ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Code No. : 81-E

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಇಂಗ್ಲಿಷ್ ಭಾಷಾಂತರ / English Version)

(ಹಳೆ ಪಠ್ಯಕ್ರಮ / Old Syllabus)

(ಪುನರಾವರ್ತಿತ ಅಭ್ಯರ್ಥಿ + ಪುನರಾವರ್ತಿತ ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / Regular Repeater + Private Repeater)

General Instructions :

i) The Question-cum-Answer Booklet consists of objective and subjective types of questions having 58 questions.

ii) Space has been provided against each objective type question. You have to choose the correct choice and write the complete answer along with its letter in the space provided.

iii) For subjective type questions enough space for each question has been provided. You have to answer the questions in the space.

iv) Follow the instructions given against both the objective and subjective types of questions.

v) Candidate should not write the answer with pencil. Answers written in pencil will not be evaluated. (Except Graphs, Diagrams & Maps)

vi) In case of Multiple Choice, Fill in the blanks and Matching questions, scratching / rewriting / marking is not permitted, thereby rendering to disqualification for evaluation.

vii) Candidates have extra 15 minutes for reading the question paper.

viii) **Space for Rough Work** has been printed and provided at the bottom of each page.

ix) Do not write anything in the space provided in the right side margin.

(SPACE FOR ROUGH WORK)

I. *Four* alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter in the space provided against each question. $20 \times 1 = 20$

1. If $A = \{ a, b, c \}$ and $B = \{ c, d, e \}$, then $A \cap B$ is

   (A) $\{ a, b, c, d, e \}$ (B) $\{ c \}$

   (C) $\{ a, b \}$ (D) $\{ d, e \}$.

2. In a geometric progression, if $T_4 = 10$ and common ratio is 2 then T_3 is

   (A) 5 (B) 20

   (C) 8 (D) 12.

3. Which of the following is an identity (unit) matrix ?

   (A) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

   (C) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

4. The value of ${}^5P_1 - {}^3P_0$ is

   (A) 4 (B) 2

   (C) 3 (D) 0.

5. The HCF and LCM of two expressions A and B are H and L respectively. Then their relation can be written as

   (A) $A \times H = B \times L$ (B) $A \times B = H \times L$

   (C) $\frac{A}{H} = \frac{B}{L}$ (D) $\frac{A}{L} = \frac{B}{H}$.

(SPACE FOR ROUGH WORK)

6. The LCM of two expressions $a^2 - 2ab + b^2$ and $a^2 - b^2$ is $(a - b)^2 . (a + b)$. Then their HCF is

(A) $(a + b)$ (B) $(a - b)$

(C) $(a - b)^2$ (D) $(a^2 - b^2)$.

7. The value of $\sum_{a,b,c} (a - b)$ is

(A) $a + b + c$ (B) 0

(C) $a - b - c$ (D) $a - b$.

8. The factors of $a^3 + b^3$ are

(A) $(a + b)(a^2 + ab + b^2)$ (B) $(a + b)(a^2 + ab - b^2)$

(C) $(a + b)(a^2 - ab + b^2)$ (D) $(a + b)(a^2 - ab - b^2)$.

9. The product of $\sqrt{2}$ and $\sqrt[3]{3}$ is

(A) $\sqrt[6]{6}$ (B) $\sqrt[6]{9}$

(C) $\sqrt[6]{72}$ (D) $\sqrt[6]{27}$.

10. Which of the following is a pure quadratic equation ?

(A) $x(x - 2) = 0$ (B) $x + \frac{1}{x} = 5$

(C) $x + \frac{1}{x} = 0$ (D) $(x - 2)^2 = 0$.

11. Square of a number is added to three times the same number and their sum is 28. This statement can be written in the equation form as

(A) $3a^2 + 3a + 28 = 0$ (B) $a^2 = 3a + 28$

(C) $a^2 + 3a = 28$ (D) $3a^2 + a = 28$.

(SPACE FOR ROUGH WORK)

12. The product of the roots of the equation $x^2 - 5x = 0$ is

(A) 0 (B) 5

(C) – 5 (D) 1.

13. The nature of the roots of the equation $x^2 - 4x + 4 = 0$ is

(A) real and equal (B) real and rational

(C) real and irrational (D) imaginary.

14. Circles having same centre but different radii are called

(A) concentric circles (B) congruent circles

(C) intersecting circles (D) touching circles.

15. "A straight line drawn parallel to the side of a triangle divides the other two sides proportionally." This statement was enunciated by

(A) Thales (B) Pythagoras

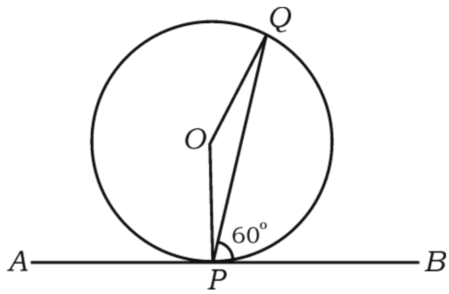
(C) Baudhayana (D) Appolonius.

16. Angle between radii at the centre of a circle is 120°. Then the angle between tangents drawn at the ends of the radii is

(A) 60° (B) 120°

(C) 90° (D) 100°.

17. In the figure APB is a tangent at P to the circle with centre O. If $\angle QPB = 60°$ then $\angle POQ$ is



(A) 60° (B) 100°

(C) 120° (D) 150°.

(SPACE FOR ROUGH WORK)

18. The circumference of the base of a right circular cylinder is 44 cm and height is 10 cm. Then its lateral surface area is

(A) 44 cm^2 (B) 400 cm^2

(C) 54 cm^2 (D) 440 cm^2.

19. The formula used to find the total surface area of a cone is

(A) πrl (B) $\pi r(r+l)$

(C) $2\pi rh$ (D) $2\pi r(r+h)$.

20. The shape of each face of a cube is

(A) square (B) triangular

(C) pentagonal (D) hexagonal.

II. Fill in the blanks with suitable answers : $10 \times 1 = 10$

21. If 2, 4 and 8 are in geometric progression then the common ratio is ....

22. If A, G, H are Arithmetic mean, Geometric mean and Harmonic mean respectively then $\sqrt{AH}$ is ....

23. The formula to find coefficient of variation is ....

24. In a right angled triangle, the side opposite to right angle is called ....

25. A solid obtained by the rotation of a rectangle about one of its fixed sides is called ....

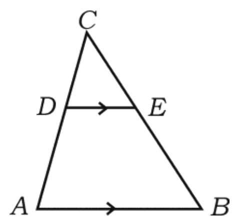
26. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ then $A - A^{I}$ is ....

27. If $\sum_{a,b,c} a = 0$ then the value of $\sum_{a,b,c} (a^3)$ is ....

28. If the HCF of ab^2 and a^2b is ab then the product of HCF and LCM is ....

(SPACE FOR ROUGH WORK)

29. In the figure $DE \parallel AB$. If $AD = 7$, $CD = 5$ and $BC = 18$ then CE is ....



30. Two circles of radii 5 cm and 3 cm touch each other internally. Then the distance between their centres is ....

III. 31. If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5\}$, then find $A - B$ and draw Venn diagram. 2

32. A florist has certain number of garlands. 120 of them have Champak, 60 have Jasmine flowers and 30 garlands have both the flowers. Find the total number of garlands with him. 2

33. Three terms are in geometric progression. Their product is 8 and common ratio is 2, then find the first term. 2

34. Find T_{10} in the harmonic progression $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}$ 2

35. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$, then find AB. 2

36. Find the values of

(a) ${}^{n}P_{0}$ (b) ${}^{10}P_{1}$

(c) ${}^{100}C_{0}$ (d) ${}^{2015}C_{2015}$. 2

37. Write $3\sqrt{5}$ in its exponential form and mention the rational factor, order and radicand. 2

38. Rationalise the denominator and simplify :

$$\frac{\sqrt{2}}{\sqrt{5} - \sqrt{3}} .$$ 2

(SPACE FOR ROUGH WORK)

39. Express $2x^2 = 5x - 3$ in the standard form of quadratic equation and write the values of a, b and c. 2

40. The product of two consecutive integers is 12. Find the numbers. 2

41. Solve $x^2 + 2x - 1 = 0$ by using formula. 2

42. Form a quadratic equation whose roots are 3 and 2. 2

43. Construct Cayley's table $(Z_4, \oplus_4)$ under addition modulo 4. 2

44. Construct a tangent to a circle of radius 3 cm at any point P on it. 2

45. Write the formula for

(a) total surface area of cylinder

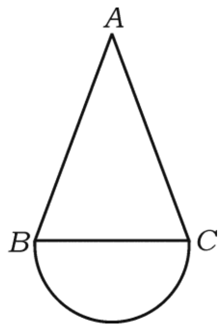
(b) volume of hemisphere. 2

46. Draw a plan using the information given below : 2

[Scale : 50 m = 1 cm]

	To D (in mts)	
	300	
	200	150 to C
To E 100	150	
	50	100 to B
	From A	

47. Verify Euler's formula for the graph : 2



48. Draw a graph (network) for the matrix : 2

$$\begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}.$$

(SPACE FOR ROUGH WORK)

IV. 49. There are 7 non-collinear points. How many (a) straight lines and (b) triangles can be drawn by joining these points ? 3

50. Calculate the standard deviation for the given frequency distribution table : 3

Class intervals	Frequency
1 — 5	2
6 — 10	3
11 — 15	4
16 — 20	1

51. Find the HCF of $4x^3 - 3x^2 - 24x - 9$ and $8x^3 - 2x^2 - 53x - 39$.

3

52. Prove that "tangents drawn to a circle from an external point are equal". 3

53. If $x^2 - 3x + 1 = 0$, then find the value of $x^2 - \frac{1}{x^2}$. 3

54. Show that the area of an equilateral triangle is $\frac{\sqrt{3}}{4} . a^2$. 3

V. 55. Draw direct common tangents to two circles of radii 4 cm and 2 cm with their centres 9 cm apart and measure their lengths. 4

56. Prove that "if two triangles are equiangular then their corresponding sides are proportional". 4

57. Find three numbers in Arithmetic Progression, whose sum and product are 6 and 6 respectively. 4

58. Draw the graphs of $y = x^2$ and $y = 2 - x$ and hence solve the equation $x^2 + x - 2 = 0$. 4

graph

(SPACE FOR ROUGH WORK)