

Total No. of Printed Pages—12

**X/22/M**

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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.**

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- (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

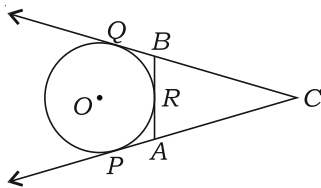
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SECTION—B

( 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



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[ 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 )

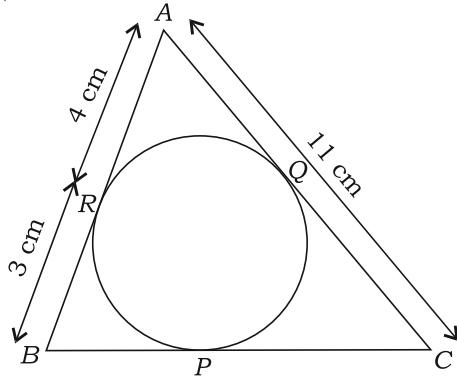
16. Using ruler and compass only, construct two tangents to a circle of radius 3.5 cm from a point  $P$  at a distance of 6.2 cm from its centre. (Only traces of construction are required.) 3

[ 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

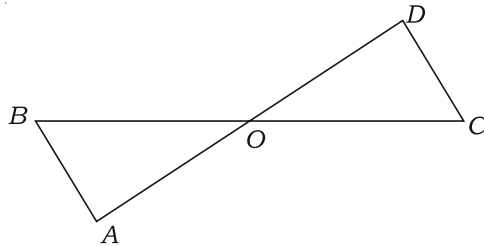
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17. In the adjoining figure,  $\triangle ABC$  is circumscribing a circle. Find the length of  $BC$ . 3



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

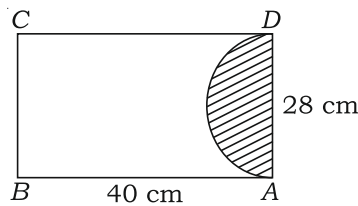


[ For Visually Handicapped (Blind) Students only, instead of Question No. 17 given above ]

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  $45^\circ$  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

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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  $60^\circ$ . 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 ' $\theta$ ' 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       |

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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 )

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- (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 )

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**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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