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## MATHEMATICS

( English Version )

( New Syllabus )

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

[ Maximum Marks : 100

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

### PART - A

( Marks : 15 )

- Note :**
- This Part contains *fifteen* questions. Answer *all* the questions.
  - Each question carries *one* mark.
  - 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. The sum of the first  $n$  natural numbers is 10. The sum of their cubes is

- |         |        |
|---------|--------|
| a) 20   | b) 100 |
| c) 1000 | d) 30. |

2. If  $-33 \pmod{9} = x$ , then the value of  $x$  is

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

[ Turn over

3. Curved surface area of a hollow cylinder is
- a)  $2\pi Rh$
  - b)  $2\pi rh$
  - c)  $\pi rl$
  - d)  $2\pi h(R+r)$ .
4.  $A' \cap B' =$
- a)  $A' \cup B'$
  - b)  $A' \cap B$
  - c)  $(A \cup B)'$
  - d)  $A \cup B'$ .
5. If  $f(x) = x + 5$ ,  $g(x) = x^2$ , then  $f \circ g(x) =$
- a)  $(x + 5)^2$
  - b)  $x^2 + 5$
  - c)  $x^2 + x$
  - d)  $x^2 - 5$ .
6. G.C.D. of  $m^6$ ,  $m^{12}$ ,  $m^{18}$  is
- a)  $m^6$
  - b)  $m^{18}$
  - c)  $m^{12}$
  - d)  $m^{36}$ .
7. Square root of  $9x^2 + 30x + 25$  is
- a)  $3x + 5$
  - b)  $3x - 5$
  - c)  $9x + 5$
  - d)  $9x - 5$ .
8. Which is linear equation ?
- a)  $2x + 3y = 5$
  - b)  $2x + 3y > 5$
  - c)  $2x + 3y < 5$
  - d)  $2x < 3y$ .
9. In a cyclic quadrilateral ABCD,  $m\angle A = 5x$ ,  $m\angle C = 4x$ , the value of  $x$  is
- a)  $12^\circ$
  - b)  $20^\circ$
  - c)  $48^\circ$
  - d)  $36^\circ$ .
10. The tangents at the ends of a diameter are
- a) perpendicular
  - b) parallel
  - c) equal
  - d) none.

11. The centre of a circle is  $( - 6, 4 )$ . A diameter of the circle has its one end at the origin. The other end of the diameter is
- a)  $( - 12, 8 )$     b)  $( 6, - 4 )$   
 c)  $( 12, - 8 )$     d)  $( - 6, 4 )$ .
12. If the straight line  $7x - 5y = k$  passes through the point  $( 1, 1 )$ , then  $k$  is
- a) 2    b) - 2  
 c) 1    d) - 1.
13. The first mathematician to use algebra in trigonometry was
- a) Brahmagupta    b) Ptolemy  
 c) Bhaskaracharya    d) Ramanujam.
14. If the value of  $\cos \theta = \frac{1}{\sqrt{2}}$  then the value of  $\tan \theta$  is
- a) 0    b) 2  
 c) 1    d) 3.
15. A die is rolled once, the probability of getting an even number is
- a)  $\frac{1}{3}$     b)  $\frac{2}{3}$   
 c)  $\frac{1}{2}$     d)  $\frac{1}{4}$ .

**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  $11^{\text{th}}$  term of the A.P. 3, 8, 13, .....

17. Solve :  $4x \equiv 2 \pmod{3}$ .

[ Turn over ]

18. The radius and height of the cone are 7 cm and 24 cm respectively. Find the volume.
19.  $\xi = \{ 5, 6, 9, 11, 13, 17, 18 \}$ ,  $A = \{ 6, 19, 13, 17 \}$  and  $B = \{ 5, 9, 17 \}$ ; find  $(A \cup B)'$ .
20. Given  $f(x) = \frac{4x}{x+1}$  with domain  $\{-3, 0\}$ . Find the range of  $f$ .
21. Find the L.C.M. of  $6x^2y$ ,  $9x^2yz$ ,  $12x^2y^2z$ .
22. If  $\alpha$  and  $\beta$  are the roots of  $x^2 + 8x - 12 = 0$ , find  $\frac{1}{\alpha} + \frac{1}{\beta}$ .
23. Define critical path and project duration.
24. Determine the length of the tangent to a circle of radius 6 cm from a point at a distance of 10 cm from the centre of the circle.
25. Chords  $AB$  and  $CD$  cut at  $P$  inside the circle.  $AB = 11$ ,  $AP = 3$ ,  $CP = 6$ . Find  $CD$ .
26. Find the point which divides the line segment joining the points  $(-1, 0)$  and  $(4, 5)$  internally in the ratio  $2 : 3$ .
27. Find the equation of a straight line parallel to Y-axis and passing through the point  $(-7, 5)$ .
28. Use trigonometric tables to find the value of  
 $\sin 29^\circ 20' + \cos 57^\circ 40'$ .
29. The coefficient of variation of a series is 65% and its standard deviation is 15.6. Find the arithmetic mean of the series.
30. An integer is chosen at random from 1 to 50. Find the probability that the number is divisible by 5.

**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 × 5 = 45

31. Find the value of  $\sqrt{3\sqrt{3\sqrt{3}}}$  .....

OR

Find the sum of  $16^2 + 17^2 + 18^2 + \dots + 30^2$ .

32. An ice-cream cone has a hemispherical top. If the height of the cone is 9 cm and base radius is 2.5 cm, find the volume of the ice-cream in the ice-cream cone.

OR

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 ?

33. Verify the De Morgan's Law  $A - (B \cup C) = (A - B) \cap (A - C)$  for the following set :

$$A = \{ 3, 4, 5, 6 \}, B = \{ 2, 5, 6, 7 \} \text{ and } C = \{ 1, 3, 6, 7 \}.$$

OR

$f(x) = \{ (-1, 2), (-3, 1), (-5, 6), (-4, 3) \}$  represents a function from A to B.

a) Write its domain and range.

Represent it using

b) an arrow diagram

c) a table.

[ Turn over

34. 4 pens, 12 notebooks, 6 pencils cost Rs. 160. 3 pens, 4 notebooks and 1 pencil cost Rs. 66. 3 pens, 6 notebooks and 4 pencils cost Rs. 94. Find the cost of each.

OR

Factorise :  $x^3 - 3x^2 - 10x + 24$ .

35. If  $9x^4 + 12x^3 + 10x^2 + ax + b$  is a perfect square, find the values of  $a$  and  $b$ .

OR

The sum of a number and its reciprocal is  $\frac{65}{8}$ . Find the number.

36. Maximise  $Z = 6x + 10y$  subject to  $2x + y \geq 1$

$$5x + 10y \geq 4$$

$$x \geq 0$$

$$y \geq 0.$$

( Graph sheet need not be used ).

OR

A project has the following time schedule :

<b>Activity</b>	1 - 2	2 - 3	2 - 4	3 - 5	4 - 6	5 - 6
<b>Duration in days</b>	6	8	4	9	2	7

Draw the network for the project and find the critical path. Compute the project duration.

37. Prove that the sum of the opposite angles of a cyclic quadrilateral is  $180^\circ$ .

OR

P and Q are points on the sides CA and CB respectively of a triangle ABC right angled at C. Prove that  $AQ^2 + BP^2 = AB^2 + PQ^2$ .

38. Show that the following points ( 9, 0 ), ( 1, 4 ) and ( 11, - 1 ) are collinear.

OR

Find the in-centre of the triangle whose vertices are A ( 1, 1 ), B ( 2, 1 ) and C ( 2, 2 ).

39. Find the area of an isosceles triangle with base 16 cm and vertical angle  $57^\circ$ .

OR

A lighthouse was observed from two points in a line with it, but on opposite sides of it. The distance between the points is 120 m. If the angle of elevation are  $30^\circ$  and  $45^\circ$ , find the height of the lighthouse.

40. The marks of 5 students scored out of 50 are 20, 25, 30, 35, 40. Find the standard deviation of the marks. When we convert the marks to 100 find the new S.D.

OR

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

[ Turn over

**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,  $\angle BAC = 30^\circ$  and  $AD = 6.5$  cm.

OR

Draw a circle of diameter 10 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  $y = x^2 - 2x - 15$  and use it to solve the equation  $x^2 - 2x - 24 = 0$ .

OR

Use the trapezoidal rule to find the area under the curve  $y = x^2$  between  $x = 2$  and  $x = 4$ , taking  $n = 4$ . Draw the graph and shade the required area.

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