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MATHEMATICS

(New Course)

**(FOR REGULAR CANDIDATES WITH PRACTICALS/
INTERNAL ASSESSMENT)**

Full Marks : 80

Pass Marks : 24

Time : 3 hours

The figures in the margin indicate full marks for the questions

General Instructions :

- (i) The question paper consists of 30 questions divided into five Sections—A, B, C, D and E.
- (ii) Section—A contains 8 questions of 1 mark each.
Section—B contains 7 questions of 2 marks each.
Section—C contains 8 questions of 3 marks each.
Section—D contains 4 questions of 4 marks each.
Section—E contains 3 questions of 6 marks each.
- (iii) There is no overall choice. However an internal choice has been provided in three questions of 3 marks each, two questions of 4 marks each and two questions of 6 marks each.
- (iv) In question on construction, the drawing should be neat and exactly as per the given measurements.
- (v) Questions which are meant for Visually Handicapped (Blind) Students, should be answered by them only.
- (vi) Use of Calculator/Mobile Phone is not permitted.

(2)

SECTION—A

(Marks : 8)

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

1. If $\frac{a}{b}$ is a rational number ($b \neq 0$) in its lowest form, then what is the condition on b so that the decimal representation of $\frac{a}{b}$ is terminating?
2. Check, whether $x = 2$ is a solution of the equation $x^2 - 3x - 2 = 0$ or not.
3. Find the 17th term of the sequence $a_n = 4n - 3$.
4. Find the value of x ($0^\circ < x < 90^\circ$) in $\tan 5x = 1$.
5. Determine whether the given sides $a = 7$ cm, $b = 24$ cm and $c = 25$ cm are sides of a right-angled triangle or not.
6. State SSS-similarity criterion.

(3)

7. Find the circumference of a circle whose diameter is 35 cm.
(Use $\frac{22}{7}$)

8. Define class-mark of a class interval.

SECTION—B

(Marks : 14)

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

9. Determine k so that $k - 2$, $4k - 6$, $3k - 2$ are the three consecutive terms of an A.P.

10. Evaluate :

$$\frac{4}{\cot^2 30^\circ} - \frac{1}{\sin^2 60^\circ} + \cos^2 45^\circ$$

11. Prove that

$$2 \cos^2 \theta - \frac{2}{1 + \cot^2 \theta} = 2$$

12. Find the coordinates of the centroid of the triangle whose vertices are $(-2, 3)$, $(2, -1)$ and $(4, 0)$.

(4)

- 13.** If the point $P(x, y)$ is equidistant from the points $A(5, 1)$ and $B(1, 5)$, then prove that $x = y$.
- 14.** The areas of two similar triangles ABC and PQR are in the ratio $9 : 16$. If $BC = 4.5$ cm, find the length of QR .
- 15.** If the tangent at a point P to a circle with centre O cuts a line through O at Q such that $PQ = 24$ cm and $OQ = 25$ cm, then find the radius of the circle.

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

- 15. (a)** Define a circle. 1
- (b)** How many tangents can be drawn from a point outside the circle? 1

SECTION—C

(Marks : 24)

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

- 16.** Using ruler and compass only, construct a $\triangle PQR$ with sides $QR = 7$ cm, $PQ = 6$ cm and $\angle PQR = 60^\circ$. Then construct another triangle whose sides are $\frac{3}{5}$ th of the corresponding sides of $\triangle PQR$. (Only traces of construction are required.)

(5)

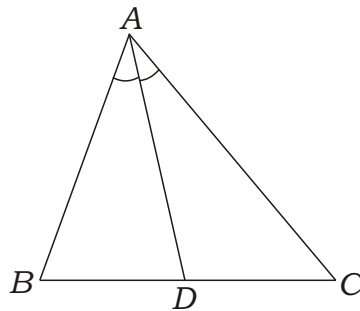
[For Visually Handicapped (Blind) Students only,
instead of Question No. 16 given in Page No. 4]

16. (a) In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

(State whether True or False) 1

(b) Define similar triangles. 2

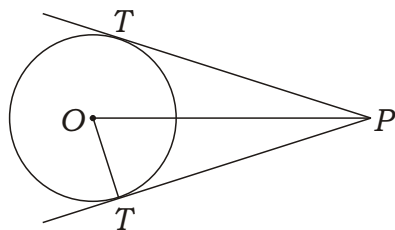
17. In the adjoining figure,



ABC is such that $\frac{BD}{DC} = \frac{AB}{AC}$, $B = 70^\circ$, $C = 50^\circ$. Find BAD .

Or

In the given figure,



find PT , if $OP = 41$ cm and $OT = 9$ cm.

(6)

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

17. (a) Define secant of a circle. 1
- (b) A tangent to a circle is _____ to the radius through the point of contact. (Fill in the blank) 1
- (c) Two triangles are said to be equiangular, if their corresponding angles are _____. (Fill in the blank) 1
18. A steel wire when bent in the form of a square encloses an area of 121 cm^2 . If the same wire is bent in the form of a circle, then find the area of the circle. (Use $\frac{22}{7}$)

Or

The minute hand of a clock is 7 cm long. Find the area of the face of the clock by the minute hand between 9 A.M. and 9:35 A.M. (Use $\frac{22}{7}$)

19. A box contains 20 cards numbered from 1 to 20. A card is drawn at random from the box. Find the probability that the number on the drawn card is—
- (a) divisible by 2 or 3;
- (b) a prime number.
20. Using Euclid's division algorithm, find the HCF of 9367 and 3451.

(7)

21. Find the sum of the following series :

$$72 \ 70 \ 68 \ \dots \ 40$$

22. If α, β are zeroes of the polynomial $p(x) = 3x^2 - 2x + 6$, then find $\alpha^2 + \beta^2$.

23. Prove that

$$\frac{\sin 70^\circ}{\cos 20^\circ} - \frac{\operatorname{cosec} 20^\circ}{\sec 70^\circ} = 2 \cos 70^\circ \operatorname{cosec} 20^\circ - 0$$

Or

If $\tan A = \frac{a}{b}$, then show that

$$\frac{a \sin A}{a \cos A} = \frac{b \cos A}{b \sin A} = \frac{a^2 + b^2}{a^2 - b^2}$$

SECTION—D

(Marks : 16)

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

24. The product of Reena's age (in years) 5 years ago and her age 8 years later is 30. Find her present age.

Or

The area of a rectangle gets reduced by 80 square units, if its length is reduced by 5 units and the breadth is increased by 2 units. If we increase the length by 10 units and decrease the breadth by 5 units, the area is increased by 50 square units. Find the length and breadth of the rectangle.

(8)

25. A kite is flying at a height of 75 m from the level ground, attached to a string inclined at 60° to the horizontal. Find the length of the string, assuming that there is no slack in it. (Use $\sqrt{3} = 1.73$)

Or

A vertically straight tree, 15 m high, was broken by the wind in such a way that its top just touched the ground and made an angle of 60° with the ground. At what height from the ground did the tree break? (Use $\sqrt{3} = 1.732$)

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

25. (a) If $\sec m = \tan n$ and $\sec n = \tan m$, then prove that $mn = 1$. 2

- (b) If $\sin \theta = \cos \theta$, then $\theta = 45^\circ$.
(State whether True or False) 1

- (c) $1 - \cot^2 \theta = \frac{2 \cot \theta}{1 + \cot^2 \theta}$. (Fill in the blank) 1

26. Find the value of 'p' for which the given points (3, 9), (2, p) and (4, 5) are collinear.

(9)

27. Prove that, if a line is drawn parallel to one side of a triangle intersecting the other two sides, then the other two sides are divided in the same ratio.

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

- 27.** (a) What is the length of the altitude of an equilateral triangle of side 2 cm? 2
- (b) State mid-point theorem. 2

SECTION—E

(Marks : 18)

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

28. Solve the following system of linear equations graphically :

$$\begin{array}{r} x \quad y \quad 1 \quad 0 \\ 3x \quad 2y \quad 12 \quad 0 \end{array}$$

Find the area of the triangle formed by the lines and x -axis (plot at least three points for each graph).

(10)

[For Visually Handicapped (Blind) Students only,
instead of Question No. 28 given in Page No. 9]

28. Solve the following system of linear equations :

$$\begin{aligned}2x + 3y &= 13 \\7x + 2y &= 20\end{aligned}$$

29. A metallic bucket, open at the top, of height 24 cm is in the form of the frustum of a cone, the radii of whose lower and upper circular ends are 7 cm and 14 cm respectively.

- (a) Find the volume of water which can completely fill the bucket.
- (b) Find the area of the metal sheet used to make the bucket.
(Use $\frac{22}{7}$)

Or

From a solid cylinder whose height is 8 cm and radius 6 cm, a conical cavity of height 8 cm and of base radius 6 cm is hollowed out. Find the volume of the remaining solid. Also, find the total surface area of the remaining solid. (Use $3 \cdot 14$)

(11)

30. The following distribution shows the daily pocket allowances of children of a locality. The mean pocket allowance is ₹ 18. Find the missing frequency f :

Daily pocket allowance (in ₹)	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	7	6	9	13	f	5	4

Or

The following table shows the ages of the patients admitted in a hospital during a year :

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
No. of patients	6	11	21	23	14	5

Find the mode of the data given above.
