General Instructions :

i) The question-cum-answer booklet contains *two* Parts, **Part – A** & **Part – B**.

ii) **Part – A** consists of 60 questions and **Part – B** consists of 16 questions.

iii) Space has been provided in the question-cum-answer booklet itself to answer the questions.

iv) Follow the instructions given in **Part – A** and write the correct choice in full in the space provided below each question.

v) For **Part – B** enough space for each question is provided. You have to answer the questions in the space provided.

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

PART – A

Four alternatives are suggested to each of the following questions / incomplete statements. Choose the most appropriate alternative and write the answer in the space provided below each question. $60 \times 1 = 60$

1. Let Set $A = \{a, b, c, d\}$, Set $B = \{b, c, e\}$, then $n(A \cap B)$ is

(A) 4 (B) 3

(C) 7 (D) 2.

Ans. : ______________________

2. If $U = \{0, 1, 2, 3, 4\}$, $A = \{2, 3, 4\}$, $B = \{0, 2, 3\}$, then $(A \cap B)' =$

(A) $\{0, 1, 2, 3, 4\}$ (B) $\{0, 1, 4\}$

(C) $\{1, 4\}$ (D) $\{\ \}$.

Ans. : ______________________

3. Among 9 passengers, 5 can speak Kannada, 2 can speak both Kannada and English. The number of passengers who can speak only English is

(A) 5 (B) 3

(C) 4 (D) 6.

Ans. : ______________________

(SPACE FOR ROUGH WORK)

4. In a progression, if $T_n = 2n - 1$, the fourth term is

(A) 23 (B) 9

(C) 5 (D) 7.

Ans. : ______________________

5. The value of $\sum_{1}^{10} n$ is

(A) 10 (B) 11

(C) 55 (D) 110.

Ans. : ______________________

6. The common ratio in the Harmonic progression $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{6}$, ... is

(A) 2 (B) -2

(C) $\frac{1}{2}$ (D) 1.

Ans. : ______________________

7. As n approaches ∞, S_∞ is

(A) $\frac{a}{(1-r)}$ (B) $\frac{(1-r)}{a}$

(C) ar^{n-1} (D) ar^{0}.

Ans. : ______________________

8. The Geometric Mean (G.M.) between 4 and 16, is

(A) 4 (B) 16

(C) 8 (D) 12.

Ans. : ______________________

(SPACE FOR ROUGH WORK)

9. If $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then IA is

(A) $\begin{bmatrix} 4 & 2 \\ 1 & 5 \end{bmatrix}$

(B) $\begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$

(D) $\begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix}$.

Ans. : ______________________________

10. If $\begin{bmatrix} 3x & 1 \\ 5 & 4 \end{bmatrix} + \begin{bmatrix} 5 & 2 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 8 & 3 \\ 6 & 4 \end{bmatrix}$, then x is equal to

(A) 3

(B) 0

(C) – 3

(D) 1.

Ans. : ______________________________

11. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 & 4 \\ 1 & 2 & 5 \end{bmatrix}$, then which is possible among the following?

(A) $A + B$

(B) $A - B$

(C) AB

(D) BA.

Ans. : ______________________________

12. The value of $5P_2 - 4P_0 + 3P_1$ is

(A) 22

(B) 13

(C) 9

(D) 4.

Ans. : ______________________________

13. The number of ways we can arrange two books among 4 different books in a shelf, so that they are always together, is

(A) $4P_2$

(B) $3P_3 \times 2P_2$

(C) $4C_2$

(D) $3C_3 \times 2C_2$.

Ans. : ______________________________

(SPACE FOR ROUGH WORK)

14. The number of combinations of the letters of the word 'CAKE' is

(A) 8 (B) 24

(C) 1 (D) 0.

Ans. : ____________________

15. The average of given numbers is 20 and coefficient of variation is $0 \cdot 1$, then Standard Deviation is

(A) 2 (B) $0 \cdot 2$

(C) 20 (D) $0 \cdot 02$.

Ans. : ____________________

16. Standard Deviation of runs of a batsman in 10 innings is $1 \cdot 6$. Then variance is

(A) $2 \cdot 56$ (B) 16

(C) $0 \cdot 8$ (D) $3 \cdot 2$.

Ans. : ____________________

17. The product of H.C.F. and L.C.M. of two expressions is $6a^3 b^4 c^2$. If one expression is $2a^3 b^3 c^2$, then the other is

(A) $3abc$ (B) $6bc$

(C) $3b$ (D) $3bc$.

Ans. : ____________________

18. The H.C.F. of $(P^2 - 4)$ and $(P^2 - 5P + 6)$ is

(A) $P - 4$ (B) $P - 2$

(C) $P + 4$ (D) $P + 2$.

Ans. : ____________________

19. The L.C.M. of $(3x - 9)$ and $(5x^2 - 45)$ is

(A) $x - 3$ (B) $3 (x + 3) (x - 3)$

(C) $5 (x + 3)$ (D) $15 (x^2 - 9)$.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

20. When $\sum$ notation is used, the expression $x^2 + y^2 + z^2 - x - y - z$ becomes

(A) $\sum_{xyz} (x^2 + x)$

(B) $\sum_{xyz} (x - x^2)$

(C) $\sum_{xyz} x^2 + \sum_{xyz} x$

(D) $\sum_{xyz} (x^2 - x)$.

Ans. : ____________________

21. The expansion of $\sum_{pqr} p^2$ is

(A) $p^2 + q^2 + r^2$

(B) p^2

(C) q^2

(D) pqr.

Ans. : ____________________

22. If the sum of three numbers is 0 and the sum of the cubes of the same numbers is 99, then the product of those numbers is

(A) 9

(B) 33

(C) 24

(D) 30.

Ans. : ____________________

23. If $a + b + c = 0$, then which is equal to $(b + c)(c + a)$?

(A) ab

(B) bc

(C) ca

(D) abc.

Ans. : ____________________

24. Pure surd of $2\sqrt[3]{5}$ is

(A) $\sqrt[3]{10}$

(B) $\sqrt[3]{30}$

(C) $\sqrt[3]{40}$

(D) $\sqrt[3]{20}$.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

25. The rationalising factor of $a\sqrt{b} + c$ is

(A) $a\sqrt{b} + c$ (B) $a\sqrt{b} - c$

(C) $a\sqrt{b}$ (D) $\sqrt{b}$.

Ans. : ____________________

26. When the denominator of $\frac{3}{\sqrt{5}}$ is rationalised we get,

(A) $\frac{\sqrt{3}}{5}$ (B) $\frac{\sqrt{15}}{3}$

(C) $\frac{3}{5}$ (D) $\frac{3\sqrt{5}}{5}$.

Ans. : ____________________

27. When the equation $4a = \frac{36}{a}$ is solved, the value of a is

(A) $\pm\ 9$ (B) $+\ 3$

(C) $-\ 3$ (D) $\pm\ 3$.

Ans. : ____________________

28. The standard form of the equation $2x = 5 - x^2$ is

(A) $2x - 5 + x^2 = 0$ (B) $x^2 + 2x - 5 = 0$

(C) $x^2 - 2x + 5 = 0$ (D) $2x - 5 - x^2 = 0$.

Ans. : ____________________

29. The quadratic equation whose roots are $(3 \pm \sqrt{5})$ is

(A) $x^2 - 6x + 4 = 0$ (B) $x^2 - 3x + 5 = 0$

(C) $x^2 + 3x - 5 = 0$ (D) $x^2 + 6x + 4 = 0$.

Ans. : ____________________

30. If the roots of a quadratic equation are real and distinct, then which of the following is correct ?

(A) $\Delta > 0$ (B) $\Delta < 0$

(C) $\Delta = 0$ (D) $\Delta \leq 0$.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

31. The sum of the roots of the quadratic equation $2x^2 - 5x + 6 = 0$ is

(A) $-\frac{5}{2}$ (B) 3

(C) $\frac{5}{2}$ (D) $\frac{2}{5}$.

Ans. : ______________________

32. If the roots of the quadratic equation $mx^2 + 6x + 1 = 0$ have to be equal, then the value of m is

(A) 6 (B) 1

(C) 9 (D) 5.

Ans. : ______________________

33. If 0 is one root of the equation $x^2 - 5x = 0$, then the other root is

(A) 0 (B) -5

(C) $+5$ (D) ± 5.

Ans. : ______________________

34. If $2y \equiv 1 \pmod 5$, then the value of y is

(A) 2 (B) 5

(C) 6 (D) 3.

Ans. : ______________________

35. 17th hour of the day is equivalent to 5th hour. This relationship is expressed as

(A) $17 \equiv 5 \pmod{12}$ (B) $12 \equiv 5 \pmod{17}$

(C) $17 \equiv 12 \pmod 5$ (D) $17 \equiv 5 \pmod{24}$.

Ans. : ______________________

(SPACE FOR ROUGH WORK)

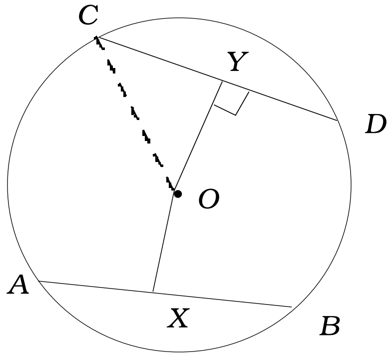
36. The product of $5 \otimes_{11} 10$ is

(A) 50 (B) 55

(C) 110 (D) 6.

Ans. : ____________________

37. In figure, $AB = CD = 8$ cm and $OX = 3$ cm then OC is

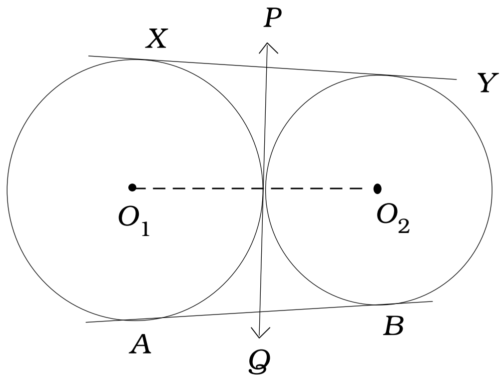


(A) 8 cm (B) 4 cm

(C) 3 cm (D) 5 cm.

Ans. : ____________________

38. In the given figure, the Transverse common tangent is



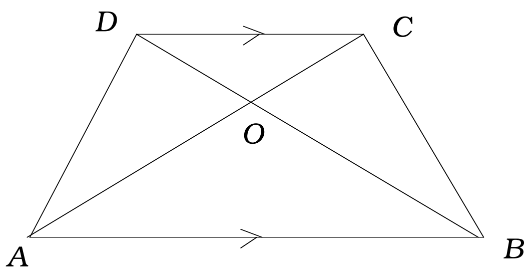
(A) XY (B) PQ

(C) AB (D) $O_1 O_2$.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

39. In the trapezium $ABCD$, $\overline{AB} \parallel \overline{CD}$ and the diagonals intersect at O. Then $\frac{OD}{OC}$ is equal to

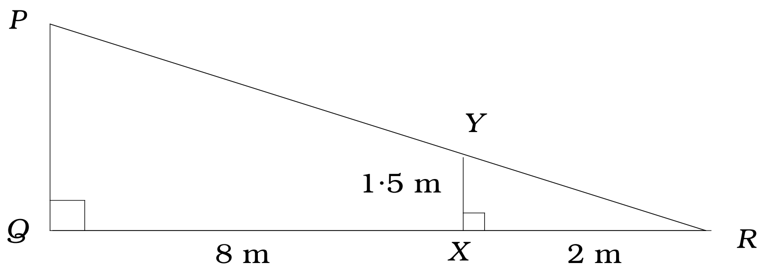


(A) $\frac{OB}{OA}$ (B) $\frac{AB}{CD}$

(C) $\frac{OC}{OD}$ (D) $\frac{AC}{BD}$.

Ans. : ____________________________

40. In the given figure, value of PQ is



(A) 10 m (B) 7·5 m

(C) 9·5 m (D) 3·5 m.

Ans. : ____________________________

41. Select the set of numbers in the following which can form similar triangles.

(A) 9, 12, 18 and 3, 4, 6 (B) 3, 4, 6 and 9, 10, 12

(C) 8, 6, 12 and 2, 6, 3 (D) 3, 4, 5 and 2, 4, 10.

Ans. : ____________________________

(SPACE FOR ROUGH WORK)

42. Two similar triangles have areas 120 sq.cm and 480 sq.cm respectively. Then the ratio of any pair of corresponding sides is

(A) 1 : 4 (B) 1 : 2

(C) 4 : 1 (D) 2 : 3.

Ans. : ____________________

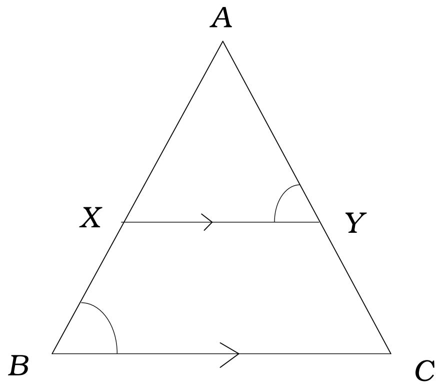
43. If two triangles are equiangular, then their corresponding sides are

(A) proportional (B) inversely proportional

(C) not proportional (D) not inversely proportional.

Ans. : ____________________

44. In the given figure, $\angle ABC = \angle AYX$, then the ratio of the corresponding sides is



(A) $\frac{AX}{AC} = \frac{AB}{AY} = \frac{CB}{XY}$ (B) $\frac{AB}{AY} = \frac{BC}{XY} = \frac{AX}{AC}$

(C) $\frac{AB}{AX} = \frac{AC}{AY} = \frac{BC}{XY}$ (D) $\frac{AX}{AC} = \frac{AY}{AB} = \frac{XY}{CB}$.

Ans. : ____________________

45. A ladder 13 m long rests against a wall at a height 12 m from the ground. Then the distance of the foot of the ladder from the wall is

(A) 1 m (B) 25 m

(C) 5 m (D) 12·5 m.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

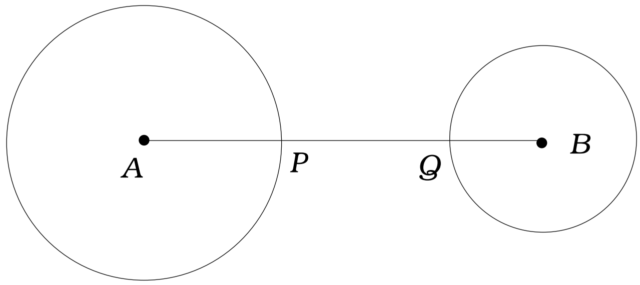
46. Major arc in a circle subtends

(A) an acute angle (B) a right angle

(C) an obtuse angle (D) a reflex angle.

Ans. : ____________________

47. Two circular discs of radii 4·5 cm and 2 cm are fixed to a string of length 10 cm as shown. Then the diameter of another disc which touches in circular discs at P and Q is



(A) 6·5 cm (B) 2·5 cm

(C) 1·75 cm (D) 3·5 cm.

Ans. : ____________________

48. Two circles of radii 8 cm and 5 cm touch internally. Then the distance between the centres is

(A) 13 cm (B) 3 cm (C) 5 cm (D) 6 cm.

Ans. : ____________________

49. A tangent is drawn to a circle of radius 8 cm from a point which is at a distance of 10 cm from the centre of the circle. Then the length of tangent is

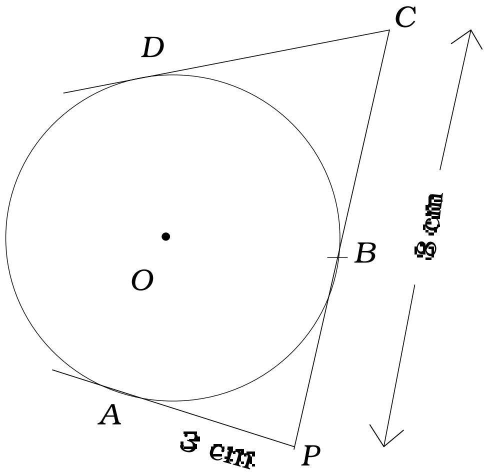
(A) 8 cm (B) 18 cm

(C) 2 cm (D) 6 cm.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

50. From the figure, $AP = 3$ cm and $PC = 8$ cm, then the length of the tangent CD is

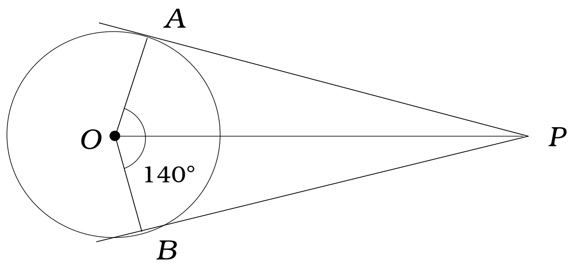


(A) 11 cm (B) 5 cm

(C) 7 cm (D) 8 cm.

Ans. : ____________________

51. In the figure, PA and PB are the tangents and $\angle AOB = 140°$. Then the measure of $\angle APO$ is



(A) 90° (B) 40°

(C) 20° (D) 180°.

Ans. : ____________________

52. Formula for Lateral surface area of a cylinder is

(A) πrh (B) $\pi r^2 h$

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

Ans. : ____________________

(SPACE FOR ROUGH WORK)

53. The curved surface area of a cone, whose circumference of the base is 66 cm and slant height is 12 cm, is

(A) 396 sq.cm (B) 792 sq.cm

(C) 78 sq.cm (D) 54 sq.cm.

Ans. : ______________________

54. A solid plastic sphere is melted and converted to a solid cube, then there will be no change in its

(A) length (B) breadth

(C) area of surface (D) volume.

Ans. : ______________________

55. Area of the base of a circular cylinder is 154 sq.cm and height is 10 cm. Then volume of cylinder is

(A) 1540 c.c. (B) 15·4 c.c.

(C) 164 c.c. (D) 144 c.c.

Ans. : ______________________

56. Total area of solid hemisphere is

(A) $4\pi r^2$ (B) $2\pi r^2$

(C) $3\pi r^2$ (D) πr^2 .

Ans. : ______________________

57. Euler's formula for all graphs is

(A) $V + F = E + 2$ (B) $N + R = A - 2$

(C) $N + R = A + 2$ (D) $N + A = R + 2$.

Ans. : ______________________

(SPACE FOR ROUGH WORK)

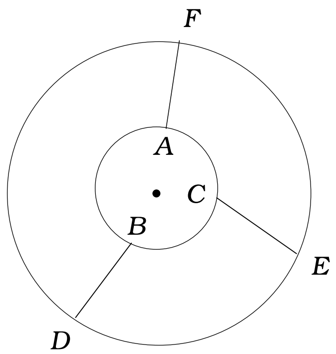
58. Shape of each face of Hexahedron is

(A) equilateral triangle (B) regular pentagon

(C) square (D) rectangle.

Ans. : ____________________

59. Number of regions in the given network is

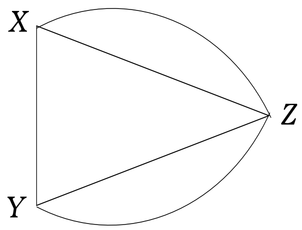


(A) 3 (B) 2

(C) 5 (D) 4.

Ans. : ____________________

60. The sum of the order of nodes in the given network is



(A) 3 (B) 4

(C) 5 (D) 10.

Ans. : ____________________

(SPACE FOR ROUGH WORK)

PART – B

61. If $A = \{ 3, 4, 5, 9 \}$, $B = \{ 4, 5, 6, 8 \}$ and $C = \{ 5, 7, 8, 9 \}$, show that Interaction of sets is associative. 2

(SPACE FOR ROUGH WORK)

62. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$, then find $A^2 - 2A$. 2

(SPACE FOR ROUGH WORK)

63. There are 7 badminton players. Ashaya is one of them. In how many ways can 5 players be selected including Ashaya ? 2

(SPACE FOR ROUGH WORK)

64. Find the 'Variance' for the given frequency table : 2

Class-interval	***Frequency (f)***
1 – 5	2
6 – 10	3
11 – 15	4
16 – 20	1

(SPACE FOR ROUGH WORK)

65. Find the H.C.F. of $2m^2 + 2m + m^3 + 1$ and $2m + 1 + m^2$. 2

(SPACE FOR ROUGH WORK)

66. If $a + b + c = 0$, then show that $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = 3$. 2

(SPACE FOR ROUGH WORK)

67. Find the product of $\sqrt{3}$ and $\sqrt[3]{6}$. 2

(SPACE FOR ROUGH WORK)

68. If $B = \dfrac{\sqrt{3}\, a^{2}}{4}$, solve for a and also find the value of a if $B = 16\sqrt{3}$. 2

(SPACE FOR ROUGH WORK)

69. Solve the quadratic equation $x^2 - 7x + 12 = 0$ by using the formula. 2

(**SPACE FOR ROUGH WORK**)

70. The base of a triangle is 4 cm longer than its altitude. If the area of the triangle is 48 sq.cm, find the altitude. 2

(SPACE FOR ROUGH WORK)

71. Construct a tangent to a circle of radius 2 cm from a point 5 cm away from its centre. 2

(SPACE FOR ROUGH WORK)

72. Draw a rough sketch from the following notes of a field book and find the area of the field : 2

	(Metre) to D	
	300	
	200	150 to *C*
	150	100 to *B*
	From *A*	

(SPACE FOR ROUGH WORK)

73. The middle term of an Arithmetic Series consisting of 25 terms is 20. Find the sum of the series. 4

(SPACE FOR ROUGH WORK)

74. Prove that ‘in a right-angled triangle, square on the hypotenuse is equal to the sum of the squares on the other two sides”. 4

(SPACE FOR ROUGH WORK)

75. Construct a direct common tangent to two circles of radii 3·5 cm and 2 cm whose centres are 8 cm apart. 4

(SPACE FOR ROUGH WORK)

76. Solve the quadratic equation $x^2 + x - 2 = 0$ graphically. 4

graph

(SPACE FOR ROUGH WORK)

(SPACE FOR ROUGH WORK)