

Total No. of Printed Pages—16

**X/19/M (O)**

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**MATHEMATICS**

( Old Course )

**( COMPARTMENTAL AND IMPROVEMENT CANDIDATES WITH  
INTERNAL ASSESSMENT )**

*Full Marks : 80*

*Pass Marks : 24*

**( NON-REGULAR, PRIVATE AND COMPARTMENT WITHOUT  
INTERNAL ASSESSMENT )**

*Full Marks : 100*

*Pass Marks : 30*

*Time : 3 hours*

*The figures in the margin indicate full marks for the questions*

*General Instructions :*

- (i) This question paper consists 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 **Compartmental and Improvement Candidates with Internal marks.**
- (iv) Question Nos. **1 to 32** (Section—A to Section—F) are to be answered by **Compartmental Candidates without Internal marks/Non-Regular/Private Candidates.**

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- (v) In Question Nos. **1** to **8** of Section—A and Question No. **31** sub Nos. (a) to (d) of Section—F, there are four options marked (A), (B), (C), (D). Only one of these options is correct. The letter indicating the correct answer should be written in capital in the answer book.
- (vi) In question on construction, the drawing should be neat and exactly as per the given measurements.
- (vii) Questions which are meant for Visually Handicapped (Blind) Students, should be answered by them only.
- (viii) Use of Calculator/Mobile Phone is not permitted.

SECTION—A

( Marks : 10 )

( Question Nos. **1** to **10** carry 1 mark each )

- 1.** Which of the following is the correct alternative of the decimal representation of an irrational number?
- (A) Non-terminating, repeating
  - (B) Terminating
  - (C) Terminating, repeating
  - (D) Non-terminating, non-repeating

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2. A polynomial of degree  $n$  has at most

(A)  $(n + 2)$  zeroes

(B)  $2n$  zeroes

(C)  $(n - 2)$  zeroes

(D)  $n$  zeroes

3. The discriminant of the quadratic equation  $2x^2 - 5x - 4 = 0$ , is

(A)  $-57$

(B)  $\sqrt{-57}$

(C)  $57$

(D)  $-7$

4. The second term of an AP whose first term,  $a = 3$  and common difference,  $d = -4$  is

(A)  $1$

(B)  $-1$

(C)  $3$

(D)  $-4$

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5. In  $\triangle ABC$ , if  $XY \parallel BC$  and  $AX = 2$  cm,  $XB = 3$  cm,  $AY = 4$  cm, then  $YC$  is equal to

(A) 2 cm

(B) 3 cm

(C) 4 cm

(D) 6 cm

6. In  $\triangle ABC$  right angled at  $B$ , if  $AC = 17$  cm,  $AB = 8$  cm,  $BC = 15$  cm, then  $\cot A$  is equal to

(A)  $\frac{15}{8}$

(B)  $\frac{8}{15}$

(C)  $\frac{17}{8}$

(D)  $\frac{8}{17}$

7. The sine of any acute angle ' $\theta$ ' in a right triangle is equal to the cosine of its

(A) reflex angle

(B) obtuse angle

(C) complementary angle

(D) supplementary angle

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8. Area of a semicircle whose radius is 7 cm, is

(A)  $154 \text{ cm}^2$

(B)  $11 \text{ cm}^2$

(C)  $77 \text{ cm}^2$

(D)  $49 \text{ cm}^2$

9. Fill in the blanks :

$$\frac{1}{2} + \frac{1}{2} = 1$$

(a) If a line divides any two sides of a triangle proportionally, it must be \_\_\_\_\_ to the third side.

(b) A \_\_\_\_\_ is a line which touches a circle at one point only.

10. Define cumulative frequency.

SECTION—B

( Marks : 12 )

( Question Nos. **11** to **16** carry 2 marks each )

11. Find a quadratic polynomial whose zeroes are  $2 + \sqrt{3}$  and  $2 - \sqrt{3}$ .

12. Solve the quadratic equation,  $x^2 - x - 20 = 0$  by completing the square.

Or

Find the 8th term from the end of the AP 7, 10, 13, ..., 184.

( 6 )

13. If  $\sin \theta = \frac{1}{2}$ , then find the value of  $\frac{3 \operatorname{cosec} \theta}{1 + \cot^2 \theta}$

14. Prove that

$$\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ} = \sqrt{3}$$

Or

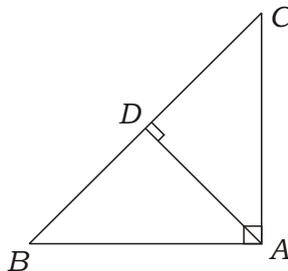
Find the value of  $\theta$ , if  $2 \sin 2\theta = \sqrt{3}$ , for  $0^\circ < \theta < 90^\circ$ .

15. The areas of two similar triangles are  $121 \text{ cm}^2$  and  $64 \text{ cm}^2$  respectively. If the median of the first triangle is  $12.1 \text{ cm}$ , then find the corresponding median of the other triangle.

Or

The perimeters of two similar triangles are  $24 \text{ cm}$  and  $32 \text{ cm}$  respectively. If one side of the first triangle is  $12 \text{ cm}$ , then find the corresponding side of the other triangle.

16. In a right  $\Delta ABC$ , right angled at  $A$ ,  $AD$  is drawn perpendicular to  $BC$ . Prove that  $AB^2 - BD^2 = AC^2 - CD^2$ .



( 7 )

[ For Visually Handicapped (Blind) Students only,  
instead of Question No. 16 given in Page No. 6 ]

16. (a) The perimeter of a circle is referred to as the \_\_\_\_\_ of the circle.  
(Fill in the blank) 1
- (b) In a right-angled triangle, the side opposite to right angle is hypotenuse.  
(State True or False) 1

SECTION—C

( Marks : 18 )

( Question Nos. 17 to 22 carry 3 marks each )

17. The LCM of two numbers 396 and 576 is 6336. Find their HCF.
18. Find the sum of the series :  
 $82 + 72 + 62 + \dots$  to 12th terms  
Or  
If the length of a rectangular field is decreased by 5 m, its area is decreased by  $70 \text{ m}^2$ . If the width is increased by 6 m, the area is increased by  $180 \text{ m}^2$ . Determine the length and width of the rectangle.
19. The coordinates of A and B are (5, -9) and (11, K). Find the value of K if the distance AB is 10 units.

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20. Prove that  $\sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} = \operatorname{cosec} \theta + \cot \theta$   
Or

Prove that  $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$

21. In a circle of radius 6 cm, a chord of 10 cm makes an angle of  $110^\circ$  at the centre of the circle. Find the length of the arc (use  $\pi = \frac{22}{7}$ ).

Or

A circular flower bed lies inside a rectangular field of size  $25 \text{ m} \times 18 \text{ m}$ . The area of the field excluding the flower bed is  $296 \text{ m}^2$ . Find the diameter of the flower bed (use  $\pi = \frac{22}{7}$ ).

22. If 65% of the population have black eyes and the rest have brown eyes, then what is the probability that a person selected at random has
- (a) brown eyes;
- (b) black eyes?

SECTION—D

( Marks : 16 )

( Question Nos. 23 to 26 carry 4 marks each )

23. The denominator of a fraction exceeds twice its numerator by 1. If 3 be subtracted from the numerator and 2 from the denominator, then the fraction becomes  $\frac{1}{3}$ . Find the fraction.

24. Find  $x$  so that the line segment with initial point  $A(x, 4)$  and terminal point  $B(3, 0)$  is divided at  $C(2, 1)$  in the ratio 3:1.

Or

Show that the points  $(4, 4)$ ,  $(3, 5)$ ,  $(-1, 1)$  are the vertices of a right-triangle.

25. A vertical tree 15 m high is broken by the wind in such a way that its top just touches the ground and makes an angle of  $60^\circ$  with the ground. At what height from the ground did the tree break? (Use  $\sqrt{3} = 1.732$ )

Or

On the opposite sides of a tower two objects are located. Their angles of depression from the top of the tower are  $45^\circ$  and  $60^\circ$ . If the height of the tower is 300 m, then find the distance between the two objects. (use  $\sqrt{3} = 1.732$ )

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

25. (a) Prove that 2

$$\frac{1}{\sec A + \tan A} + \frac{1}{\sec A - \tan A} = 2 \sec A$$

- (b)  $1 + \underline{\hspace{2cm}} = \operatorname{cosec}^2 \theta$ . (Fill in the blank) 1

- (c)  $\tan A = \sec(90^\circ - A)$  (State True or False) 1

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- 26.** Using ruler and compass only, construct a triangle similar to a given  $\triangle ABC$  such that each of its sides is  $\frac{3}{4}$ th of the corresponding sides of  $\triangle ABC$ . It is given that  $AB = 3$  cm,  $BC = 4$  cm and  $CA = 5$  cm. [only traces of construction are required]

[ For Visually Handicapped (Blind) Students only,  
instead of Question No. 26 given above ]

- 26.** (a) If two triangles are equiangular to one another, their corresponding sides are \_\_\_\_\_.  
(Fill in the blank) 1
- (b) A parallelogram whose adjacent sides are equal is called a trapezium.  
(State True or False) 1
- (c) \_\_\_\_\_ is the longest chord of a circle.  
(Fill in the blank) 1
- (d) Define an isosceles triangle. 1

SECTION—E

( Marks : 24 )

( Question Nos. **27** to **30** carry 6 marks each )

- 27.** Solve the following system of linear equations graphically :

$$2x + 3y = 12$$

$$x - y = 1$$

Find the coordinates of the vertices of the triangle formed by the two straight lines and the  $y$ -axis. (Plot at least three points for each graph)

[ For Visually Handicapped (Blind) Students only,  
instead of Question No. 27 given in Page No. 10 ]

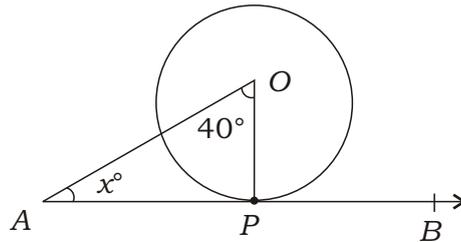
27. Solve the following system of linear equations :

$$2x + 3y = 28$$

$$3x - 4y = -9$$

28. Prove that, the tangent at any point of a circle is perpendicular to the radius through the point of contact. 4

In the adjoining figure,  $O$  is the centre of the circle and  $AB$  is a tangent to a circle at  $P$ . Find the value of  $x$ . 2



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

28. (a) All chords of a circle are equal in length. (State True or False) 1
- (b) Define a secant of a circle. 1
- (c) The lengths of two tangents drawn from an external point to a circle are \_\_\_\_\_. (Fill in the blank) 1
- (d) If the radius of a circle is 12 cm, then its diameter is \_\_\_\_\_. (Fill in the blank) 1
- (e) A triangle can have two obtuse angles. (State True or False) 1
- (f) State Basic Proportionality theorem. 1

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29. A cylindrical tube, open at both ends is made of iron 1 cm thick. If its external diameter be 22 cm and its length 50 cm, then find the volume of iron contained in the tube (use  $\pi = \frac{22}{7}$ ).

Or

A rocket is in the form of a cone of height 28 cm, surmounted over a right circular cylinder of height 112 cm. The radius of the bases of a cone and a cylinder are equal each being 21 cm. Find the total surface area of the rocket (use  $\pi = \frac{22}{7}$ ).

30. The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality :

<i>Monthly Consumption</i> (in unit)	65–85	85–105	105–125	125–145	145–165	165–185	185–205
<i>No. of Consumers</i>	4	5	13	20	14	8	4

Compute the median.

Or

Find the mean of the following data using any method :

<i>Weight</i> (in kg)	30–35	35–40	40–45	45–50	50–55	55–60
<i>No. of Students</i>	4	16	40	22	10	8

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SECTION—F

( Marks : 20 )

[ Candidates appearing for 100 marks ]

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

(a) A number which has got more than two factors is called

- (A) an odd number
- (B) a prime number
- (C) an even number
- (D) a composite number (Choose the correct option)

(b) The zeroes of the polynomial  $(x + 2)(x - 3)$  are

- (A) (2, -3)
- (B) (-2, -3)
- (C) (2, 3)
- (D) (-2, 3) (Choose the correct option)

(c) 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)  $\frac{a_1}{a_2} \neq \frac{c_1}{c_2}$
- (B)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
- (C)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
- (D)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$  (Choose the correct option)

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- (d) The common difference of the AP 1·8, 2·0, 2·2, 2·4, ... is
- (A) 2
  - (B) 0·2
  - (C) -0·2
  - (D) 0·02
- (Choose the correct option)

- (e)  $\frac{41}{2^2 \times 5 \times 7}$  has a terminating decimal representation.
- (State *True* or *False*)

(f) State Pythagoras theorem.

(g) Find the distance between the origin and the point (-4, 0).

(h) Find the prime factors of 3600.

(i) The value of  $\cos 82^\circ - \sin 8^\circ$  is \_\_\_\_\_. (Fill in the blank)

(j) Define a circle.

(k) If  $r$  is the radius of a sphere, then its volume is \_\_\_\_\_.  
(Fill in the blank)

(l) What is the mode of the data 0, 1, 5, 3, 2, 5, 7, 1, 5?

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(m) In which quadrant or axis does the point  $(-4, 0)$  lie?

(n) A polynomial of degree 4 is called a \_\_\_\_\_ polynomial.  
(Fill in the blank)

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

(a) Find the HCF and LCM of 16 and 24 by prime factorisation method.

(b) Find the sum and the product of the zeroes of  $x^2 - 5x + 6$ .

(c) Divide  $6x^2 - 31x + 40$  by  $2x - 5$  and write down the quotient and remainder.

(d) For  $A = 30^\circ$ , verify that

$$\frac{\cos^2 A}{\sin A} + \sin A = \operatorname{cosec} A$$

(e) Find the coordinates of the mid-point of the line segment joining the points  $\left(\frac{3}{2}, -\frac{3}{4}\right)$  and  $\left(\frac{2}{3}, -\frac{1}{3}\right)$ .

(f) Prove that  $\sin 39^\circ \sec 51^\circ + \cos 47^\circ \operatorname{cosec} 43^\circ = 2$

(g) Find the radius of a circle whose circumference is 352 m (use  $\pi = \frac{22}{7}$ ).

( 16 )

- (h) Find the curved surface area of a right-circular cylinder of radius 3.5 cm and height 10 cm (use  $\pi = \frac{22}{7}$ ).
- (i) Determine the length of the diagonal of a square whose side is 50 cm.
- (j) Solve the quadratic equation  $x^2 + 9x + 14 = 0$  by factorization.

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