.P. : 45, 50, 55, 60, 1
4. When are two triangles said to be similar? 1
5. Find the value of $\frac{\sin 10^\circ}{\cos 80^\circ}$. 1
6. How many tangents can be drawn to a circle from a point outside the circle? 1
7. Write the formula for the area of a sector of angle 'θ' of a circle of radius 'r' units. 1
8. Find the class mark of the class 35–55. 1

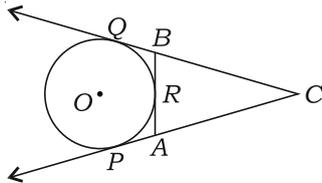
(3)

SECTION—B

(Marks : 14)

(Question Nos. 9 to 15 carry 2 marks each)

9. Find the discriminant of the quadratic equation $2x^2 - 16x + 30 = 0$ and hence write the nature of its roots. 2
10. If $A = 30^\circ$ and $B = 60^\circ$, verify that $\sin(A + B) = \sin A \cos B + \cos A \sin B$ 2
11. Find the value of x ($0^\circ < x < 90^\circ$) in $2\sin 2x = \sqrt{3}$. 2
- Or
- In $\triangle ABC$, right angled at A , if $AB = 4$, $AC = 3$ and $BC = 5$, then find $\cos B$ and $\operatorname{cosec} B$. 2
12. Find the distance between the pair of points $(5, 8)$ and $(-3, 2)$. 2
13. Find the coordinates of the centroid of the triangle whose vertices are $(-3, 0)$, $(5, -2)$ and $(-8, 5)$. 2
- Or
- Find the ratio in which the point $(2, y)$ divides the line segment joining the points $A(-2, 2)$ and $B(3, 7)$. 2
14. The triangles ABC and DEF are similar. If the ar $(\triangle ABC) = 9 \text{ cm}^2$, ar $(\triangle DEF) = 64 \text{ cm}^2$ and $DE = 5.1 \text{ cm}$, then find AB . 2
15. In the given figure, CP and CQ are tangents to a circle with centre O . ARB is another tangent touching the circle at R . If $CP = 11 \text{ cm}$ and $BC = 7 \text{ cm}$, then find the length of BR . 2



(4)

[For Visually Handicapped (Blind) Students only,
instead of Question No. 15 given in Page No. 3]

15. (a) One and only one tangent can be drawn through a point lying on the circle.
(State whether True or False) 1
- (b) Can we draw infinite number of tangents to a circle? 1

SECTION—C

(Marks : 24)

(Question Nos. 16 to 23 carry 3 marks each)

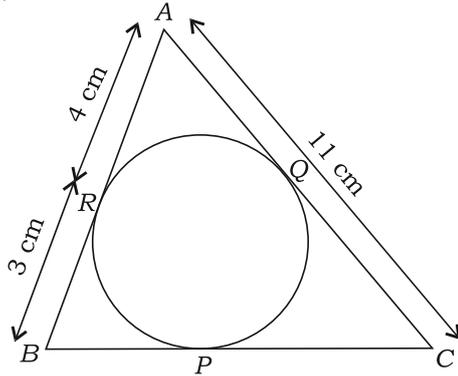
16. Using ruler and compass only, construct two tangents to a circle of radius 3.5 cm from a point P at a distance of 6.2 cm from its centre. (Only traces of construction are required.) 3

[For Visually Handicapped (Blind) Students only,
instead of Question No. 16 given above]

16. (a) All equilateral triangles are _____.
(Fill in the blank) 1
- (b) The lengths of the tangents drawn from an external point to a circle are equal.
(State whether True or False) 1
- (c) Find the radius of a circle whose diameter is 35 cm. 1

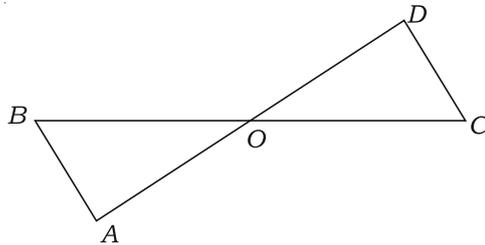
(5)

17. In the adjoining figure, $\triangle ABC$ is circumscribing a circle. Find the length of BC . 3



Or

- In the figure below, $\triangle OAB \sim \triangle OCD$. When $AB = 8$ cm, $BO = 6.4$ cm, $OC = 3.5$ cm and $CD = 5$ cm, find OA . 3

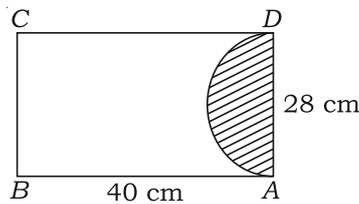


[For Visually Handicapped (Blind) Students only, instead of Question No. 17 given above]

17. (a) If the corresponding sides of two triangles are equal, then they are similar. (State whether True or False) 1
- (b) The distance between two parallel tangents to a circle of radius 6 cm is _____. (Fill in the blank) 2

(6)

18. A sheet of paper is in the form of a rectangle $ABCD$ in which $AB = 40$ cm and $AD = 28$ cm as shown in the adjoining figure. A semi-circular portion with AD as diameter is cut off. Find the area of the remaining paper. (Use $\pi = \frac{22}{7}$) 3



Or

- What is the perimeter of a sector of angle 45° of a circle with radius 7 cm? (Use $\pi = \frac{22}{7}$) 3

19. A die is thrown once. Find the probability of getting—
(a) an even number;
(b) a number less than 5. 3
20. Using Euclid's division algorithm, find the HCF of 714 and 924. 3

Or

- Find the HCF and LCM of the pair of integers 26 and 91 by prime factorisation method and verify that $\text{LCM} \times \text{HCF} = \text{product of the two numbers}$. 3

21. If one zero of the polynomial $(a^2 + 9)x^2 + 15x + 6a$ is reciprocal of the other, then find the value of 'a'. 3

(7)

22. Is 310 a term of the A.P. : 3, 8, 13, 18, ... ? 3

Or

The n th term of a sequence is $2n + 3$. Is the sequence an A.P.? If so, find its 6th term. 3

23. Prove that

$$\frac{1 + \sin \theta}{1 - \sin \theta} = (\sec \theta + \tan \theta)^2 \quad 3$$

Or

If $x \operatorname{cosec} \theta = a$ and $y \cot \theta = b$, prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$. 3

SECTION—D

(Marks : 16)

(Question Nos. 24 to 27 carry 4 marks each)

24. Six years hence a man's age will be three times as old as his son and three years ago he was nine times as old as his son. Find their present ages. 4

Or

Find two consecutive positive integers, the sum of whose squares is 365. 4

25. A vertical pole stands on the level ground. From a point on the ground, 25 m away from the foot of the pole, the angle of elevation of its top is found to be 60° . Find the height of the pole. (Use $\sqrt{3} = 1.732$) 4

Or

The length of a string between a kite and a point on the ground is 90 metres. If the string makes an angle ' θ ' with the ground level such that $\tan \theta = \sqrt{3}$, how high is the kite? Assume that there is no slack in the string. (Use $\sqrt{3} = 1.732$) 4

[For Visually Handicapped (Blind) Students only,
instead of Question No. 25 given in Page No. 7]

25. (a) Prove that $(1 - \sin^2 \theta) \sec^2 \theta = 1$. 2
(b) The value of $\sec 60^\circ$ is $\frac{1}{2}$.
(State whether True or False) 1
(c) $\cos(90^\circ - \theta) = \underline{\hspace{2cm}}$. (Fill in the blank) 1
26. If $P(x, y)$ is a point equidistant from the points $A(6, -1)$
and $B(2, 3)$, then show that $x - y = 3$. 4
- Or
- Find the area of the triangle whose vertices are
 $(5, -7)$, $(-4, -5)$ and $(4, 5)$. 4
27. Prove that a tangent to a circle is perpendicular to the
radius through the point of contact. 4

[For Visually Handicapped (Blind) Students only,
instead of Question No. 27 given above]

27. (a) Define a circle. 2
(b) A line, which intersects the circle in two points, is
called a _____.
(Fill in the blank) 1
(c) The portion of a circular region enclosed between a
chord and the corresponding arc is called a segment
of the circle.
(State whether True or False) 1

SECTION—E

(Marks : 18)

(Question Nos. 28 to 30 carry 6 marks each)

28. Solve the following system of linear equations graphically :

$$3x - y = 3$$

$$x - 2y = -4$$

Also, shade the area of the region bounded by the lines and x -axis. (Plot at least three points for each graph.) 6

[For Visually Handicapped (Blind) Students only, instead of Question No. 28 given above]

28. Solve the following system of linear equations : 6

$$2x + 3y = 0$$

$$3x + 4y = 5$$

29. The largest possible sphere is carved out of a wooden solid cube of side 7 cm. Find the volume of the wood left. (Use $\pi = \frac{22}{7}$) 6

Or

A solid metallic sphere of radius 5.6 cm is melted and solid cones each of radius 2.8 cm and height 3.2 cm are made. Find the number of such cones formed. 6

30. Find the mean of the following data : 6

<i>Class Interval</i>	10-20	20-30	30-40	40-50	50-60	60-70
<i>Frequency</i>	11	15	20	30	14	10

Or

Find the median of the following frequency distribution : 6

<i>Class Interval</i>	0-100	100-200	200-300	300-400	400-500
<i>Frequency</i>	40	32	48	22	8

(10)

SECTION—F

(Marks : 20)

[For Candidates without Internal Assessment]

31. Answer the following as directed (any *eight*) : 1×8=8

(a) If p and q are two prime numbers, then their LCM is

(A) pq

(B) p

(C) q

(D) 1

(Choose the correct option)

(b) Which of the following is not a quadratic equation?

(A) $x^2 + 5x - 3 = 0$

(B) $x^2 - 4x = x^2 - 2x$

(C) $x^2 - 2x + 5 = 0$

(D) $\sqrt{3}x^2 - 5x + \frac{1}{3} = 0$

(Choose the correct option)

(c) The first term of the sequence $a_n = n(n+2)$ is

(A) 1

(B) 2

(C) 3

(D) 4

(Choose the correct option)

(d) If a pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ represents intersecting lines, then

(A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(C) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(D) None of the above

(Choose the correct option)

(11)

- (e) A polynomial having three terms is called _____.
(Fill in the blank)
- (f) Write the value of $\sin 37^\circ - \cos 53^\circ$.
- (g) $\sin^2 \theta + \cos^2 \theta = 1$.
(State whether True or False)
- (h) Write the coordinates of the origin.
- (i) Zero (0) is the smallest natural number.
(State whether True or False)
- (j) Write the formula of the volume of a cylinder of radius ' r ' and height ' h '.
- (k) If two triangles are congruent, then their areas are _____.
(Fill in the blank)
- (l) Define modal class.
- (m) Write the standard form of a quadratic equation.
- (n) If $\sin \theta = \cos \theta$, then the value of ' θ ' is _____.
(Fill in the blank)

(12)

32. Answer any six from the following : 2×6=12

- (a) Is $x = 1$ a solution of the quadratic equation $x^2 - 3x + 2 = 0$?
- (b) Find the zeroes of the polynomial $3x^2 - 2x - 1$.
- (c) Express the number 49896 as a product of their primes.
- (d) Evaluate $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$.
- (e) Find the coordinates of the midpoint of the line segment joining the points $A(-7, 6)$ and $B(9, -10)$.
- (f) Find the sum of first n natural numbers.
- (g) Find the value of 'k' for which the quadratic equation $9x^2 - 24x + k = 0$ has real and equal roots.
- (h) A man goes 15 m due west and then 8 m due north. How far is he from the starting point?
- (i) The circumference of a circle is 39.6 cm. Find its radius. (Use $\pi = \frac{22}{7}$)
- (j) The probability that it will rain today is 0.87. What is the probability that it will not rain today?
- (k) State the converse of Pythagoras Theorem.

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