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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* choices. Choose the correct or the most appropriate one among them and write down the alphabet indicating the response.
- $15 \times 1 = 15$

1. The common difference of the A.P. $5 + 9 + 13 + 17 + \dots$ is

- | | |
|------|-------|
| a) 3 | b) 2 |
| c) 5 | d) 4. |

2. The value of $5 \oplus_4 2$ is

- | | |
|------|-------|
| a) 3 | b) 4 |
| c) 5 | d) 6. |

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3. Volume of a hemisphere is

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

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

c) $\frac{1}{3} \pi r^3$ cu.units

d) $\frac{1}{3} \pi r^2 h$ cu.units.

4. $A \cup A' =$

a) A

b) $\{\}$

c) A'

d) ξ .

5. If $R = \{(a, r), (a, s), (b, r), (b, s)\}$, then the domain is

a) $\{a, b\}$

b) $\{b, s\}$

c) $\{r, s\}$

d) $\{a, r\}$.

6. The value of $\frac{x}{5-x} - \frac{5}{5-x}$ is

a) 1

b) -1

c) $x-5$

d) $5x$.

7. If the roots are equal, then the value of $b^2 - 4ac$ is

a) 0

b) > 0

c) < 0

d) 4.

8. A point that satisfies $2x + 3y \leq 6$ is

a) (7, 0)

b) (3, -3)

c) (4, 2)

d) (-1, 4).

9. Angles in the same segment of a circle are
- a) equal b) unequal
c) complementary d) supplementary.
10. The number of tangents that can be drawn from a point outside the circle is
- a) 1 b) 0
c) 2 d) 4.
11. If the straight line $4x - 3y = k$ passes through the point $(1, 1)$, then k is
- a) 2 b) - 2
c) 1 d) - 1.
12. The equation of a line parallel to y -axis and passing through the point $(3, 2)$ is
- a) $y - 2 = 0$ b) $x - 2 = 0$
c) $y - 3 = 0$ d) $x - 3 = 0$.
13. If $\sin \theta = \tan \theta$, then the value of θ is
- a) 45° b) 90°
c) 60° d) 0° .
14. If the variance of a data is 1.69, then the standard deviation is
- a) 1.3 b) 13
c) 3.38 d) 69.
15. The sum of $P(A) + P(\overline{A})$ is
- a) 1 b) $\frac{1}{2}$
c) $\frac{1}{4}$ d) $\frac{3}{4}$.

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PART - B

(Marks : 20)

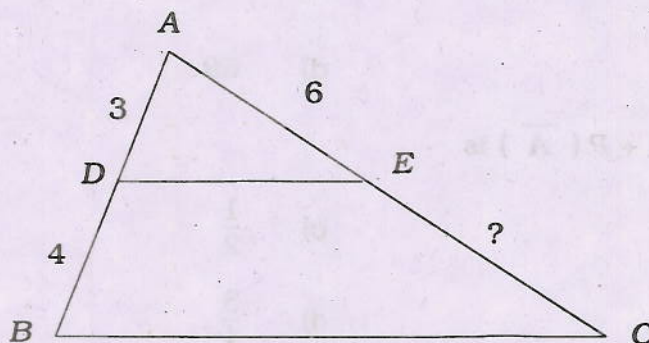
Note : i) Answer any *ten* from the *fifteen* questions.

ii) Show all the steps.

iii) Each question carries *two* marks.

$10 \times 2 = 20$

16. Solve : $4x \equiv 2 \pmod{3}$.
17. The 7th term of an A.P. is -15 and 16th term is 30 . Find the common difference.
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 $A = \{ a, b, c, d, e \}$, $B = \{ b, d, f, g \}$ and $C = \{ b, e, f, h \}$, then find the set of $A \cup (B \cap C)$.
20. In the function $f(x) = x^2 - x + 7$, the domain of f is $\{ 1, 3, -3 \}$. Find the range of f .
21. If $(x + 1)$ is a factor of $x^3 + mx^2 + 19x + 12$, determine the value of m .
22. Simplify : $\frac{5x + 15}{2y - 8} \times \frac{3y - 12}{4x + 12}$.
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 the triangle ABC , $DE \parallel BC$. Find EC .



26. Find the intercepts made by the straight line $3x - 2y - 6 = 0$ on the axes of co-ordinates.
27. The centre of a circle is $(6, 4)$. A diameter of the circle has its one end at the origin. Find its other end.
28. If $\sin \theta = \cos \theta$, where θ is an acute angle, find the value of $2 \tan^2 \theta - \sin^2 \theta - 1$.
29. Evaluate coefficient of variation for some data whose standard deviation is 14 and arithmetic mean is 70.
30. What is the probability that a leap year selected at random will contain 53 Sundays ?

PART - C

(Marks : 45)

Note : i) This part contains *ten* questions.

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. The fourth and the seventh terms of a G.P. are 27 and 729 respectively. Find the first term and the common ratio.

OR

Find the sum of all numbers between 200 and 400 divisible by 7.

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

OR

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.

33. Verify the de Morgan's law using Venn diagram :

$$A - (B \cup C) = (A - B) \cap (A - C).$$

OR

If $f(x) = x - 1$, $g(x) = 2x + 1$ and $h(x) = x^2$, prove that

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

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

OR

Simplify : $\frac{x}{x^2 - 9x + 20} + \frac{x}{x^2 - 8x + 15} - \frac{x}{x^2 - 7x + 12}$.

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

OR

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

36. Use graphical method to solve the following :

$$2x + y \geq 4 ; 3x + 5y \geq 15 ; x \geq 0 ; y \geq 0.$$

(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 opposite angles of a cyclic quadrilateral are supplementary.

OR

Chords AB and CD cut at P outside a circle such that $AB = 8$, $BP = 4$ and $CD = 8$. Find DP .

38. Find the area of the quadrilateral formed by the points $(3, 4)$, $(5, -2)$, $(4, -7)$ and $(1, 1)$.

OR

Find the equation of the straight line joining the point $(4, 5)$ and the point of intersection of the straight lines $5x - 3y = 8$ and $2x - 3y = 5$.

39. Find the area of a right angled triangle with hypotenuse 10 cm and one of the acute angles, $66^\circ 36'$.

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 them.

40. Find the standard deviation of the following data :

38, 70, 48, 34, 42, 56.

OR

Two persons X and Y appeared in an interview for two vacancies in an office. The chance for X 's selection is $\frac{1}{5}$ and the chance of Y 's selection is $\frac{1}{7}$. Find the chance that (i) both of them are selected (ii) only one of them is selected (iii) none of them is selected.

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PART - D

(Marks : 20)

Note : i) This part contains two questions.

ii) Answer both the questions choosing either of the alternatives under each question.

iii) Each question carries ten marks. 2 × 10 = 20

41. Construct a cyclic quadrilateral $ABCD$, given $AB = 7$ cm, $BC = 5$ cm, $AC = 6$ cm and $BD = 6.5$ cm.

OR

Draw a circle with centre O and radius 5 cm. Take a point P outside the circle at a distance of 13 cm from its centre. Draw two tangents to the circle from the point P .

42. Solve graphically of the following equation :

$$2x^2 - x - 6 = 0.$$

OR

Draw the graph of $xy = 18$, $x > 0$, $y > 0$. Use the graph to find y when $x = 6$ and x when $y = 4$.