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 × 1 = 60

1. If set $A = \{ 2, 3, 4, 5 \}$ and set $B = \{ 4, 5 \}$, then which of the following is a null set ?

    (A) $A - B$ (B) $B - A$

    (C) $A \cup B$ (D) $A \cap B$.

    Ans. : _____

2. P, Q and R are three sets, then $(P \cup Q) \cap (P \cup R) =$

    (A) $P \cup (Q \cup R)$ (B) $P \cap (Q \cup R)$

    (C) $P \cup (Q \cap R)$ (D) $P \cap (Q \cap R)$.

    Ans. : _____

3. A and B are the subsets of set U, $A^{\,\prime} \cup B^{\,\prime} = \{ 2, 3, 5 \}$ and

    $U = \{ 1, 2, 3, 4, 5, 6 \}$, then $A \cap B =$

    (A) $\{ 2, 3, 5 \}$ (B) $\{ 1, 4 \}$

    (C) $\{ 1, 2, 3, 4, 5, 6 \}$ (D) $\{ 1, 4, 6 \}$.

    Ans. : _____

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4. In a class of 50 students everyone should be a member of either Science club, or Maths club or even both. 29 students are the members of Science club and 11 students are the members of both the clubs. Then the number of students in Maths club only is

    (A)   21   (B)   18

    (C)   11   (D)   10.

    Ans. : _____

5. In sets A and B if $A - B = A$, then $A \cap B =$

    (A) A (B) B

    (C) $\cup$ (D) ϕ.

    Ans. : _____

6. In an arithmetic progression $T_n = 3n - 1$, then common difference =

    (A)   1   (B)   2

    (C)   3   (D)   4.

    Ans. : _____

7. In an arithmetic progression $T_{n+5} = 35$ and $T_{n+1} = 23$ then common difference is

    (A)   3   (B)   2

    (C) $3n$ (D) $2n$.

    Ans. : _____

8. Geometric mean of three numbers is 4. Then their product is

    (A)   16   (B)   64

    (C)   128   (D)   256.

    Ans. : _____

(SPACE FOR ROUGH WORK)

9. The harmonic mean of P and Q is

    (A) $\dfrac{2(P+Q)}{PQ}$

    (B) $\dfrac{2PQ}{P+Q}$

    (C) $\dfrac{2(P+Q)}{P-Q}$

    (D) $\dfrac{2P+Q}{PQ}$.

    Ans. : _____

10. If $\begin{bmatrix} 2 & 2x-6 \\ 0 & 3 \end{bmatrix}$ is a diagonal matrix, then x is equal to

    (A) 0

    (B) 1

    (C) 2

    (D) 3 .

    Ans. : _____

11. If $(AB)' = \begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}$, then $B'\,A' =$

    (A) $\begin{bmatrix} 2 & 5 \\ 3 & 6 \end{bmatrix}$

    (B) $\begin{bmatrix} 2 & 3 \\ 6 & 5 \end{bmatrix}$

    (C) $\begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}$

    (D) $\begin{bmatrix} 5 & 6 \\ 2 & 3 \end{bmatrix}$.

    Ans. : _____

12. $^{n}P_{1} + {}^{n}C_{1} =$

    (A) $2n$

    (B) n

    (C) 2

    (D) $n+1$.

    Ans. : _____

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13. Value of $^{20}C_{18}$ =

(A)   360   (B)   300

(C)   180   (D)   190.

Ans. : _____

14. If $^{n}P_{3}$ = 120, then n is equal to

(A)   12   (B)   10

(C)   8   (D)   6.

Ans. : _____

15. The correct relation is

(A) $^{n}P_{r} = {^{n}C_{r}} \times \lfloor r$ (B) $^{n}C_{r} = {^{n}P_{r}} \times \lfloor r$

(C) $^{n}P_{r} = {^{n}C_{r}} \div \lfloor r$ (D) $^{n}C_{r} = {^{n}P_{r}} + \lfloor r$.

Ans. : _____

16. Sheela is one among 5 girls in a group. 5 chairs are kept in a row. In how many ways can Sheela sit in the middle chair ?

(A) $^{5}P_{5}$ (B) $^{4}P_{4}$

(C) $^{5}P_{4} \times {^{2}P_{2}}$ (D) $^{4}P_{4} \times {^{2}P_{2}}$.

Ans. : _____

17. If the value of standard deviation is 0·9, then the value of variance is

(A)   0·81   (B)   8·1

(C)   0·3   (D)   0·03.

Ans. : _____

18. If the value of standard deviation of 10 scores is 0, then the scores

(A)   are equal to one another but opposite in signs

(B)   are equal to each other

(C)   are unequal to one another

(D)   increase by one.

Ans. : _____

(SPACE FOR ROUGH WORK)

19. Coefficient of variation of price of 4 foodgrains namely rice, wheat, jowar and ragi are 9·2, 9·9, 9·8 and 9·0 respectively. Then which foodgrain's rate is more consistent ?

    (A) Rice   (B) Wheat

    (C) Jowar   (D) Ragi.

    Ans. : _____

20. H.C.F. of $(a + b)$ and $(a - b)$ is

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

    (C) 1   (D) 0.

    Ans. : _____

21. When $\displaystyle\sum_{x,\ y,\ z} (x + y)$ is expanded, we get

    (A) $x + y + z$ (B) $2x + 2y + 2z$

    (C) $3x + 3y + 3z$ (D) $3xyz$.

    Ans. : _____

22. The value of $\displaystyle\sum_{a,\ b,\ c} (a - b)$ is equal to

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

    (C) 1   (D) 0.

    Ans. : _____

23. $(a + b)$ and $(a^2 + b^2 - ab)$ are the factors of

    (A) $a^3 + b^3$ (B) $a^3 - b^3$

    (C) $(a + b)^3$ (D) $(a - b)^3$.

    Ans. : _____

24. If $a - 2b - 3c = 0$ then $a^3 - 8b^3 - 27c^3 =$

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

    (C) $18abc$ (D) $- 27abc$.

    Ans. : _____

(SPACE FOR ROUGH WORK)

25. The order and radicand of $a \sqrt[n]{x}$ respectively are

    (A) a and n (B) a and x

    (C) n and x (D) x and n.

    Ans. : _____

26. $\sqrt{32} + \sqrt{50} =$

    (A) $\sqrt{82}$ (B) $5\sqrt{3}$

    (C) $7\sqrt{2}$ (D) $9\sqrt{2}$.

    Ans. : _____

27. Rationalising factor of $5\sqrt{p - q}$ is

    (A) $5\sqrt{p + q}$ (B) $\sqrt{p - q}$

    (C) $\sqrt{p + q}$ (D) $5\sqrt{p} + 5\sqrt{q}$.

    Ans. : _____

28. When $2\sqrt{x} - \sqrt{y}$ is subtracted from $5\sqrt{x} + 2\sqrt{y}$, the answer is

    (A) $3\sqrt{x} + 3\sqrt{y}$ (B) $3\sqrt{x} - \sqrt{y}$

    (C) $3\sqrt{x} + \sqrt{y}$ (D) $3\sqrt{x} - 3\sqrt{y}$.

    Ans. : _____

29. An example for pure quadratic equation is

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

    (C) $4x = 9x^2$ (D) $2x^2 = 16$.

    Ans. : _____

(**SPACE FOR ROUGH WORK**)

30. If an equation has only one root, then the equation is

    (A) quadratic equation   (B) linear equation

    (C) cubic equation   (D) simultaneous equation.

    Ans. : _____

31. If $F = \dfrac{mv^2}{r}$ then $v =$

    (A) $\sqrt{\dfrac{Fm}{r}}$ (B) $\sqrt{\dfrac{mr}{F}}$

    (C) $\sqrt{\dfrac{Fr}{m}}$ (D) $\sqrt{\dfrac{F}{rm}}$.

    Ans. : _____

32. One of the positive roots of the equation $(2x - 7)(3x - 5) = 0$ is

    (A) $\dfrac{7}{2}$ (B) $\dfrac{2}{7}$

    (C) $\dfrac{3}{5}$ (D) $\dfrac{5}{7}$.

    Ans. : _____

33. Value of x in the equation $px^2 + qx + r = 0$ is

    (A) $\dfrac{-p \pm \sqrt{p^2 - 4pq}}{2p}$ (B) $\dfrac{-q \pm \sqrt{q^2 - 4pr}}{2p}$

    (C) $\dfrac{-p \pm \sqrt{r^2 - 4pq}}{2r}$ (D) $\dfrac{-p \pm \sqrt{p^2 - 4pq}}{2q}$.

    Ans. : _____

34. The length of a rectangle is 4 cm more than the breadth. The area is 60 sq.cm. This can be represented as

    (A) $x + (x + 4) = 60$ (B) $x + (x + 4) - 60 = 0$

    (C) $(x + 4) x + 60 = 0$ (D) $(x + 4) x - 60 = 0.$

    Ans. : _____

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35. The nature of the roots of the equation $ax^2 + bx + c = 0$ is decided by

    (A) $b^2 - 4ac$ (B) $b^2 + 4ac$

    (C) $b - 4ac$ (D) $b + 4ac$.

    Ans. : _____

36. The product of the roots of the equation $2x^2 = 3x$ is

    (A) $-\dfrac{2}{3}$ (B) $\dfrac{3}{2}$

    (C) 0 (D) $\dfrac{1}{2}$.

    Ans. : _____

37. The positive value of m for which the roots of the equation $x^2 - mx + 25 = 0$ are equal, is

    (A) 20 (B) 10

    (C) 15 (D) 5.

    Ans. : _____

38. If the sum of the roots of a quadratic equation is -5 and the product is 4, then the equation is

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

    (C) $x^2 + x - 20 = 0$ (D) $x^2 - x - 20 = 0$.

    Ans. : _____

39. If a and b are the roots of the equation $x^2 - 5x + 7 = 0$, then $ab(a + b) =$

    (A) 5 (B) 25

    (C) 35 (D) 49.

    Ans. : _____

(SPACE FOR ROUGH WORK)

[Turn over

40. The product of the roots of the equation $x^2 + 5x + (k + 4) = 0$ is zero, then $k =$

 (A) – 5   (B) – 4

 (C) 4   (D) 5.

 Ans. : _____

41. The greatest remainder obtained when an integer is divided by $(m + 1)$ is

 (A) 0   (B) 1

 (C) $m - 1$ (D) m.

 Ans. : _____

42. Value of x, if $x \oplus_{10} x \equiv 2$, is

 (A) 2   (B) 3

 (C) 6   (D) 7.

 Ans. : _____

43. If $^nC_3 = {}^nC_8$, then the value of $^nC_1 =$

 (A) 3   (B) 11

 (C) 24   (D) 336.

 Ans. : _____

44. *AB* and *CD* are two equal and parallel chords in a circle. If the distance from the centre of the circle to the chord *AB* = 2x units, then the distance between the chords is

 (A) 4x units   (B) 2x units

 (C) x units   (D) 1 unit.

 Ans. : _____

(SPACE FOR ROUGH WORK)

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45. ∠ *ABC* is an angle in a major arc. Then ∠ *ABC* is

   (A)   Obtuse angle   (B)   Right angle

   (C)   Acute angle   (D)   Straight angle.

   Ans. : _____

46. Which of the following is a correct statement ?

   (A)   All the rectangles are similar

   (B)   All the rhombuses are similar

   (C)   All the right-angled triangles are similar

   (D)   All the equilateral triangles are similar.

   Ans. : _____

47. In Δ *ABC*, *PQ* $\parallel$ *AB* . The correct relation is
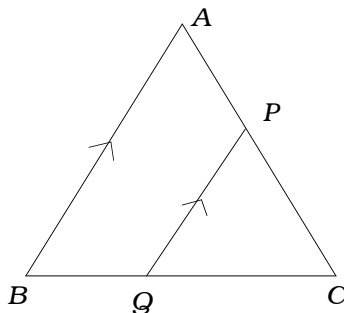
   (A) $\dfrac{BQ}{BA}$ = $\dfrac{CP}{CA}$ (B) $\dfrac{AP}{PC}$ = $\dfrac{BQ}{QC}$

   (C) $\dfrac{PQ}{BQ}$ = $\dfrac{AB}{BC}$ (D) $\dfrac{PQ}{QC}$ = $\dfrac{AB}{AP}$.

   Ans. : _____

48. If the perimeters of two similar triangles are in the ratio of 4 : 1, then the ratio
   between their areas will be

   (A)   16 : 1   (B)   4 : 1

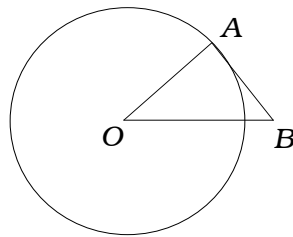   (C)   2 : 1   (D) $\sqrt{2}$: 1.

   Ans. : _____

(SPACE FOR ROUGH WORK)

49. In the figure, $\angle ABC = \angle AQP = 90°$. Then, $\dfrac{AQ}{AB} =$
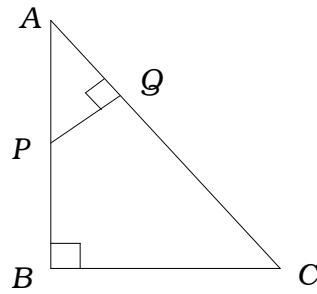
(A) $\dfrac{BC}{PQ}$ (B) $\dfrac{AC}{PQ}$

(C) $\dfrac{QP}{BC}$ (D) $\dfrac{AP}{AB}$.

Ans. : _____

50. In the figure, AB is tangent to the circle with centre O. If $\angle AOB = 30°$, then $\angle A$ and $\angle B$ respectively are

(A)   75°, 75°   (B)   100°, 50°

(C)   80°, 70°   (D)   90°, 60°.

Ans. : _____

51. Radii of two circles are 5 cm and 3 cm respectively and the distance between their centres is 6 cm. Then they are

(A)   touching externally   (B)   intersecting circles

(C)   touching internally   (D)   concentric circles.

Ans. : _____

(SPACE FOR ROUGH WORK)

52. In the figure, *A* and *B* are the centres of two circles with radii 6 cm and 2 cm respectively. *CD* is the diameter, then *MD* =
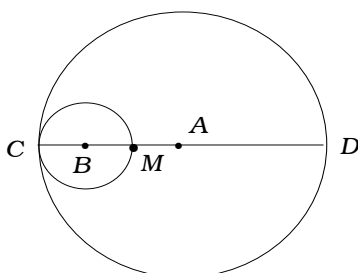
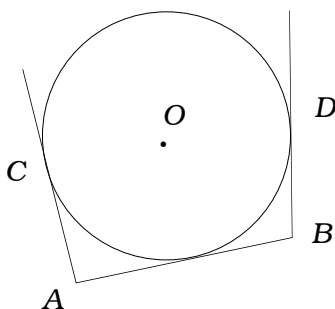(A)   8 cm   (B)   6 cm

(C)   4 cm   (D)   2 cm.

Ans. : _____

53. In the figure, *AB, AC* and *BD* are the tangents as shown in the figure. If   *AB* = *x* cm, *BD* = *y* cm, then *AC* =

(A)   *x* cm   (B)   *y* cm

(C)   (*x* – *y*) cm   (D)   (*x* + *y*) cm.

Ans. : _____

(SPACE FOR ROUGH WORK)

54. The formula used to find the total surface area of a solid cylinder is

    (A) $2 \pi r h$

    (B) $2 \pi r^2 (r + h)$

    (C) $\pi r (r + h)$

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

    Ans. : _____

55. The number of plane surfaces in a solid cone is

    (A) 0

    (B) 1

    (C) 2

    (D) 3.

    Ans. : _____

56. Ratio between the radii of two solid spheres is 2 : 3, then the ratio between their volumes is

    (A) 8 : 27

    (B) 4 : 9

    (C) 2 : 3

    (D) $\sqrt{2} : \sqrt{3}$.

    Ans. : _____

57. The volume of a solid cone is 60 cm^3 and the area of the base is 20 cm^2 . Then the height is

    (A) 6 cm

    (B) 9 cm

    (C) 12 cm

    (D) 18 cm.

    Ans. : _____

(SPACE FOR ROUGH WORK)

58. A metal sheet of length 2 m and breadth 44 cm is rolled to form a hollow pipe of length 2 m. Then the radius of that pipe is

(A) 44 cm   (B) 22 cm
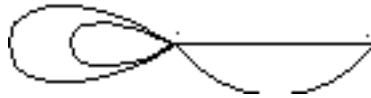
(C) 11 cm   (D) 7 cm.

Ans. : _____

59. The numbers of vertices and edges respectively in a tetrahedron are

(A) 4, 6   (B) 6, 4

(C) 8, 6   (D) 6, 8.

Ans. : _____

60. The numbers of regions and nodes in the given network are

(A) 3, 2   (B) 3, 3

(C) 4, 2   (D) 4, 5

Ans. : _____

(**SPACE FOR ROUGH WORK**)

PART – B

61. A person deposits Rs. 1,000 in the first month. Then every month he increases the monthly deposit by Rs. 60. Calculate his total investment at the end of 2 years.   2

(SPACE FOR ROUGH WORK)

62. If $A = \begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix}$ then find $AA^{\prime}$. 2

(SPACE FOR ROUGH WORK)

63. Calculate the standard deviation of 10, 12, 14, 16, 18, 20.

    (Given mean = 15) 2

(SPACE FOR ROUGH WORK)

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64.   If $a + b + c = 0$, then prove that $(b + c) (b - c) + a (a + 2b) = 0.$ 2

(SPACE FOR ROUGH WORK)

65. Simplify by rationalising the denominator : 2

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

(SPACE FOR ROUGH WORK)

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66. The height of a triangle is 5 cm less than the base. If the area of the triangle is 150 sq.cm, find the base.   2

(SPACE FOR ROUGH WORK)

67. The H.C.F. and L.C.M. of two expressions are $(x - 3)$ and $x^3 - 5x^2 - 2x + 24$ respectively. If one of the expressions is $x^2 - 7x + 12$, then find the other. 4

(SPACE FOR ROUGH WORK)

68. Draw a circle of radius 3·5 cm. Draw two radii such that the angle between them is 110°. Draw tangents at the ends of the radii.   2
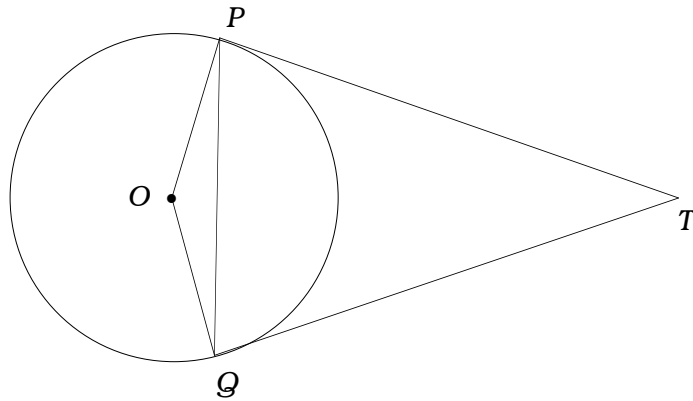

(SPACE FOR ROUGH WORK)

69. If one diagonal of a trapezium divides the other in the ratio 2 : 1, then prove that one of the parallel sides is twice the other.   2

(**SPACE FOR ROUGH WORK**)

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70. In the figure, *TP* and *TQ* are the tangents drawn to a circle with centre *O*. Show that
     ∠ *PTQ* = 2 ∠ *OPQ*.   2
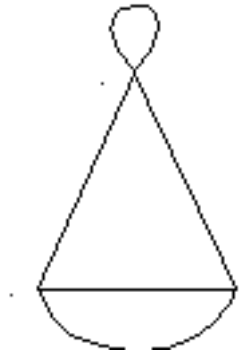

(SPACE FOR ROUGH WORK)

71. Draw a plan by using the data given below :

    (Scale : 20 m = 1 cm)   2

	To D	
	200	
	160	60 C
E 80	100	
	40	50 B
	From A (metres)	

(SPACE FOR ROUGH WORK)

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72.   Construct the matrix for the given network. Write the relation between the sum of the elements of the matrix and the sum of the order of the nodes.   2

(**SPACE FOR ROUGH WORK**)

73. State and prove 'Pythagoras theorem'. 4

(SPACE FOR ROUGH WORK)

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74. Draw two circles of radii 2·5 cm and 2 cm with their centres 8 cm apart. Draw the transverse common tangents to them.   4

(SPACE FOR ROUGH WORK)

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75. The 10th term of a geometric progression is 8 times the 13th term. The first term is 3. Then find the sum up to infinite terms. 4

(SPACE FOR ROUGH WORK)

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76. Draw the graph of the equation $y = 2x^2$.   2

x :	0	1	– 1	2	– 2
y :	0	2	2	8	8

graph

_____

(SPACE FOR ROUGH WORK)

(**SPACE FOR ROUGH WORK**)

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