

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. Find the prime factorization of 96. 1
2. Find the 5th term of the sequence $a_n = 2n + 5$. 1
3. Write the discriminant of the quadratic equation $3x^2 - 2x + 8 = 0$. 1
4. What is the area of an equilateral triangle of side 'a'? 1
5. In how many points does a line intersect the circle at most? 1
6. Find the area of a circle whose radius is 10.5 m. (Use $\pi = \frac{22}{7}$) 1
7. Evaluate : 1
 $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$
8. Find the class mark of class 10–25. 1

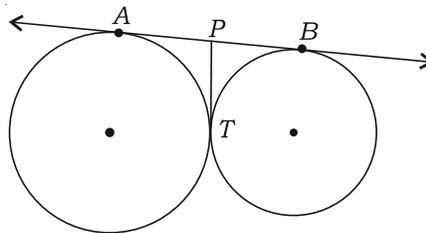
(3)

SECTION—B

(Marks : 14)

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

9. Solve the quadratic equation $3x^2 - x - 2 = 0$ by factorization. 2
10. If $A = 30^\circ$, verify that $\sin 2A = 2 \sin A \cos A$ 2
11. Find the value of $x (0^\circ < x < 90^\circ)$ in $\tan 3x = \sin 45^\circ \cos 45^\circ + \sin 30^\circ$ 2
- Or
- In $\triangle ABC$, right angled at B , if $AB = 5$, $BC = 12$ and $AC = 13$, find $\sin A$ and $\tan A$. 2
12. Find the distance between the pair of points $(-6, 7)$ and $(-1, -5)$. 2
13. Find the coordinates of the midpoint of the line segment joining the points $P(12, -8)$ and $Q(8, -4)$. 2
- Or
- Find the coordinates of the centroid of the triangle whose vertices are $(8, 0)$, $(0, 6)$ and $(8, 12)$. 2
14. In the figure below, AB is a common tangent to the given circles, which touch externally at P . If $AP = 3.2$ cm, find the length of AB : 2



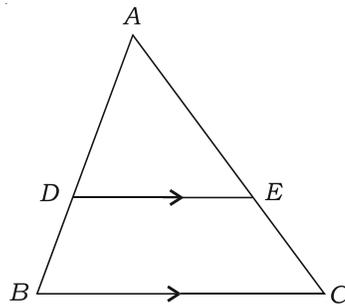
(4)

**[For Visually Handicapped (Blind) Students only,
instead of Question No. 14 given in Page No. 3]**

14. (a) Define a secant. 1

(b) A tangent cannot be drawn from a point lying within the circle.
(State whether True or False) 1

15.



In the above figure, ABC is a triangle. D and E are the points on the sides AB and AC respectively, such that $DE \parallel BC$. If $AD = x$ cm, $DB = (x - 2)$ cm, $AE = (x + 2)$ cm and $EC = (x - 1)$ cm, find the value of x . 2

**[For Visually Handicapped (Blind) Students only,
instead of Question No. 15 given above]**

15. (a) Define a triangle. 1

(b) The greatest side of a _____ triangle is called hypotenuse.
(Fill in the blank) 1

(5)

SECTION—C

(Marks : 24)

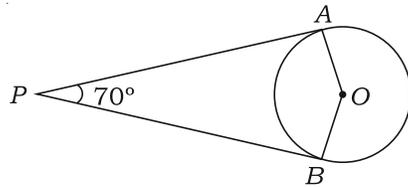
(Question Nos. 16 to 23 carry 3 marks each)

16. Using ruler and compass only, draw a line segment of length 7 cm and divide it internally in the ratio 2 : 3. (Only traces of construction are required.) 3

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

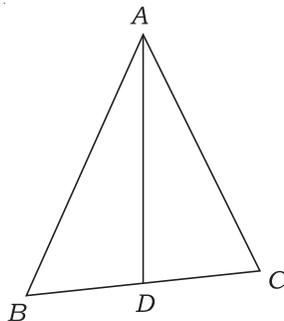
16. (a) When are two triangles said to be similar? 2
(b) Define an equilateral triangle. 1

17. The two tangents drawn from an external point P to a circle with centre O are PA and PB . If $\angle APB = 70^\circ$, what is the value of $\angle AOB$? 3



Or

- In the figure below, AD is the bisector of $\angle A$ in $\triangle ABC$, intersecting the side BC at D . If $AB = 5$ cm, $AC = 4.2$ cm and $DC = 2.1$ cm, find BD : 3



(6)

[For Visually Handicapped (Blind) Students only,
instead of Question No. 17 given in Page No. 5]

17. (a) State Basic Proportionality Theorem. 2

(b) A tangent to a circle is _____ to the radius through
the point of contact.

(Fill in the blank) 1

18. Find the angle subtended at the centre of a circle of
radius 5 cm by an arc of length $\frac{5\pi}{3}$ cm. 3

Or

The difference between the circumference and the radius
of a circle is 37 cm. Find the area of the circle.
(Use $\pi = \frac{22}{7}$) 3

19. A bag contains 6 red balls, 8 white balls, 5 green balls
and 3 black balls. One ball is drawn at random from the
bag. Find the probability that the ball drawn is—
(a) white;
(b) red or black. 3

20. Find the HCF and LCM of 84, 90, 120 by applying
prime factorization method. 3

Or

Given that $\text{HCF}(306, 657) = 9$, find the LCM of 306
and 657. 3

(7)

21. Which term in the A.P. 68, 64, 60, is -8? 3

Or

Find the sum of 100 terms of the A.P. 2, 4, 6, 3

22. Find a quadratic polynomial whose zeroes are -5 and -7. 3

23. Evaluate : 3

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 30^\circ} - 2\cos^2 45^\circ - \sin^2 0^\circ$$

Or

If $\tan(A - B) = \frac{1}{\sqrt{3}}$ and $\tan(A + B) = \sqrt{3}$, $0^\circ < (A + B) < 90^\circ$
and $A > B$, find A and B . 3

SECTION—D

(Marks : 16)

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

24. The sum of two numbers is 16. The sum of their reciprocals is $\frac{1}{3}$. Find the numbers. 4

Or

The sum of the numerator and denominator of a fraction is 12. If the denominator is increased by 3, the fraction becomes $\frac{1}{2}$. Find the fraction. 4

25. A tower stands vertically on the ground. From a point on the ground 20 m away from the foot of the tower, the angle of elevation of the top of the tower is 60° . What is the height of the tower? (Use $\sqrt{3} = 1.732$) 4

Or

The string of a kite is 100 m long and it makes an angle of 60° with the horizontal. Find the height of the kite, assuming that there is no slack in the string. (Use $\sqrt{3} = 1.732$) 4

(8)

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

25. (a) The value of $\cot 90^\circ = \underline{\hspace{2cm}}$.
(Fill in the blank) 1
- (b) If $\cos \theta = 1$, then $\theta = 0^\circ$.
(State whether True or False) 1
- (c) Write down the relation between $\sin \theta$, $\cos \theta$ and $\tan \theta$. 2
26. Find the coordinates of the point, which divides the join of $A(-1, 7)$ and $B(4, -3)$ in the ratio $2 : 3$. 4

Or

If the points $(2, 1)$ and $(1, -2)$ are equidistant from the point (x, y) , prove that $x + 3y = 0$. 4

27. Prove that, in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. 4

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

27. (a) Define a right triangle. 2
- (b) The length of the diagonal of a square of side ' a ' is _____.
(Fill in the blank) 2

(9)

SECTION—E
(Marks : 18)

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

28. Solve the following system of linear equations graphically :

$$2x - y = 4$$

$$3y - x = 3$$

Also, find the points where the lines meet the axis of y .
(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

$$2x + y = 7$$

$$4x - 3y + 1 = 0$$

29. If the total surface area of a solid hemisphere is 462 cm^2 ,
find its volume. (Use $\pi = \frac{22}{7}$)

6

Or

A cone of height 20 cm and radius of base 5 cm is made
up of modelling clay. A child reshapes it in the form of a
sphere. Find the diameter of the sphere.

6

30. Find the mean of the following data :

6

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Students	12	18	27	20	17	6

Or

Find the mode of the following frequency distribution :

6

Class Interval	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	30	45	75	35	25	15

(10)

SECTION—F

(Marks : 20)

[For Candidates without Internal Assessment]

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

(a) The common difference of the A.P. 4, 1, -2, -5, is

(A) 3

(B) -3

(C) 4

(D) 2

(Choose the correct option)

(b) Every composite number can be expressed as a product of

(A) primes

(B) coprimes

(C) twin primes

(D) None of the above

(Choose the correct option)

(c) In which quadrant does the point (-2, 6) lie?

(A) 1st quadrant

(B) 2nd quadrant

(C) 3rd quadrant

(D) 4th quadrant

(Choose the correct option)

(d) The area of a circle with radius ' r ' is

(A) πr^2 square units

(B) $2\pi r^2$ square units

(C) $\frac{1}{2}\pi r^2$ square units

(D) $3\pi r^2$ square units

(Choose the correct option)

(11)

- (e) Define constant polynomial.
- (f) If the polynomial $ax^2 + bx + c$ is a perfect square, then $b^2 = 4ac$.
(State whether True or False)
- (g) What is the degree of a cubic polynomial?
- (h) Find the circumference of a circle whose radius is 10.5 m. (Use $\pi = \frac{22}{7}$)
- (i) How many tangents can be drawn to a circle from a point outside the circle?
- (j) Each quadratic equation has at most two roots.
(State whether True or False)
- (k) Write the value of $\sec 60^\circ$.
- (l) The total surface area of a right circular cylinder of radius ' r ' and height ' h ' is _____.
(Fill in the blank)
- (m) A polynomial having _____ terms is called binomial.
(Fill in the blank)
- (n) π is an irrational number.
(State whether True or False)

(12)

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

- (a) Express 0.125 as a rational number.
- (b) Find the zeroes of the polynomial $x^2 - 2x - 3$.
- (c) Find the distance between the pair of points $(a, 0)$ and $(0, b)$.
- (d) A chord of a circle of radius 14 cm subtends a right angle at the centre. What is the area of the minor sector? (Use $\pi = \frac{22}{7}$)
- (e) A die is thrown once. What is the probability of getting a number other than 4?
- (f) The difference between two numbers is 26 and one number is three times the other. Find the numbers.
- (g) Find the coordinates of the midpoint of the line segment joining the points $P(7, 0)$ and $Q(-5, 4)$.
- (h) Find the sum of the first 100 natural numbers.
- (i) Find the value of x ($0^\circ < x < 90^\circ$) in $2 \cos 3x = 1$.
- (j) If α, β are zeroes of the polynomial $P(x) = 3x^2 - 2x - 6$, then find $\frac{1}{\alpha} + \frac{1}{\beta}$.
- (k) Determine the value of 'k' for which $x = 1$ is a solution of the equation $x^2 + kx + 3 = 0$.

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