ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Code No. : 81-E

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಇಂಗ್ಲಿಷ್ ಭಾಷಾಂತರ / English Version)

(ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus)

(ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / Private Fresh)

General Instructions :

i) The Question-cum-Answer Booklet consists of objective and subjective types of questions having 50 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) Candidates 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. $8 \times 1 = 8$

1. The harmonic mean between 2 and 4 is

   (A) $\frac{8}{3}$ (B) $\frac{3}{8}$

   (C) $\frac{8}{6}$ (D) $\frac{6}{8}$.

2. The value of ${}^{n}C_{n}$ is

   (A) n (B) 0

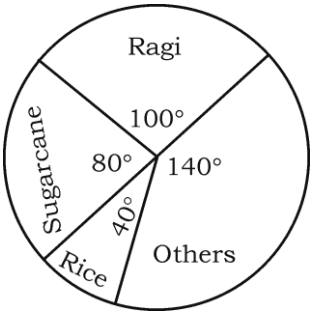
   (C) 1 (D) $n!$

3. The probability of winning a game is $\frac{5}{6}$. Then the probability of losing it is

   (A) $-\frac{5}{6}$ (B) $\frac{5}{6}$

   (C) $-\frac{1}{6}$ (D) $\frac{1}{6}$.

4. The given pie-chart shows annual agricultural yield of certain place. If the total production is 8100 tons, then the yield of Ragi in tons is



   (A) 225 (B) 2250

   (C) 22·5 (D) 2·250.

(SPACE FOR ROUGH WORK)

5. Which of the following is the zeroes of the polynomial $x^2 + 4x + 4$?

(A) 2 (B) – 2

(C) 4 (D) – 4.

6. The value of $\tan^2 60°$ is

(A) $\sqrt{3}$ (B) $2\sqrt{3}$

(C) $\frac{1}{3}$ (D) 3.

7. The distance between the points (2, 3) and (6, 6) is

(A) 5 units (B) 7 units

(C) 3 units (D) 4 units.

8. The slope of the line joining the points (3, – 2) and (4, 5) is

(A) $\frac{1}{7}$ (B) 1

(C) 7 (D) $\frac{3}{7}$.

II. Answer the following : $6 \times 1 = 6$

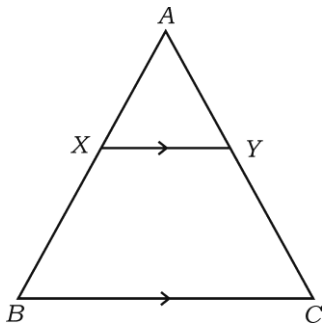
9. Express 210 as the product of prime factors.

10. If $A = \{ 1, 2, 3, 4 \}$ and $B = \{ 1 \}$, find $A \setminus B$.

11. Mean and standard deviation of runs scored by a cricket player are 80 and 4 respectively. Find coefficient of variation.

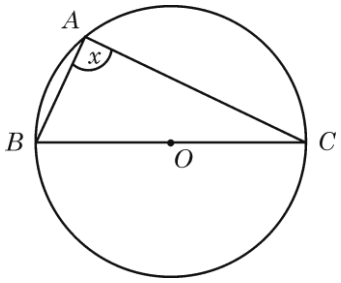
12. If $f(x) = x^2 - 4$, find $f(4)$.

13. In ΔABC, $XY \parallel BC$, $\frac{AY}{CY} = \frac{1}{2}$ and $AX = 4$. Find BX.



(SPACE FOR ROUGH WORK)

14. In the figure, BC is the diameter. What is the measure of x ?



III. 15. Prove that $3 + \sqrt{5}$ is an irrational number. 2

16. In a class of 100 students, 55 students have passed in Physics and 67 students have passed in Mathematics. Find the number of students passed in Physics only.

OR

A and B are the two subsets of Universal Set $\cup$ such that $n(\cup) = 700$, $n(A) = 200$, $n(B) = 300$ and $n(A \cap B) = 100$. Find $n(A' \cap B')$.

2

17. In how many ways 4-digit numbers can be formed using the digits 1, 2, 3, 7, 8, 9 without repetitions ? How many of these are even numbers ? 2

18. Find the number of sides of a polygon having 35 diagonals. 2

19. Two dice are thrown simultaneously. Find the probability of getting

(a) same number on both faces and

(b) both faces having multiples of five. 2

20. Calculate variance for the following data : 2

X = 2, 4, 6, 8, 10

(Scores)

21. Find the product of $\sqrt{2}$ and $\sqrt[3]{5}$. 2

(SPACE FOR ROUGH WORK)

22. Rationalise the denominator and simplify :

$$\frac{\sqrt{6}+\sqrt{3}}{\sqrt{6}-\sqrt{3}}.$$ 2

23. Find the value of a if $(x-5)$ is a factor of $\left(x^3-3x^2+ax-10\right)$.

OR

What must be added to the polynomial

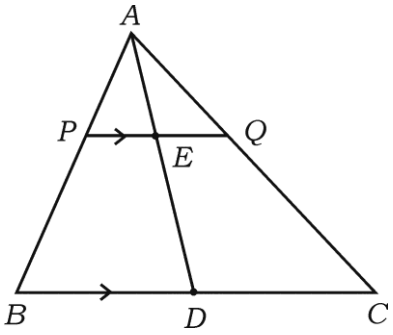
$P(x) = x^4 + 2x^3 - 2x^2 + x - 1$

so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$?

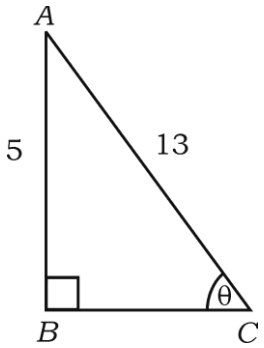
2

24. Solve the equation by using formula : $x^2 - 4x + 2 = 0$. 2

25. In ΔABC, AD is the median and $PQ \parallel BC$. Prove that $PE = EQ$. 2



26. In the given figure, find the values of cos θ and tan θ. 2



27. Find the perimeter of a triangle whose vertices have the coordinates (3, 10), (5, 2) and (14, 12). 2

(SPACE FOR ROUGH WORK)

28. Draw a circle of radius 3 cm and construct two tangents to it from an external point 8 cm away from the centre. 2

29. Draw a plan of a level ground using the given information : 2

[Scale : 20 m = 1 cm]

	Metre To D	
To E 60	150 100 80 40	80 to C 40 to B
	From A	

30. Verify Euler's formula for a Hexahedron. 2

31. If $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$, $A = \{1, 2, 3\}$ and $B = \{2, 3, 4, 5\}$, verify $(A \cup B)' = A' \cap B'$. 2

32. Find the number of terms in the Arithmetic progression
100, 96, 92, ... , 12. 2

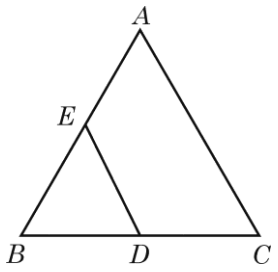
33. If ${}^{n}P_{r} = 840$ and ${}^{n}C_{r} = 35$, find n. 2

34. Simplify : $\sqrt{75} + \sqrt{108} - \sqrt{192}$. 2

35. Find the remainder using remainder theorem when
$P(x) = (x^3 + 3x^2 - 5x + 8)$ is divided by $g(x) = (x - 3)$. 2

36. Find the sum and product of the roots of the quadratic equation
$8m^2 - m - 2 = 0$. 2

37. In the given figure ABC and BDE are two equilateral triangles and $BD = DC$. Find the ratio between the areas of ΔABC and ΔBDE.



2

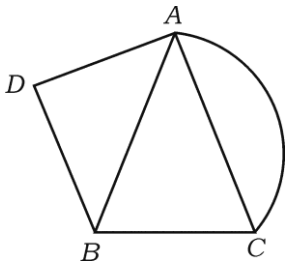
(SPACE FOR ROUGH WORK)

38. In a circle of radius 3 cm draw two radii such that the angle between them is 70°. Construct tangents at the non-centre ends of the radii.

2

39. Draw a circle of radius 3·5 cm and construct a chord of length 6 cm in it. Measure the perpendicular distance between the centre and the chord. 2

40. Find the order and type of each node in the given network. 2



IV. 41. In a harmonic progression, $T_3 = \frac{1}{7}$ and $T_7 = \frac{1}{5}$. Find T_{15}. 3

42. Aniruddha bought some books for Rs. 60. Had he bought 5 more books for the same amount, each book would have cost him 1 rupee less. Find the number of books bought by Aniruddha.

OR

The ages of Kavya and Karthik are 11 years and 14 years respectively. In how many years time will the product of their ages will be 304 ? 3

43. In ΔABC, $\angle A = 90°$, $AD \perp BC$ and $\angle B = 45°$. If $AB = x$, find AD in terms of x.

OR

ABC is a right angled triangle with $\angle C = 90°$, $BC = a$, $AC = b$, $CD \perp AB$ and $CD = P$. Show that

$$\frac{1}{P^2} = \frac{1}{a^2} + \frac{1}{b^2}.$$ 3

(SPACE FOR ROUGH WORK)

44. Prove that

$$\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = 1 - 2\sec\theta \cdot \tan\theta + 2\tan^2\theta.$$

OR

Prove that

$$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\,\theta + \cot\theta.$$ 3

45. Prove that 'the tangents drawn from an external point to a circle are equal'. 3

46. A solid cylinder has a total surface area of 462 cm^2. Its curved surface area is one-third of its total surface area. Find the radius of the cylinder.

OR

From the top of a cone of base radius 12 cm and height 20 cm, a small cone of base radius 3 cm is to be cut off. How far down the vertex is the cuts should be made ? Find the volume of the frustum so obtained. 3

V. 47. The sum of three consecutive terms in an arithmetic progression is 6 and their product is – 120. Find the three numbers.

OR

The product of three consecutive terms in a geometric progression is 216 and sum of their products in pairs is 156. Find the three terms. 4

48. 'In a right angled triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.' Prove. 4

49. Construct direct common tangents to two circles of radii 4 cm and 2 cm whose centres are 9 cm apart from their centres. Measure their length and write the length of direct common tangents. 4

50. Solve the equation graphically :

$x^2 + x - 6 = 0$. 4

graph

(SPACE FOR ROUGH WORK)