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MATHEMATICS

(English Version)

(New Syllabus)

Time Allowed : $2\frac{1}{2}$ Hours]

[Maximum Marks : 100

- Instructions :**
- i) This question paper consists of *four* Parts. Answer according to the note given in each part.
 - ii) Numbers and letters should be legible. The rough work should be shown at the bottom of the pages of the answer-scripts.
 - iii) Only the logarithmic and trigonometric tables issued at the centre should be used.

PART - A

(Marks : 15)

- Note :**
- i) This Part contains *fifteen* questions. Answer *all* the questions.
 - ii) Each question carries *one* mark.
 - iii) Each question has *four* alternate choices. Choose the correct or the most appropriate one from among them and write down the alphabet indicating the response.
- $15 \times 1 = 15$

1. If the sum of $1 + 2 + 3 + \dots + 10$ is 55, then the sum of

$1^3 + 2^3 + 3^3 + \dots + 10^3$ is

- a) 55^2
- b) 55^3
- c) 3024
- d) 3026.

2. The common ratio of the G.P. 64, 16, 4, is

- a) 4
- b) - 4
- c) $\frac{1}{4}$
- d) $-\frac{1}{4}$

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3. Volume of a hemisphere is

- a) $\frac{4}{3} \pi r^3$ cubic units b) $\frac{2}{3} \pi r^3$ cubic units
 c) $\frac{1}{3} \pi r^3$ cubic units d) $\frac{1}{3} \pi r^2 h$ cubic units.

4. If $A = \{ p, q, r, s \}$ then $A \cap A$ is

- a) $\{ p, q, r, s \}$ b) 4
 c) $\{ 4 \}$ d) $\cap (A)$.

5. If $f(a) = a$ for all $a \in A$ then f is of A .

- a) into function
 b) identity function
 c) constant function
 d) many to one function.

6. If $(ax + b)$ divides $p(x)$, then remainder is

- a) $p(-a)$ b) $p(a)$
 c) $p\left(-\frac{b}{a}\right)$ d) $p\left(\frac{b}{a}\right)$.

7. The nature of the roots of the equation $x^2 + 9 = 0$ is

- a) unreal or imaginary
 b) real, unequal and irrational
 c) real, unequal and rational
 d) real, equal and rational.

8. The point which satisfies the linear inequation $x + y \leq 8$ is

- a) $(4, 5)$ b) $(4, 3)$
 c) $(5, 4)$ d) $(3, 8)$.

9. The angle in the semicircle is
- acute angle
 - obtuse angle
 - right angle
 - straight angle.
10. If a line is drawn parallel to one side of a triangle the other two sides are divided in
- same
 - the same ratio
 - parallel
 - perpendicular.
11. The co-ordinates of the mid-point of the line segment joining the points A (- 3, 2) and B (7, 8) is
- (5, 5)
 - (- 5, 5)
 - (- 2, 5)
 - (2, 5).
12. If the two straight lines are perpendicular, then
- $m_1 \times m_2 = -1$
 - $m_1 \times m_2 = 1$
 - $m_1 = m_2$
 - $m_1 = -m_2$.
13. If $\sin \theta = \tan \theta$, then the value of θ is
- 45°
 - 90°
 - 1°
 - 0° .
14. The variance of 5 scores is 16. If each one of them is divided by 2, then the standard deviation of the new scores is
- 4
 - 8
 - 2
 - 16.
15. The probability of an event of getting more than two heads in tossing two coins simultaneously is
- 1
 - 0
 - $\frac{1}{4}$
 - $\frac{3}{4}$.

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PART - B

(Marks : 20)

Note : i) Answer any *ten* from the *fifteen* questions in this Part.

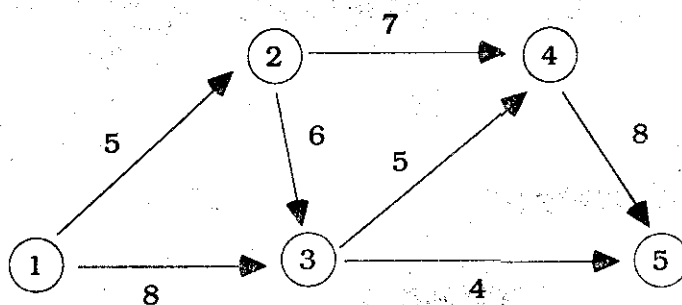
ii) Show all the steps.

iii) Each question carries *two* marks.

$10 \times 2 = 20$

16. Which term of the A.P. 21, 42, 63, is 420 ?
17. What month is 19 months after July ?
18. A cone is of radius 7 cm, and its slant height is 25 cm. Find the curved surface area of the cone.
19. If $A = \{ 1, 3, 5, 7 \}$, $B = \{ 1, 2, 4, 6, 8 \}$ and $C = \{ 1, 3, 6, 8 \}$, find $A \cup (B \cap C)$.
20. In the function $f(x) = x^2 - x + 7$, the domain of f is $\{ 1, 3, -3 \}$. Find the range of f .
21. Find m if $5x^5 - 9x^3 + 3x + m$ leaves a remainder 7 when divided by $(x + 1)$.
22. Solve : $x^2 - x - 12 = 0$.

23. Find the project duration of the following network diagram :



24. In triangle ABC , $DE \parallel BC$, $AD = 6$, $DB = 10$, $AE = 3$, find AC .
25. Chords AB and CD cut at P inside the circle. $AB = 11$, $AP = 3$, $CP = 6$, find CD .

26. Find the centroid of the triangle whose vertices are the points (8, 4), (1, 3) and (3, - 1).
27. Find the intercepts made by the straight-line $3x - 2y - 6 = 0$ on the axes of co-ordinates.
28. Use trigonometric tables to find $\sin 29^\circ 20' + \cos 57^\circ 40'$.
29. The marks obtained by 10 students in a class test out of 100 marks are 62, 49, 71, 75, 33, 41, 100, 88, 50, 31. Calculate the mean of the marks.
30. If 3 coins are tossed, then what is the chance of getting exactly one head ?

PART - C

(Marks : 45)

Note : i) This Part contains 10 questions each with *two* alternatives.
Answer any *nine* questions.

ii) Choose either of the alternatives.

iii) Steps and diagrams should be shown.

iv) Each question carries *five* marks.

$9 \times 5 = 45$

31. The sixth and the tenth terms of a G.P. are 63 and 5103 respectively. Find the G.P.

OR

Find the sum of $400 + 441 + \dots + 1600$.

32. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find its capacity.

OR

A solid right circular cylinder has a base radius of 12 cm and height of 16 cm. It is melted and made into 8 spherical balls of equal size. Calculate the radius of each of the spherical balls.

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33. Verify the De Morgan's law $A - (B \cup C) = (A - B) \cap (A - C)$ using Venn diagrams.

OR

If $A = \{ 0, 1, 2, 3 \}$, $B = \{ 3, 7, 11, 15, 17 \}$, $f: A \rightarrow B$ is defined by $f(x) = 4x + 3$, represent f as

- the set of ordered pairs
- a table
- a graph
- an arrow diagram.

34. Factorise $x^3 - 6x^2 + 11x - 6$.

OR

Find the G.C.D. of the following polynomials :

$$x^3 - 9x^2 + 23x - 15 \text{ and } 4x^2 - 16x + 12.$$

35. If $9x^4 + 12x^3 + 10x^2 + px + q$ is a perfect square, find the value of p and q .

OR

$$\text{Simplify : } \frac{x^2 - 2x - 8}{x - 2} \times \frac{4x - 8}{x^2 - 4x - 12} \div \frac{x^2 - 7x + 12}{x^2 - 9x + 18}$$

36. Draw the graph of the inequation $2x + 3y \geq 6$.

(Graph sheet need not be used)

OR

A small maintenance project consists of the following jobs whose activities and durations are given below :

Activity	1 - 2	1 - 3	2 - 3	2 - 4	3 - 4	3 - 5	4 - 5
Duration in days	20	25	10	12	5	8	10

- Draw the network diagram.
- Find the critical path and project duration.

37. State and prove Pythagoras theorem.

OR

If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.

38. Find the area of the triangle whose vertices are $(5, 2)$, $(-9, -3)$ and $(-3, -5)$.

OR

Find the value of a for which the straight-lines $2x + y - 1 = 0$, $2x + ay - 3 = 0$ and $3x + 2y - 2 = 0$ are concurrent.

39. Find the length of the chord of a circle of radius 5 cm subtending at the centre the angle of 144° .

OR

Two men are on the opposite sides of a tower. They measure the angles of elevation of the top of the tower as 30° and 45° respectively. If the height of the tower is 150 m, find the distance between the men.

40. Find the co-efficient of variation of the following data :

16, 13, 17, 21, 18.

OR

Two dice are rolled once. Find the probability of getting an even number on the second die or the total of face numbers 10.

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PART - D

(Marks : 20)

- Note : i) This Part contains *two* questions each with two alternatives.
ii) Answer two questions choosing either of the alternatives in each question.
iii) Each question carries *ten* marks. $2 \times 10 = 20$

41. Construct a cyclic quadrilateral $ABCD$ given $AB = 7.5$ cm, $AC = 10$ cm, $m \angle BAC = 30^\circ$ and $AD = 6.5$ cm.

OR

Draw a circle of radius 5 cm. Take a point P at a distance of 13 cm from the centre. Draw two tangents from P to the circle and measure the length of the tangents.

42. Draw the graph of $y = x^2 - 4$.

OR

Draw the graph of $xy = 12$, $x, y > 0$. Use the graph to find y when $x = 5$ and x when $y = 8$.
