

S.S.L.C. HALF YEARLY EXAMINATION - 2017

MATHEMATICS

Register Number

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Time Allowed : 2.30 Hrs

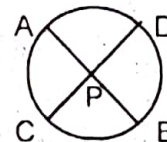
Maximum Marks : 100

SECTION - I

Note : 1) Answer all the 15 questions. 2) Choose the correct answer from the given four alternatives and write the given options code and the corresponding answer.

15 X 1 = 15

1. Which of the following is / are not applicable if A and B are two sets?
i) $A \subset B$ ii) $B \subseteq A$ iii) $A = B$ iv) $A \in B$
a) (iv) only b) (iii) and (iv) c) (iii) only d) none of the above
2. If a, b, c are in A.P. then $\frac{a-b}{b-c}$ is equal to :
a) $\frac{a}{b}$ b) $\frac{b}{c}$ c) $\frac{a}{c}$ d) 1
3. The sequence of natural numbers 1, 2, 3, 4, is
a) a G.P. with Common ratio 2 b) an A.P. with Common ratio 1
c) an A.P. with Common difference 1 d) neither G.P. nor A.P.
4. The square root of $121x^4 y^8 z^6 (l-m)^2$ is
a) $11x^2 y^4 z^4 |l-m|$ b) $11 x^4 y^4 |z^3 (l-m)|$
c) $11x^2 y^4 z^6 |l-m|$ d) $11 x^2 y^4 |z^3 (l-m)|$
5. If 1 and 2 are the roots of a polynomial equation $p(x) = 0$ of degree 2 then which of the following is correct?
a) $p(x) = x^2 - 3x + 2$ g) $p(x) = 2x^2 - 6x + 4$
c) $p(x) = 6(x^2 - 3x + 2)$ d) the polynomial can't be determined
6. If A is of order 3 X 4 and B is of order 4 X 3 then the order of BA is
a) 3 X 3 b) 4 X 4 c) 4 X 3 d) not defined
7. The area of the triangle formed by the points (0, 0), (3, 0) and (0, -2) is
a) 3 b) 2 c) $\frac{3}{2}$ d) $\frac{3}{4}$
8. The angle of inclination of a straight line parallel to x - axis is equal to
a) 0° b) 60° c) 45° d) 90°
9. In the adjoining figure, chords AB and CD intersect at P. If AB = 16cm, PD = 8cm, PC = 6cm and $AP > PB$ then AP =
a) 8cm b) 4cm
c) 12 cm d) 6cm



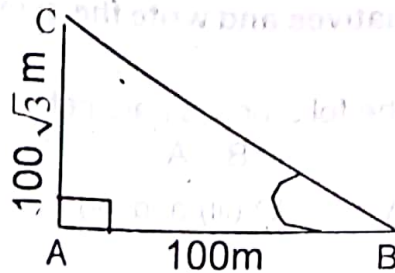
10. ΔABC is a right angled Δ . Where $\angle B = 90^\circ$ and $BD \perp AC$. If $BD = 8\text{cm}$, $AD = 4\text{cm}$ then CD is

a) 24 cm b) 16 cm c) 32 cm d) 8 cm

11. Which of the following statements is correct
- $\sin \theta + \cos \theta = \sqrt{2}$ is an identity since it is true for $\theta = 45^\circ$
 - $\sin^2 \theta + \cos^2 \theta = 1$ is an equation since it is true for $\theta = 60^\circ$
 - $\sin \theta + \cos \theta = 1$ is an identity since it is true for $\theta = 90^\circ$
 - $\cos^2 \theta + \sin^2 \theta = 1$ is an identity since it is true for $0^\circ \leq \theta \leq 90^\circ$

12. In the figure $\angle ABC = ?$

- 45°
- 30°
- 60°
- 50°



13. Two right circular cones have equal radii. If their slant heights are in the ratio 4 : 3, then their respective curved surface areas in the ratio
- 16 : 9
 - 2 : 3
 - 4 : 3
 - 3 : 4
14. The variance of 10, 10, 10, 10, 10 is
- 10
 - $\sqrt{10}$
 - 5
 - 0
15. A card is drawn from a pack of 52 cards at random. The probability of getting neither an ace nor a king card is
- $\frac{2}{13}$
 - $\frac{11}{13}$
 - $\frac{4}{13}$
 - $\frac{8}{13}$

SECTION - II

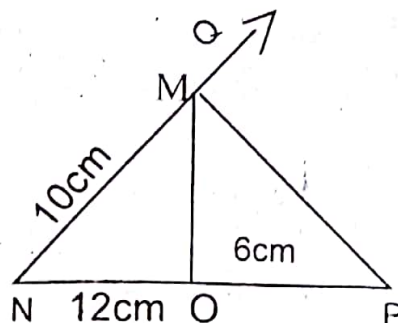
Note : 1) Answer 10 questions. 2) Questions number 30 is compulsory. Select any 9 questions from the first 14 questions.

$$10 \times 2 = 20$$

16. If $A = \{4, 6, 7, 8, 9\}$, $B = \{2, 4, 6\}$ and $C = \{1, 2, 3, 4, 5, 6\}$ then find $A \setminus (C \setminus B)$.
17. Let $X = \{1, 2, 3, 4\}$ Examine whether the relation given below is a function from X to X . or not. Explain $f = (2, 3), (1, 4), (2, 1), (3, 2), (4, 4)$
18. Which term of the arithmetic sequence $24, 23\frac{1}{4}, 22\frac{1}{2}, 21\frac{3}{4}, \dots$ is 3.
19. Find the quotient and remainder when $x^3 + x^2 - 7x - 3$ is divided by $x - 3$.
20. Simplify : $\frac{(x^2 - 2x)}{(x + 2)} \times \frac{(3x + 6)}{(x - 2)}$
21. Can you give an example for a scalar matrix (of order 3×3) which is not a diagonal matrix? If not, why?
22. Find the values of x, y and z from the matrix equation $\begin{bmatrix} 5x+2 & y-4 \\ 0 & 4z+6 \end{bmatrix} = \begin{bmatrix} 12 & -8 \\ 0 & 2 \end{bmatrix}$.

23. For what values of a , the straight line $6x + ay = 0$ passes through the origin.
24. If the x -intercept and y -intercept of a straight line are $\frac{2}{3}$ and $\frac{3}{4}$ respectively, then find the equation of the straight line.

25. In a $\triangle MNO$, MP is the external bisector of $\angle M$ meeting NO produced at P .
If $MN = 10\text{cm}$, $MO = 6\text{cm}$,
 $NO = 12\text{cm}$, then find OP .



26. A ladder leaning against a vertical wall, makes an angle of 60° with the ground. The foot of the ladder is 3.5m away from the wall. Find the length of the ladder.
27. Total surface area of a solid hemisphere is 675π sq.cm. Find the curved surface area of the solid hemisphere.
28. Calculate the standard deviation of the first 13 natural numbers.
29. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of drawing a red ball, then find the number of blue balls in the bag.

30. a) Prove the identity $\frac{\sin \theta - 2\sin^3 \theta}{2\cos^3 \theta - \cos \theta} = \tan \theta$. (OR)

b) A rectangular sheet of metal foil with dimension 66cm X 12 cm is rolled to form a cylinder of height 12cm. Find the volume of the cylinder.

SECTION - III

Note : 1) Answer 9 questions. 2) Question number 45 is compulsory. Select any 8 questions from the 14 questions.

$$9 \times 5 = 45$$

31. Let $U = \{-2, -1, 0, 1, 2, 3, \dots, 10\}$
 $A = \{-2, 2, 3, 4, 5\}$ and $B = \{1, 3, 5, 8, 9\}$ verify De Morgan's laws of complementation.
32. Let $A = \{4, 6, 8, 10\}$ and $B = \{3, 4, 5, 6, 7\}$ If $f : A \rightarrow B$ is defined by

$$f(x) = \frac{1}{2}x + 1 \text{ then represent } f \text{ by :}$$

- 1) an arrow diagram 2) a set of ordered pairs and 3) a table

33. The sum of three terms of Geometric sequence is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms.

34. Solve the quadratic equation $9x^2 - 12x - 17 = 0$ by using square method.

35. If $m - nx + 28x^2 + 12x^3 + 9x^4$ is a perfect square, then find the values of m and n .

36. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ then $A^2 - 4A + 5I_2 = 0$.

37. If $x + 2y = 7$ and $2x + y = 8$ are the equations of the lines of two diameters of a circle, find the radius of the circle if the point $(0, -2)$ lies on the circle.
38. If C is the midpoint of the line segment joining A $(4, 0)$ and $(0, 6)$ and if O is the origin then show that C is equidistant from all the vertices of $\triangle OAB$.
39. State and prove Pythagoras theorem.
40. If $\frac{1}{a} \cot \alpha = \cot \theta$ and $\frac{1}{b} \operatorname{cosec} \alpha = \operatorname{cosec} \theta$ then prove that $\sec^2 \theta = \frac{a^2 - 1}{b^2 - 1}$ where $a \neq 0, b \neq 0, \text{ and } b \neq \pm 1$.
41. An iron right circular cone of diameter 8 cm and height 12 cm is melted and recast into spherical lead shots each of radius 4mm. How many lead shots can be made.
42. The perimeter of the ends of a frustum of a cone are 44cm and 8.5π cm. If the depth is 14cm, then find its volume.
43. For a collection of data if $\Sigma x = 35, n = 5, \Sigma(x - 9)^2 = 82$ then find Σx^2 and $\Sigma(x - \bar{x})^2$.
44. If A die is rolled twice. Find the probability of getting an even number in the first time or a total of 8.
45. a) If a, b, c, d are in geometric sequence, then prove that $(b - c)^2 + (c - a)^2 + (d - b)^2 = (a - d)^2$. (OR)
 b) If α and β are the roots of $x^2 - 3x - 1 = 0$, then form a quadratic equation whose roots are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$.

SECTION - IV

Note : Answer both the questions choosing eight of the alternatives.

2 X 10 = 20

46. a) Draw a circle of diameter 10cm. From a point P, 13cm away from its centre, draw the two tangents PA and PB to the circle, and measure their lengths. (OR)
 b) Construct a $\triangle ABC$ in which the base $BC = 5\text{cm}$, $\angle BAC = 40^\circ$ and the median from A to BC is 6 cm. Also, measure the length of the altitude from A.
47. a) Draw a graph of $y = x^2$ and hence solve $x^2 - 4x - 5 = 0$. (OR)
 b) A bank gives 10% S.I. on deposits for senior citizens. Draw the graph for the relations between the sum deposited and the interest earned for one year. Hence find :
 i) the interest on the deposit of Rs. 650.
 ii) the amount to be deposited to earn an interest of Rs. 45.