

SSLC MODEL EXAMINATION

MATHEMATICS [English Version]

Time : 2½ Hrs.]

[Max. Marks : 100

SECTION - A

- Note :** (i) All questions are compulsory.
(ii) Each question carries one mark.
(iii) Choose the most suitable answer from the given four alternatives. 15 x 1 = 15

1. If $f = \{ (6, 3), (8, 9), (5, 3), (-1, 6) \}$ then the pre-images of 3 are
a) 5 and -1 b) 6 and 8 c) 8 and -1 d) 6 and 5

2. The sequence $-3, -3, -3, \dots$ is
a) an A.P. only b) a G.P. only c) neither A.P. nor G.P. d) both A. P. and G.P.

3. The value of $1 + 2 + 3 + \dots + 20$ is
a) 210 b) 420 c) -400 d) 250

4. The LCM of a^k, a^{k+3}, a^{k+5} where $k \in \mathbf{N}$ is
a) a^{k+9} b) a^k c) a^{k+6} d) a^{k+5}

5. The value of $\frac{x}{5-x} - \frac{5}{5-x}$ is
a) 1 b) -1 c) $x - 5$ d) $5x$

6. If $(5 \times 1) \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = (20)$, then the value of x is
a) 7 b) -7 c) $\frac{1}{7}$ d) 0

7. The slope of the straight line $7y - 2x = 11$ is equal to
a) $-\frac{7}{2}$ b) $\frac{7}{2}$ c) $\frac{2}{7}$ d) $-\frac{2}{7}$

8. The mid point of the line joining points $(1, -3)$ and $(-5, 7)$ is
a) $(3, -5)$ b) $(-2, 2)$ c) $(3, 5)$ d) $(-4, 4)$

9. If the tangents PA and PB from an external point P to circle with centre O are inclined to each other at an angle of 40° then $\angle POA =$
a) 70° b) 80° c) 50° d) 60°

10. The number of tangents that can be drawn from a point outside the circle is

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- a) 1 b) 2 c) 4 d) 0

11. If $x = a \sec \theta$, $y = b \tan \theta$, then the value of $\frac{x^2}{a^2} - \frac{y^2}{b^2} =$

- a) 1 b) -1 c) $\tan^2 \theta$ d) $\operatorname{cosec}^2 \theta$

12. If $\sin \theta = \tan \theta$ then the value of θ is

- a) 45 b) 90 c) 1 d) 0

13. The total surface area of a solid right circular cylinder whose radius is half of its height h is equal to

- a) $\frac{3}{2} \pi h$ sq.units b) $\frac{2}{3} \pi h^2$ sq.units c) $\frac{3}{2} \pi h^2$ sq.units d) $\frac{2}{3} \pi h$ sq.units

14. If the variance of a data is 12.25, then the S.D. is

- a) 3.5 b) 3 c) 2.5 d) 3.25

15. Probability of sure event is

- a) 1 b) 0 c) 100 d) 0.1

SECTION - B

Note : (i) Answer any **10** questions from questions numbered 16 to 36

(ii) Question No. **30** is compulsory

(iii) Each question carries two marks.

10 x 2 = 20

16. If $A = \{ 4, 6, 7, 8, 9 \}$, $B = \{ 2, 4, 6 \}$ and $C = \{ 1, 2, 3, 4, 5, 6 \}$, then find $A \cup (B \cap C)$

17. Let $A = \{ 1, 2, 3, 4, 5 \}$, $B = \mathbf{N}$ and $f: A \rightarrow B$ be defined by $f(x) = x^2$. Find range of f . Identify the type of function.

18. Find the 17th term of the A.P. 4, 9, 14,

19. Simplify $\frac{x^3}{x-2} + \frac{8}{2-x}$

20. If $A = \begin{bmatrix} 2 & 3 \\ -9 & 5 \end{bmatrix}$, then find the additive inverse fo A.

21. Construct a 2×3 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = |2i - 3j|$

22. 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.

23. Let PQ be a tangent to a circle at A and AB be a chord. Let C be a point on the circle such that $\angle BAC = 54^\circ$ and $\angle BAQ = 62^\circ$ then find $\angle ABC$.
24. Prove the identity $\frac{\sin \theta}{\operatorname{cosec} \theta} + \frac{\cos \theta}{\sec \theta} = 1$
25. A ramp for unloading a moving truck, has an angle of elevation of 30° . If the top of the ramp is 0.9 m above the ground level, then find the length of the ramp.
26. Radius and slant height of a cone are 20 cm and 29 cm respectively. Find its volume.
27. Total surface area of a solid hemisphere is 675π sq.cm. Find the curved surface area of the hemisphere.
28. Calculate the standard deviation of the first 13 natural numbers.
29. One number is chosen randomly from the integers 1 to 50. Find the probability that it is divisible by 4 or 6.
30. a) If $(x + 1)$ is a factor of $x^3 + mx^2 + 19x + 12$, determine the value of m
- (OR)**
- b) Prove that the points $(9, 0)$, $(1, 4)$, $(11, -1)$ are collinear.

SECTION - C

Note : (i) **9** questions to be answered from the questions numbered 31 to 45

9 x 5 = 45

(ii) Each question carries FIVE marks.

(iii) Answer any **8** questions from the first 14 questions

(iv) Question no **45** is compulsory.

31. Use Venn diagrams to verify De Morgan's law for set difference $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$
32. Let $A = \{6, 9, 15, 18, 21\}$; $B = \{1, 2, 3, 4, 5, 6\}$ and $f: A \rightarrow B$ be defined by $f(x) = \frac{x-3}{3}$.
Represent f by (i) an arrow diagram (ii) a set of ordered pairs (iii) a table (iv) a graph
33. If the 4th and 7th terms of a G.P. are 54 and 1458 respectively, find the G.P.
34. Factorize $2x^3 - 3x^2 - 3x + 2$ into linear factors.
35. Find the values of a and b if the following polynomials are perfect squares: $4x^4 - 12x^3 + 37x^2 + ax + b$
36. If α and β are the roots of the equation $3x^2 - 4x + 1 = 0$, form a quadratic equation whose roots are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$

37. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ then show that $A^2 - 4A + 5I_2 = O$.
38. Find the area of the quadrilateral formed by the points $(-4, -2)$, $(-3, -5)$, $(3, -2)$ and $(2, 3)$
39. If the vertices of a ΔABC are $A(2, -4)$, $B(3, 3)$ and $C(-1, 5)$. Find the equation of the straight line along the altitude from the vertex B .
40. Prove that : In a right angled triangle, the square of the hypotenuse is equal to sum of the squares of the other two sides.
41. Prove the identities : $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$
42. A sector containing an angle of 120° is cut off from a circle of radius 21 cm and folded into a cone. Find the curved surface area of the cone. (Take $\pi = \frac{22}{7}$)
43. Calculate the standard deviation of the the data : 10, 20, 15, 8, 3, 4
44. The probability that a new car will get an award for its design is 0.25, the probability that it will get an award for efficient use of fuel is 0.35 and the probability that it will get both the awards is 0.15. Find the probability that
(i) it will get atleast one of the two awards. (ii) it will get only one of the awards.
45. Find the sum of $400 + 441 + \dots + 1600$

(OR)

A cylinder of radius 8 cm and height 12 cm is melted and made into some cones of radius 6 cm and height 16 cm. How many cone can be made ?

SECTION - D

- Note :** (i) Each question carries TEN marks
(ii) Answer both the questions

2 x 10 = 20

46. Draw a circle of radius 3 cm. From an external point 7 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.
- (OR)**
- Construct a ΔABC such that $BC = 5$ cm. $\angle A = 45^\circ$ and the median from A to BC is 4 cm.
47. Draw the graph of $y = x^2 - x - 8$ and hence find the roots of $x^2 - 2x - 15 = 0$.

(OR)

Draw the Graph of $xy = 20$, $x, y > 0$. Use the graph to find y when $x = 5$, and to find x when $y = 10$.