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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)

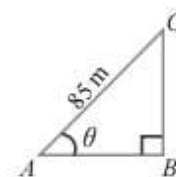
Note: (i) Answer all the 15 questions.

15 x 1 = 15

(ii) Choose the correct answer from the given four alternatives and write the option code and the corresponding answer.

1. Given $f(x) = (-1)^x$ is a function from N to Z . Then the range of f is
a) $\{1\}$ b) N c) $\{1, -1\}$ d) Z
2. If the n^{th} term of a sequence is $100n + 10$, then the sequence is
a) an A.P. b) a G.P. c) neither A.P or G.P. d) a constant sequence
3. If the product of the first four consecutive terms of a G.P is 256 and if the common ratio is 4 and the first term is positive, then its 3rd term is
a) 8 b) $\frac{1}{16}$ c) $\frac{1}{32}$ d) 16
4. The sum of two zeros of the polynomial $f(x) = 2x^2 + (p+3)x + 5$ is zero, then the value of p is
a) 3 b) 4 c) -3 d) -4
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
a) $ax^2 + bx + c = 0$ b) $bx^2 + ax + c = 0$ c) $cx^2 + bx + a = 0$ d) $cx^2 + ax + b = 0$
6. If $\begin{pmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{pmatrix} = \begin{pmatrix} 1 & y-2 \\ 8 & 8 \end{pmatrix}$ then the values of x and y respectively are
a) -2, 7 b) $-\frac{1}{3}, 7$ c) $-\frac{1}{3}, -\frac{2}{3}$ d) 2, -7

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
- a) 1 b) 2 c) 3 d) 4
8. The centre of a circle is $(-6, 4)$. If one end of the diameter of the circle is at $(-12, 8)$, then the other end is at
- a) $(-18, 12)$ b) $(-9, 6)$ c) $(-3, 2)$ d) $(0, 0)$
9. Triangles ABC and DEF are similar. If their areas are 100 cm^2 and 49 cm^2 respectively and BC is 8.2 cm then EF =
- a) 5.47 cm b) 5.74 cm c) 6.47 cm d) 6.74 cm
10. 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°
11. If $\tan \theta = \frac{a}{x}$, then the value of $\frac{x}{\sqrt{a^2 + b^2}} =$
- a) $\cos \theta$ b) $\sin \theta$ c) $\operatorname{cosec} \theta$ d) $\sec \theta$
12. In the adjoining figure, $\sin \theta = \frac{15}{17}$. Then BC =
- a) 85 m b) 65 m c) 95 m d) 75 m
13. If the total surface of a solid hemisphere is $12\pi \text{ cm}^2$ then its curved surface area is equal to
- a) $6\pi \text{ cm}^2$ b) $24\pi \text{ cm}^2$ c) $36\pi \text{ cm}^2$ d) $8\pi \text{ cm}^2$
14. If 't' is the standard deviation of x, y, z , then the standard deviation of $x+5, y+5, z+5$ is
- a) $\frac{t}{3}$ b) $t + 5$ c) t d) $x y z$
15. The probability that a student will score centum in mathematics is $\frac{4}{5}$. The probability that he will not score centum is
- a) $\frac{1}{5}$ b) $\frac{2}{5}$ c) $\frac{3}{5}$ d) $\frac{4}{5}$



SECTION – II
(Marks 20)

Note: (i) Answer 10 questions.

(ii) Question No. 30 is Compulsory. Choose any 9 questions from first 14 questions. $10 \times 2 = 20$

16. Verify the commutative property of set intersection for $A = \{1, m, n, o, 2, 3, 4, 7\}$ and $B = \{2, 5, 3, -2, m, n, o, p, \}$.
17. Write the pre-images of 2 and 3 in the function $f = \{(12, 2), (13, 3), (15, 3), (14, 2), (17, 17)\}$.
18. How many two digit numbers are divisible by 13?
19. Find the LCM of $66a^4 b^2 c^3, 44a^3 b^4 c^2, 24a^2 b^3 c^4$.

20. Determine the nature of the roots of the equation $3x^2 - 2\sqrt{6}x + 2 = 0$.

21. Find the values of x , y and z if $\begin{pmatrix} x & 5 & 4 \\ 5 & 9 & 1 \end{pmatrix} = \begin{pmatrix} 3 & 5 & z \\ 5 & y & 1 \end{pmatrix}$

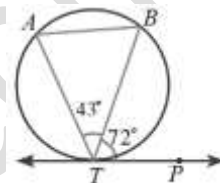
22. If $(5 \ x \ 1) \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = (20)$ then find the value of ' x '.

23. Show that the straight lines $3x - 5y + 7 = 0$ and $15x + 9y + 4 = 0$ are perpendicular.

24. Show that the points $A(2, 3)$, $B(4, 0)$ and $C(6, -3)$ are collinear.

25. In the figure TP is a tangent to a circle. A and B are two points on the circle.

If $\angle BTP = 72^\circ$ and $\angle ATB = 43^\circ$ find $\angle ABT$.



26. Prove that $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

27. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 14 cm.

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. An integer is chosen from the first twenty natural numbers. What is the probability that it is a prime number?

30. (a) 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.

(OR)

(b) The radii of two right circular cylinders are in the ratio of 3 : 2 and their heights are in the ratio 5 : 3. Find the ratio of their curved surface areas.

SECTION – III (Marks 45)

Note: (i) Answer 9 questions:

9 x 5 = 45

(ii) Question No. 45 is Compulsory. Select any 8 questions from the first 14 questions.

31. Verify De Morgan's laws for set difference using the sets given below:

$$A = \{1, 3, 5, 7, 9, 11, 13, 15\}, B = \{1, 2, 5, 7\} \text{ and } C = \{3, 9, 10, 12, 13\}.$$

32. Let $A = \{4, 6, 8, 10\}$ and $B = \{3, 4, 5, 6, 7\}$. If $f: A \rightarrow B$ is defined by $f(x) = \frac{1}{2}x + 1$ then represent f by

(i) an arrow diagram (ii) a set of ordered pairs and (iii) a table.

33. The sum of first three terms of a geometric sequence is $\frac{13}{12}$ and their product is -1 . Find the common ratio and the terms.

34. If $1^3 + 2^3 + 3^3 + \dots + k^3 = 8281$, then find $1 + 2 + 3 + \dots + k$.
35. Simplify: $\frac{2x-1}{x^2+2x+4} \times \frac{x^4-8x}{2x^2+5x-3} \times \frac{x+3}{x^2-2x}$
36. Find the square root of $4 + 25x^2 - 12x - 24x^3 + 16x^4$
37. 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 $\frac{\beta^2}{\alpha}$.
38. Solve $(x \ 1) \begin{pmatrix} 1 & 0 \\ -2 & -3 \end{pmatrix} \begin{pmatrix} x \\ 5 \end{pmatrix} = (0)$
39. If the area of the quadrilateral whose vertices, taken in order are $(1, 2)$, $(-3, 4)$, $(-5, -6)$, $(4, k)$ is 43 sq units, find 'k'.
40. State and prove Thales Theorem.
41. A person in an helicopter flying at a height of 700 m, observes two objects lying opposite to each other on either bank of a river. The angles of depression of the objects are 30° and 45° . Find the width of the river.
(use $\sqrt{3} = 1.732$)
42. The volume of a solid hemisphere is 1152π cu.cm. Find its curved surface area.
43. Find the coefficient of variation of 18, 20, 15, 12, 25.
44. In a class, 40% of the students participated in Mathematics-quiz, 30% in Science-quiz and 10% in both the quiz programmes. If a student is selected at random from the class, find the probability that the student participated in Mathematics or Science or both quiz programmes.
45. (a) The vertices of a ΔABC are $A(2, 1)$, $B(-2, 3)$ and $C(4, 5)$. Find the equation of the median through the vertex A.

(OR)

- (b) Water is flowing at the rate of 15 km/hr through a cylindrical pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. In how many hours will the water level in the tank raise by 21 cm? (Take $\pi = \frac{22}{7}$)

SECTION – IV
(Marks 20)

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

2 x 10 = 20

46. (a) Draw a circle of radius 3 cm. From an external point 7 cm away from its centre, construct a pair of tangents to the circle and measure their lengths.

(OR)

(b) Construct a cyclic quadrilateral PQRS given $PQ = 5$ cm, $QR = 4$ cm, $\angle QPR = 35^\circ$ and $\angle PRS = 70^\circ$

47. (a) Solve the equation graphically $(2x + 1)(x - 3) = 0$

(OR)

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