Register Number | | | | | | |

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 × 1 = 15

1. The sum of 1 + 3 + 5 + ... 20 terms is

a) 210 b) 400

c) - 400 d) 250.

2. The common ratio of the G.P. 3, 6, 12, 24, ... is

a) 2 b) - 2

c) $\frac{1}{2}$ d) $-\frac{1}{2}$.

3. The volume of a sphere of radius r units is

a) $\frac{2}{3}\pi r^3$ cu.units b) $\frac{4}{3}\pi r^2$ cu.units

c) $\frac{4}{3}\pi r^3$ cu.units d) $4\pi r^3$ cu.units.

4. $A = \{3, 4, 5, 6\}$, $B = \{5, 7, 8\}$, then $A - B$ is

a) $\{5\}$ b) $\{3, 4, 6\}$

c) $\{3, 4, 8\}$ d) $\{7, 8\}$.

5. $f = \{(0, -1), (3, 2), (5, 3), (7, 2)\}$. In this function the image of 5 is

a) -1 b) 2

c) 3 d) 5.

6. The square root of $36a^8$ is

a) $6a^{16}$ b) $18a^8$

c) $6a^4$ d) a^4.

7. When $x^3 + x^2 + 5$ is divided by $(x - 1)$, the remainder is

a) 10 b) 0

c) 7 d) -7.

8. A point on $2x + y \geq 10$ is

a) $(-5, 2)$ b) $(5, 2)$

c) $(2, 5)$ d) $(2, -5)$.

9. The number of tangents drawn to the circle at any point on the circle is

a) 2 b) 3

c) 4 d) 1.

10. The length of the diagonal of a square is $4\sqrt{2}$ m, then the length of the side is

a) 4 m b) $8\sqrt{2}$ m

c) $\sqrt{2}$ m d) 8 m.

11. The mid-point of the line segment, joining the points (3, 5) and (1, 3) is

a) (4, 2) b) (2, 4)

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

12. The equation of a straight line passing through (2, – 3) and parallel to x-axis is

a) $x = 3$ b) $x = -3$

c) $y = -3$ d) $y = 3$.

13. If $\sin\theta = \frac{\sqrt{3}}{2}$, then the value of θ is

a) 60° b) 30°

c) 45° d) 90°.

14. The standard deviation of a given data is 4. If each value is multiplied by 3, then the new standard deviation is

a) 4 b) 12

c) 7 d) 1.

15. One card is drawn at random from a shuffled pack of 52 cards. Then the probability that it will be a spade is

a) $\frac{1}{13}$ b) $\frac{1}{4}$

c) $\frac{1}{2}$ d) $\frac{1}{52}$.

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. Find the 10^{th} term of an A.P. whose first term is 12 and the common difference is 5.

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

18. Find the surface area of the sphere whose radius is 3 cm.

19. If $A = \{ a, b, c, d, e \}$, $B = \{ b, d, f, g \}$, $C = \{ b, e, f, h \}$, find the value of $A \cup (B \cap C)$.

20. If $f(x) = x + 5$, $g(x) = x^2$, then find the value of fog.

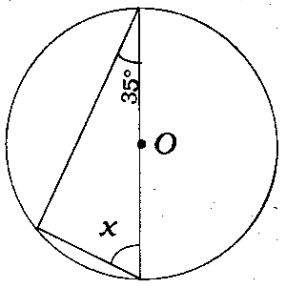
21. Find the G.C.D. of $(a - b)^2$; $a^2 - b^2$.

22. Simplify : $\frac{5x + 20}{7x + 28}$.

23. Define Event.

24. Chords AB and CD cut at P inside the circle. If $AP = 10$, $PB = 4$, $CP = 5$, find PD.

25. In the figure, O is the centre of the circle, find the value of x.



26. Find the co-ordinates of the point which divides the line segment joining the points (2, 6) and (3, 4) in the ratio 3 : 1 internally.

27. If the straight line $7x - 5y = k$ passes through the point (1, 1), find the value of k.

28. If $\sin \theta = \cos \theta$ and θ is acute, find the value of $\tan \theta$.

29. The standard deviation and the mean of a series are 15 and 60 respectively. Find the coefficient of variation.

30. An integer is chosen from 1 to 50. Find the probability that it is a multiple of 7.

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. Find the sum of all multiples of 9 between 400 and 600.

OR

In a G.P. the fourth term is 27, and the 7^{th} term is 729. Find the first term and the common ratio.

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

OR

A hemispherical bowl of radius 30 cm is filled with soap paste. If paste is made into cylindrical soap cakes each of radius 5 cm and height 2 cm, how many cakes do we get ?

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

OR

If $A = \{ 0, 1, 2, 3 \}$, $B = \{ 3, 7, 11, 15, 17 \}$, $f : A \to B$ is defined by $f(x) = 4x + 3$, represent f as (i) the set of ordered pairs (ii) a table (iii) an arrow diagram.

34. Factorise : $3x^3 - 10x^2 + 11x - 4$.

OR

Multiply :

$$\frac{x^2 - 4x - 12}{x^2 - 3x - 18} \times \frac{x^2 - 2x - 3}{x^2 + 3x + 2}.$$

35. If $9x^4 + 12x^3 + 40x^2 + ax + b$ is a perfect square, find the value of a and b.

OR

If α, β are the roots of the equation $x^2 - 3x - 4 = 0$, form the equation whose roots are $\alpha^2\beta$, $\beta^2\alpha$.

36. Draw the graph of the system of linear inequations :

$x - 2y \geq 3$ and $2x + 3y \leq 6$

and find the solution set. (Graph sheet need not be used).

OR

The following table given is the characteristics of a project :

Activity	1 – 2	1 – 3	2 – 3	3 – 4	3 – 5	4 – 6	5 – 6	6 – 7
Duration in days	5	10	3	4	6	6	5	5

i) Draw the network diagram.

ii) Find the critical path and project duration.

37. Prove that in a right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides.

OR

Three circles with centres at A, B, and C touch each other externally. $AB = 4$ cm, $BC = 6$ cm, $CA = 8$ cm. Find their radii.

38. Prove that the points (2, – 2), (8, 4), (5, 7) and (– 1, 1) form a parallelogram.

OR

Show that the following lines are concurrent, and find their point of concurrency :

$x + y = 7$, $2x + y = 16$ and $3x + 8y = 11$.

39. A ladder is placed against a wall such that it reaches the top of the wall of height 6 m and the ladder is inclined at an angle of 60° with the ground. Find how far the ladder is from the foot of the wall.

OR

From the top of a lighthouse, the angles of depression of two ships on either sides of the lighthouse are observed as 30° and 45°. If the height of the lighthouse is 200 metres, find the distance between the ships.

40. Find the standard deviation for the following values :

30, 80, 60, 70, 20, 40, 50.

OR

A coin is tossed three times. Find the probability of getting (i) head and tail alternatively, (ii) exactly two heads.

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 $AB = 7{\cdot}5$ cm, $AC = 10$ cm, $\angle BAC = 30°$, $AD = 6{\cdot}5$ cm.

OR

Take a point P at a distance of 7 cm from the centre of a circle of radius 3 cm and from P draw two tangents to the circle. Measure the length of each tangent.

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

OR

Draw the graph of $y = x^2 - 2x - 8$ and hence use it to solve $x^2 - 2x - 8 = 0$.