

SSLC MODEL EXAMINATION

MATHEMATICS [English Version]

Time allowed: 2½ Hours]

[Maximum Marks: 100

- Instructions:** (1) Check the question paper for fairness printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
(2) Use Black or Blue ink to write and pencil to draw diagrams.
Note: This question paper contains four sections.

SECTION – I (Marks 15)

- Note:** (i) Answer all the 15 questions.
(ii) Choose the correct answer from the given four alternatives and write the option code and the corresponding answer. 15 x 1 =15

1. Which one of the following is not true?
(1) $A \setminus B = A \cap B'$ (2) $A \setminus B = A \cap B$ (3) $A \setminus B = (A \cup B) \cap B'$ (4) $A \setminus B = (A \cup B) \setminus B$
2. If $A = \{5,6,7\}$, $B = \{1,2,3,4,5\}$ and $f:A \rightarrow B$ is defined by $f(x) = x - 2$, then the range of f is
(1) $\{1,4,5\}$ (2) $\{1,2,3,4,5\}$ (3) $\{2,3,4\}$ (4) $\{3,4,5\}$
3. If n^{th} term of a sequence is $100n + 10$, then the sequence is
(1) an A.P (2) a G.P (3) a constant sequence (4) neither A.P nor G.P
4. The LCM of a^k, a^{k+3}, a^{k+5} where $k \in \mathbb{N}$ is
(1) a^{k+9} (2) a^k (3) a^{k+6} (4) a^{k+5}
5. If α and β are the roots of $ax^2+bx+c=0$, then one of the quadratic equation whose roots are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$, is
(1) $ax^2 + bx + c = 0$ (2) $bx^2 + ax + c = 0$ (3) $cx^2 + bx + a = 0$ (4) $cx^2 + ax + b = 0$
6. $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$, then the values of a, b, c and d respectively are
(1) $-1, 0, 0, -1$ (2) $1, 0, 0, 1$ (3) $-1, 0, 1, 0$ (4) $1, 0, 0, 0$
7. Slope of the line joining the points $(3, -2)$ and $(-1, a)$ is $-\frac{3}{2}$, then the value of a is equal to
(1) 1 (2) 2 (3) 3 (4) 4
8. The equation of the straight line passing through the origin and perpendicular to the straight line $2x + 3y - 7 = 0$ is
(1) $2x + 3y = 0$ (2) $3x - 2y = 0$ (3) $y + 5 = 0$ (4) $y - 5 = 0$
9. If a vertical stick 12 m long casts a shadow 8 m long on the ground and at the same time a tower casts a shadow 40 m long on the ground, then the height of the tower is
(1) 40 m (2) 50 m (3) 75 m (4) 60 m

10. The areas of two similar triangles are 16 cm^2 and 36 cm^2 respectively. If the altitude of the first triangle is 3 cm, then the corresponding altitude of the other triangle is
 (1) 6.5 cm (2) 6 cm (3) 4 cm (4) 4.5 cm
11. $(1 + \tan^2\theta) \sin^2\theta =$
 (1) $\sin^2\theta$ (2) $\cos^2\theta$ (3) $\tan^2\theta$ (4) $\cot^2\theta$
12. $\frac{1 + \tan^2\theta}{1 + \cot^2\theta} =$
 (1) $\cos^2\theta$ (2) $\tan^2\theta$ (3) $\sin^2\theta$ (4) $\cot^2\theta$
13. The surface areas of two spheres are in the ratio of 9 : 25. Then their volumes are in the ratio
 (1) 81 : 625 (2) 729 : 15625 (3) 27 : 75 (4) 27 : 125
14. The range of the first 10 prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 is
 (1) 28 (2) 26 (3) 29 (4) 27
15. The outcome of a random experiment results in either success or failure. If the probability of success is twice the probability of failure, then the probability of success is
 (1) $\frac{1}{3}$ (2) $\frac{2}{3}$ (3) 1 (4) 0

SECTION – II
(Marks 20)

Note: (i) Answer 10 questions.
(ii) Question No. 30 is Compulsory. Choose any 9 questions from first 14 questions. 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. The following table represents a function from $A = \{5, 6, 8, 10\}$ to $B = \{19, 15, 9, 11\}$ where $f(x) = 2x - l$.
 Find the values of a and b .

x	5	6	8	10
$f(x)$	a	11	b	19

18. Find the sum of the first 20 terms of the series $1^2 - 2^2 + 3^2 - 4^2 + \dots$
19. Multiply $\frac{x^3 - 8}{x^2 - 4}$ by $\frac{x^2 + 6x + 8}{x^2 + 2x + 4}$
20. If one of the roots of the equation $3x^2 - 10x + k = 0$ is $\frac{1}{3}$, then find the other root and also the value of k .
21. Find a and b if $a \begin{pmatrix} 2 \\ 3 \end{pmatrix} + b \begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$
22. Find the equation of the straight line passing through the point (3, 4) and has intercepts which are in the ratio 3 : 2.

23. In ΔABC , $DE \parallel BC$ and $\frac{AD}{DB} = \frac{2}{3}$. If $AE = 3.7$ cm, find EC .
24. Prove the identity $(\sin^6\theta + \cos^6\theta) = 1 - 3 \sin^2\theta \cos^2\theta$.
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. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 14 cm.
27. If the curved surface area of a solid hemisphere is 2772 sq.cm, then find its total surface area.
28. If the coefficient of variation of a collection of data is 57 and its S.D is 6.84, then find the mean.
29. Two coins are tossed together. What is the probability of getting at most one head?
30. (a) If $A = \begin{pmatrix} 1 & 3 \\ 9 & -6 \end{pmatrix}$, then verify $AI = IA = A$, where I is the unit matrix of order 2.
- (OR)
- (b) Find the value of k for which the given points are collinear: (k, k) , $(2, 3)$ and $(4, -1)$.

SECTION – III
(Marks 45)

Note: (i) Answer 9 questions:

(ii) Question No. 45 is Compulsory. Select any 8 questions from the first 14 questions. $9 \times 5 = 45$

31. Use Venn diagrams to verify $(A \cap B)' = A' \cup B'$.
32. A function $f : [-3, 7) \rightarrow \mathbb{R}$ is defined as $f(x) = \begin{cases} 4x^2 - 1; & -3 \leq x < 2 \\ 3x - 2; & 2 \leq x \leq 4 \\ 2x - 3; & 4 < x < 7 \end{cases}$
- Find (i) $f(5) + f(6)$ (ii) $f(1) - f(-3)$ (iii) $f(-2) - f(4)$ (iv) $\frac{f(3) + f(-1)}{2f(6) - f(1)}$
33. If S_1, S_2 and S_3 are the sum of first $n, 2n, 3n$ terms of a geometric series respectively, then prove that $S_1(S_3 - S_2) = (S_2 - S_1)^2$.
34. Find the square root by division method: $4 + 25x^2 - 12x - 24x^3 + 16x^4$
35. The speed of a boat in still water is 15km/hr. It goes 30km upstream and return downstream to the original point in 4 Hrs 30 minutes. Find the speed of the stream.
36. If $A = \begin{pmatrix} 4 \\ -6 \\ -2 \end{pmatrix}$ and $B = (2 \ 9 \ -3)$ then verify that $(AB)^T = B^T A^T$.
37. In an isosceles ΔPQR , $PQ = PR$. The base QR lies on the x -axis, P lies on the y -axis and $2x - 3y + 9 = 0$ is the equation of PQ . Find the equation of the straight line along PR .

38. Find the equation of the straight lines each passing through the point $(6, -2)$ and whose sum of the intercepts is 5.
39. State and prove Basic Proportionally Theorem.
40. Prove : $(1 + \cot \theta - \operatorname{cosec} \theta) (1 + \tan \theta + \sec \theta) = 2$
41. The perimeter of the ends of a frustum of a cone are 44 cm and 8.4π cm. If the depth is 14 cm, then find its volume.
42. Using clay, a student made a right circular cone of height 48 cm and base radius 12 cm. Another student reshapes it in the form of a sphere. Find the radius of the sphere.
43. Calculate the standard deviation of 38, 40, 34, 31, 28, 26, 34.
44. A bag contains 10 white, 5 black, 3 green and 2 red balls. One ball is drawn at random. Find the probability that the ball drawn is white or black or green.
45. (a) Find the sum of all 3 digit natural numbers, which are divisible by 9.

(OR)

- (b) If one root of the equation $3x^2 + kx - 81 = 0$ is the square of the other, find k .

SECTION – IV
(Marks 20)

Note: Answer both the questions choosing either of the alternatives:

2 x 10 = 20

46. (a) Take a point which is 9cm away from a circle of radius 3cm, and draw the two tangents to the circle from the point.

(OR)

- (b) Construct a cyclic quadrilateral PQRS with $PQ = 6.5$ cm, $QR = 5.5$ cm, $PR = 7$ cm and $PS = 4.5$ cm

47. (a) Draw the graph of $y = x^2 + x - 12$ and hence solve $x^2 + 2x + 2 = 0$

(OR)

(b)

x	1	3	5	7	8
y	2	6	10	14	16

Draw the graph for the above table and hence find

- (i) the value of y , if $x = 4$.
(ii) the value of x , if $y = 12$.

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