

Common Instructions to Candidates:

- 1) This is a question cum answer paper booklet.
 - 2) Space is provided to write answers below each question. Answer should be written within the space provided.
 - 3) This question paper has 58 questions including the matching type question.
 - 4) Candidate should not write the answer with pencil. Answer written with pencil will not be evaluated (Except graphs, diagrams & maps).
 - 5) In case of multiple choice, fill in the blanks and matching questions, scratching, rewriting & marking is not allowed. Answers with such errors will not be evaluated.
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I. Four alternatives are given to each of the following incomplete statements. Select the most appropriate one and write its serial letter and also the correct answer in the space provided. **[20 x 1 = 20]**

1. If $T_n = (-1)^n$, then the correct relation between the sum of terms is
 - a) $S_1 = S_2$
 - b) $S_2 = S_3$
 - c) $S_3 = S_4$
 - d) $S_2 = S_4$

2. HCF of ab , bc and ac is
 - a) abc
 - b) $a^2 b^2 c^2$
 - c) 1
 - d) $ab + bc + ac$.

3. The corresponding sides of two similar triangles are in the ratio 4 : 9. The ratio between their areas is
 - a) 2 : 3
 - b) 16 : 81
 - c) 81 : 16
 - d) 14 : 19

4. If $9\sqrt{x} = \sqrt{12} + \sqrt{147}$, the value of x is
 - a) 12
 - b) 9
 - c) 3
 - d) $\sqrt{3}$

5. The incorrect statement among the following is
 - a) ${}^n P_n = {}^n C_n$
 - b) ${}^n P_1 = {}^n C_1$
 - c) ${}^n P_0 = {}^n C_0$
 - d) ${}^n P_n = {}^n P_{n-1}$

6. An example for HP among the following is

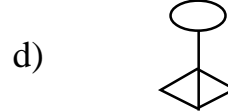
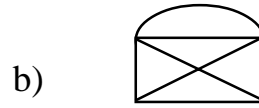
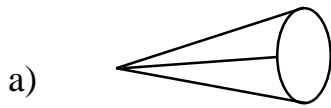
a) $1, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$

b) $1, \frac{1}{3}, \frac{1}{6}, \frac{1}{9}$

c) $1, \frac{2}{3}, \frac{1}{2}, \frac{2}{5}$

d) $1, \frac{1}{4}, \frac{1}{7}, \frac{1}{9}$

7. A non - traversable network among the following is



8. The fourth term of the sequence $\sqrt{3}, 3, 3\sqrt{3}$ is

a) 9

b) 21

c) $27\sqrt{3}$

d) $9\sqrt{3}$

9. The LCM of $(x + y)^2, (x - y)^2$ and $(x^2 - y^2)$ is

a) $(x^2 + y^2)^2$

b) $x^4 - y^4$

c) $(x^2 - y^2)^2$

d) $(x + y)(x - y)^3$

10. The sum and the product of three numbers are 0 and 30 respectively. The sum of their cubes is

a) 0

b) 90

c) 160

d) 900

11. If $v^2 = u^2 + 2as$, then the value of 'u' is

a) $v^2 - 2as$

b) $\pm\sqrt{v^2 + 2as}$

c) $\pm\sqrt{v^2 - 2as}$

d) $2as - v^2$

12. The quadratic equation whose roots are 1 and -1 is

- a) $ax^2 - x - 1 = 0$ b) $ax^2 - 1 = 0$
 c) $x^2 = 1$ d) $x^2 + 1 = 0$

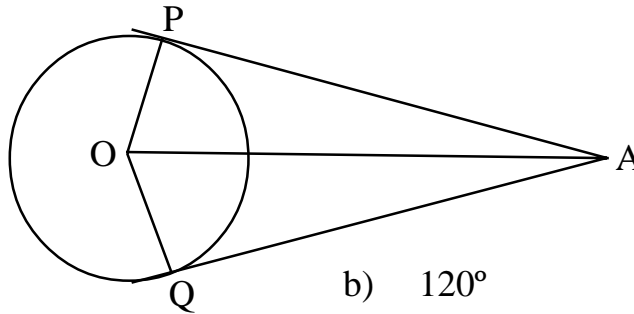
13. If $\sum_{abc} a = 0$, then $\sum_{abc} a^3$ is

- a) 0 b) 1
 c) $-3abc$ d) $3abc$

14. The value of $1! \times 3! \times 0!$ is

- a) 6 b) 0
 c) 3 d) 1

15. In the given figure if $\angle PAO = 30^\circ$, the measure of $\angle POQ$ is



- a) 60° b) 120°
 c) 90° d) 30°

16. The pure quadratic equation in the following is

- a) $4x = \frac{81}{x}$ b) $x + \frac{1}{x} = 5$
 c) $(x + 2)^2 = 3x$ d) $5 - x^2 = x$

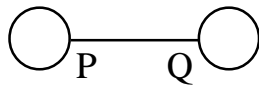
17. The diagonal of a square is $10\sqrt{2}$ cm, then the length of its side is

- a) 2 cm b) 10 cm
 c) 8 cm d) 20 cm

18. The Harmonic Mean between 1 and 2 is

- a) $1\frac{1}{2}$ b) $1\frac{1}{4}$
 c) $1\frac{1}{3}$ d) $1\frac{2}{3}$

19. The matrix of the given network is



- a) $\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$
 c) $\begin{bmatrix} 2 & 1 \\ 2 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

20. The value of $\sum_{n=1}^n n + \sum_{n=1}^n (n-1)$ is

- a) $n(n-1)$ b) $\frac{n^2}{2}$ c) $2n^2$ d) n^2

II. Complete the following statements by filling the blanks. **[10 x 1 = 10]**

21. If the order of matrix A is $m \times n$ and the order of matrix B is $n \times p$, then the order of matrix AB is _____.
22. A regular polyhedron enclosed by pentagonal faces is _____.
23. If P and Q are non - empty sets and $P - Q = P$, then $P \cap Q$ is _____.
24. The mathematician who proposed Basic Proportionality Theorem is _____.
25. The angle in a semi circle is _____.

26. The formula used to find the coefficient of variation is _____.
27. The conjugate of $a\sqrt{x} + b\sqrt{y}$ is _____.
28. A solid described by the revolution of a semi circle about a fixed diameter is _____.
29. The formula used to find the curved surface area of a cylinder is _____.
30. The reciprocals of the terms of an AP form _____.

III. Solve the following problems in the space provided.

31. In a group of 25 persons 8 drink tea only, 7 drink coffee only and 4 persons drink both tea and coffee. Draw a Venn diagram to show how many of them neither drink tea nor coffee. [2]
32. If one root of the equation $px^2 + 3x + 2 = 0$ is reciprocal of the other, then find the value of p . [2]
33. Solve the equation $x^2 + 1 = 8x$ using the formula. [2]
34. Three numbers are in the ratio $\frac{1}{3} : \frac{1}{5} : \frac{1}{6}$. If the sum of their squares is 644, find the numbers. [2]
35. $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$. Find the value of AA' . [2]
36. Two girls and four boys are made to sit in a line for a photograph. In how many different ways they can be seated so that the two girls are always together. [2]

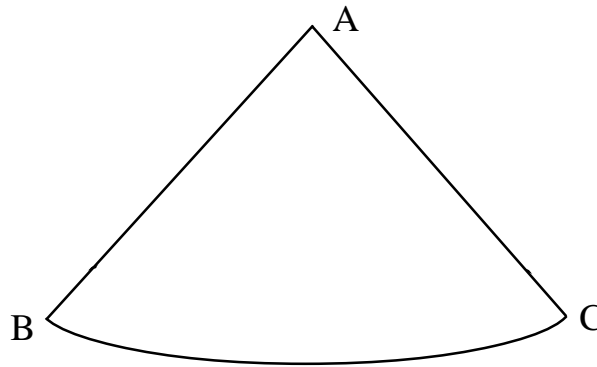
37. Rationalise the denominator and simplify

$$\frac{3\sqrt{2} + 2\sqrt{3}}{3\sqrt{2} - 2\sqrt{3}} \quad [2]$$

38. Find the product of $\sqrt[4]{4}$ and $\sqrt[3]{3}$. [2]

39. Find the length and breadth of a rectangular plot whose area is 60 sq.m. and its perimeter is 32 m. [2]

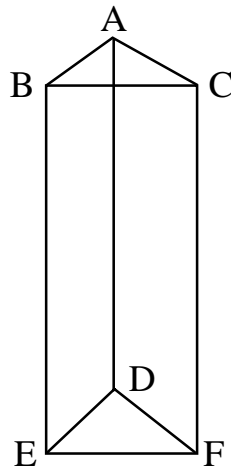
40. A sheet of Aluminium foil having a shape as shown in the figure is rolled to make a cone. If $AB = 25$ cm and arc $BC = 44$ cm, find the volume of the obtained cone. [2]



41. Draw a plan for the recordings from the surveyor’s field book given below. (scale 20 m = 1cm). [2]

	Metres	
	To D	
	140	
	120	60 to C
to E 80	100	
	50	40 to B
	From A	

42. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
 $A = \{x : x \text{ is a perfect square less than } 10\}$
 $B = \{x : x \text{ is an even natural number less than } 10\}$
 Verify $(A \cup B)' = A' \cap B'$ [2]
43. In a HP $T_7 = \frac{1}{20}$ and $T_{13} = \frac{1}{38}$. Find the first term of H.P. [2]
44. Construct Cayley's table under multiplication modulo 10 on $S = \{2, 4, 6, 8\}$. [2]
45. Draw the graph for the following matrix [2]
- $$\begin{bmatrix} 0 & 2 & 2 \\ 2 & 0 & 1 \\ 2 & 1 & 0 \end{bmatrix}$$
46. Verify Euler's formula for the solid given below. [2]



47. In a circle of radius 4cm, draw two radii such that the angle between them is 100° .
 Draw two tangents at the ends of the radii. [2]
48. The first term of a GP is 64 and the common ratio is ' r '. If the average of the first and the fourth term is 140, find the value of ' r '. [2]

IV. 49. If $a + b + c = 2s$, then show that

[3]

$$\frac{a^2 + b^2 - c^2 + 2ab}{a^2 - b^2 - c^2 + 2bc} = \frac{s}{s-b}.$$

50. Prove that the tangents drawn to a circle from an external point are equal. [3]

51. Calculate the standard deviation for the following frequency distribution. [3]

C.I	f
20 – 24	2
25 – 29	3
30 – 34	5
35 – 39	3
40 – 44	2

52. There are 16 cricket players in a club, of whom 5 are batsmen, 4 are bowlers and the rest are allrounders. In how many ways a team of 11 be selected so as to contain 3 batsmen, 2 bowlers and the remaining allrounders. [3]

53. Find the L.C.M. of :

$$(x^3 - 9x^2 + 26x - 24) \text{ and } (x^3 - 6x^2 + 11x - 6). \quad [3]$$

54. A ladder of length 2.6m is leaned against a wall. When it is at a distance of 2.4 m from the foot of the wall, the top of the ladder touches the bottom edge of the window in the wall. If the foot of the ladder is moved 1.4m towards the wall it touches the top edge of the window. Find the height of the window. [3]

V. 55. If 7 times the 7th term of an A.P. is equal to 11 times the 11th term, prove that 18th term is equal zero. [4]

56. Prove that the areas of similar triangles are proportional to the squares of the corresponding sides. [4]

57. Construct a transverse common tangent to two circles of radii 3 cm and 2 cm, with their centres 9 cm apart. Measure the length of the tangent and verify. [4]

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58. Draw the graphs of $y = x^2$ and $y = 6 - x$ and hence solve the equation $x^2 + x - 6 = 0$.
[4]

