Register Number | | | | | | |

MATHEMATICS

(English Version)

Time Allowed : 2 $\frac{1}{2}$ Hours] [Maximum Marks : 100

Instructions : i) This question paper consists of *four* Parts. Read the note carefully under each Part before answering them.

ii) Write legibly. The rough work should be shown at the bottom of the pages of the answer-book.

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 × 1 = 15

1. The common difference of an A.P. 3, 1, – 1, – 3, ... is

a) 2 b) – 2

c) $\frac{1}{3}$ d) 3.

2. The value of 1 + 2 + 3 + ... + 20 is

a) 210 b) 420

c) 400 d) 230.

[Turn over

3. The total surface area of a right circular cylinder of radius r and height h is

   a) $\pi r (h + r)$ sq.units

   b) $2\pi r (h - r)$ sq.units

   c) $2\pi r (h + r)$ sq.units

   d) $\pi r (h - r)$ sq.units.

4. The value of $A \cup (B \cap C)$ is

   a) $A \cup (B \cup C)$

   b) $(A \cup B) \cup (A \cup C)$

   c) $A \cap (B \cup C)$

   d) $(A \cup B) \cap (A \cup C)$.

5. If $f (x) = x + 5$, then the value of $f (- 3)$ is

   a) 2 b) $- 2$

   c) $- 15$ d) 15.

6. G.C.D. of P^8 , P^7 , P^{12} is

   a) P^8 b) P^7

   c) P^{12} d) P^{27} .

7. The solution set of $(x - 5) (x + 2) = 0$ is

   a) $\{ - 5, 2 \}$ b) $\{ 5, - 2 \}$

   c) $\{ 5, 2 \}$ d) $\{ - 5, - 2 \}$.

8. A point on $x + y \leq 2$ is

   a) (3, 4) b) (3, 0)

   c) (1, 0) d) (2, 2).

9. If one angle of a cyclic quadrilateral is 70°, then the angle opposite to it is

a) 20° b) 110°

c) 140° d) 160°.

10. Angle in a minor segment is

a) an acute angle

b) an obtuse angle

c) a right angle

d) a reflex angle.

11. The slope of the line $3x + 2y = 5$ is

a) $\frac{3}{2}$ b) $-\frac{3}{2}$

c) $\frac{2}{3}$ d) $\frac{-2}{3}$.

12. The equation of the line with the slope 5, which passes through the origin, is

a) $5y = -x$ b) $5y = x$

c) $y = 5x$ d) $y = -5x$.

13. If $\tan\theta = \sqrt{3}$, then the value of θ is

a) 30° b) 60°

c) 0° d) 45°.

14. If the largest value of a data is 25, the range of the data is 15, then the smallest value of the data is

a) 10 b) – 10

c) 40 d) – 40.

15. When a fair die is rolled, then the probability of getting 3 on the face of the die is

a) $\frac{1}{2}$ b) $\frac{1}{4}$

c) $\frac{1}{6}$ d) $\frac{1}{3}$.

PART – B

(Marks : 20)

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

ii) Show all the steps.

iii) Each question carries *two* marks. $10 \times 2 = 20$

16. Find the 5^{th} term of the G.P. 3, 6, 12, ...

17. Find the value of $1^3 + 2^3 + 3^3 + ... + 10^3$.

18. A cone of height 24 cm, has a radius 7 cm. Find its volume.

19. $\xi = \{ 1, 2, 3, 4, 5, 6, 7 \}$, $A = \{ 3, 4, 5, 6 \}$, $B = \{ 1, 2, 3, 4 \}$. Find the value of $(A \cap B)'$.

20. In the function $f(x) = 3x$, the domain of f is $\{ 0, 2 \}$. Find the range of f.

21. If $(x + 1)$ is a factor of $x^3 + mx^2 + 19x + 12$, determine the value of m.

22. Find the value of $\frac{x}{x+y} + \frac{y}{x+y}$.

23. Define Network.

24. A chord is 15 cm away from the centre of a circle of radius 17 cm. Find the length of the chord.

25. In ΔABC, $DE \parallel BC$. Find EC, if $AD = 3$, $DB = 5$, $AE = 6$.

26. Find the centroid of the triangle whose vertices are given by (2, 3), (5, 4) and (2, 2).

27. Find the point of intersection of the lines, $x = -4$ and $y = 0$.

28. The angle of elevation of the top of a tower, from a place at a distance of 50 m from its foot on horizontal plane is found to be 60°. Find the height of the tower.

29. The coefficient of variation of a series is 80% and the arithmetic mean is 20. What is its standard deviation ?

30. Two coins are tossed simultaneously. What is the probability of getting two heads ?

PART - C

(Marks : 45)

Note : i) This part contains 10 questions each with alternatives.

ii) Choose either of the alternatives in each question and answer any *nine* questions.

iii) Steps and diagrams should be shown.

iv) Each question carries *five* marks. $9 \times 5 = 45$

31. In an A.P., $t_7 = 45$, $t_9 = 57$. Find the first term and the common difference.

OR

Find the sum to n terms of the series $3 + 33 + 333 + \ldots\ldots$.

32. A toy is in the form of a cone mounted on a hemisphere of radius 3·5 cm. The total height of the toy is 15·5 cm. Find the volume of the toy.

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 spherical ball.

33. If $A = \{ 2, 4, 8 \}$, $B = \{ 1, 2, 6, 8 \}$, $C = \{ 1, 5, 6, 8 \}$, then verify that $A - (B \cup C) = (A - B) \cap (A - C)$.

OR

If $f(x) = x + 5$, $g(x) = 4x$, $h(x) = x - 4$, prove that

$(f \circ g) \circ h = f \circ (g \circ h)$.

34. The polynomial $x^2 + ax + b$ gives remainder 18 when divided by $(x - 2)$ and leaves a remainder -2, when divided by $(x + 3)$. Find the values of a and b.

OR

Find the G.C.D. of $2x^3 + 2x^2 + 2x + 2$ and $6x^3 + 12x^2 + 6x + 12$.

35. Find the values of a and b, if $25x^4 - 40x^3 - 34x^2 + ax + b$ is a perfect square.

OR

The perimeter of rectangle is 36 cm and its area is 80 sq.cm. Find its dimensions.

36. Solve the following inequations graphically :

$x - y \geq 2$, $3x + 2y \leq 21$ (Graph sheet need not be used).

OR

A project has the following schedule :

Activity	1 – 2	2 – 3	2 – 4	3 – 5	4 – 6	5 – 6
Duration in weeks	6	8	4	9	2	7

i) Construct the network.

ii) Find the critical path and project duration.

37. Prove that the sum of the opposite angles of a cyclic quadrilateral is 180°.

OR

$ABCD$ is a quadrilateral with $\angle B = 90°$. If $AD^2 = AB^2 + BC^2 + CD^2$, prove that $\angle ACD = 90°$.

38. Find the area of the quadrilateral whose vertices are (5, 8), (6, 3), (3, 1) and (2, 6).

OR

Find the equation of the straight line perpendicular to the straight line given by the equation $4x - 3y + 2 = 0$ and which passes through $(-2, 3)$.

39. Find the length of a side of a regular polygon of 25 sides inscribed in a circle of radius 8 cm.

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. The scores of a batsman are 38, 70, 48, 34, 42, 56. Find the standard deviation.

OR

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

PART – D

(Marks : 20)

Note : i) This part contains *two* questions, each with alternatives.

ii) Answer *two* questions choosing either of the alternatives.

iii) Each question carries *ten* marks. $2 \times 10 = 20$

41. Construct a cyclic quadrilateral $ABCD$, given $AB = 7$ cm, $BC = 5$ cm, $AC = 6$ cm and $BD = 6{\cdot}5$ cm.

OR

Construct a $\Delta\ ABC$, given the base $BC = 5$ cm, $m \angle BAC = 45°$ and median $AD = 4$ cm.

42. Draw the graph of $y = x^2 - 2x - 15$ and hence solve the equation

$x^2 - 2x - 24 = 0$.

OR

Draw the graph of $xy = 30$, $x, y > 0$. Use the graph to find y when $x = 5$ and find x when $y = 10$.