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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.

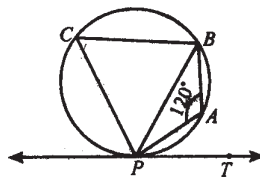
15 x 1 = 15

- For any two sets A and B, $\{(A \setminus B) \cup (B \setminus A)\} \cap (A \cap B)$ is
 - ϕ
 - $A \cup B$
 - $A \cap B$
 - $A' \cap B'$
- The $A = \{5, 6, 7\}$, $B = \{1, 2, 3, 4, 5\}$ and $f: A \rightarrow B$ is defined by $f(x) = x - 2$, then the range of f is
 - $\{1, 4, 5\}$
 - $\{1, 2, 3, 4, 5\}$
 - $\{2, 3, 4\}$
 - $\{3, 4, 5\}$
- The sequence $-3, -3, -3, \dots$ is
 - an A.P. only
 - a G.P. only
 - neither A.P. nor G.P.
 - both A.P. and G.P.
- The system of equations $x - 4y = 8$, $3x - 12y = 24$
 - has infinitely many solutions
 - has no solution
 - has a unique solution
 - may or may not have a solution
- The common root of the equations $x^2 - bx + c = 0$ and $x^2 + bx - a = 0$ is
 - $\frac{c+a}{2b}$
 - $\frac{c-a}{2b}$
 - $\frac{c+b}{2a}$
 - $\frac{a+b}{2c}$
- If A and B are square matrices such that $AB = I$ and $BA = I$, then B is
 - Unit matrix
 - Null matrix
 - Multiplicative inverse matrix of A
 - A
- 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
 - 2
 - 3
 - 4
- The x and y-intercepts of the line $2x - 3y + 6 = 0$, respectively are
 - 2, 3
 - 3, 2
 - 3, 2
 - 3, -2

9. The sides of two similar triangles are in the ratio 2 : 3, then their areas are in the ratio

- a) 9 : 4 b) 4 : 9 c) 2 : 3 d) 3 : 2

10. In the figure, if $\angle PAB = 120^\circ$ then $\angle BPT$



- a) 120° b) 30° c) 40° d) 60°

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. $\frac{1 + \tan^2\theta}{1 + \cot^2\theta} =$

- a) $\cos^2\theta$ b) $\tan^2\theta$ c) $\sin^2\theta$ d) $\cot^2\theta$

13. If the surface area of a sphere is $36\pi \text{ cm}^2$, then the volume of the sphere is equal to

- a) $12\pi \text{ cm}^3$ b) $36\pi \text{ cm}^3$ c) $72\pi \text{ cm}^3$ d) $108\pi \text{ cm}^3$

14. The range of the first 10 prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 is

- a) 28 b) 26 c) 29 d) 27

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

- a) $\frac{2}{13}$ b) $\frac{11}{13}$ c) $\frac{4}{13}$ d) $\frac{8}{13}$

SECTION - B

Note : (i) Answer any **10** questions from questions numbered 16 to 30

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

(iii) Each question carries two marks.

10 x 2 = 20

16. If $A \subset B$, then show that $(A \cup B) = B$ (use Venn diagram)

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

18. Find the sum of the series : $1^3 + 2^3 + 3^3 + \dots + 20^3$

19. Form a quadratic equation whose roots are : $\frac{4 + \sqrt{7}}{2}$, $\frac{4 - \sqrt{7}}{2}$
20. Solve : $x + \frac{1}{x} = 2\frac{1}{2}$
21. Construct a 3×2 matrix $A = [a_{ij}]$ whose elements are given by : $a_{ij} = \frac{|2i - 3j|}{2}$
22. Prove that $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}$ are inverse to each other under matrix multiplication.
23. Find the equation of the straight line whose angle of inclination is 60° and y - intercept is $\frac{1}{\sqrt{3}}$
24. Find the equation of the straight line whose x and y -intercepts on the axes are given by $\frac{2}{5}$ and $-\frac{3}{4}$
25. State Tangent - Chord theorem.
26. Prove the identity $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$
27. A kite is flying with a string of length 200m. If the thread makes an angle 30° with the ground, find the distance of the kite from the ground level. (Here, assume that the string is along a straight line)
28. A solid right circular cylinder has radius 7 cm and height 20 cm. Find its curved surface area
(Take $\pi = \frac{22}{7}$)
29. Find the standard deviation of the first 10 natural numbers.
30. (a) The radii of two right circular cylinder are in the ratio 2:3. Find the ratio of their volumes if their heights are in the ratio 5 : 3
(OR)
(b) There are 7 defective items in a sample of 35 items. Find the probability that an item chosen at random is non-defective.

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. An advertising agency finds that, of its 170 clients, 115 use Television, 110 use Radio and 130 use Magazines. Also, 85 use Television and Magazines, 75 use Television and Radio, 95 use Radio and Magazines, 70 use all the three. Draw Venn diagram to represent these data. Find
(i) how many use only Radio ? (ii) how many use only Television ? (iii) how many use Television and magazine but not radio ?

32. Let $A = \{ 6, 9, 15, 18, 21 \}$; $B = \{ 1, 2, 4, 5, 6, \}$ 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 product of three consecutive terms in G.P. is 216 and sum of their products in pairs is 156, find them.
34. The GCD of $x^4 + 3x^3 + 5x^2 + 26x + 56$ and $x^4 + 2x^3 - 4x^2 - x + 28$ is $x^2 + 5x + 7$. Find their LCM.
35. Find the square root of the polynomial $9x^4 - 6x^3 + 7x^2 - 2x + 1$ by division method.
36. Solve the equation $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$, where $x+1 \neq 0$, $x+2 \neq 0$ and $x+4 \neq 0$ using quadratic formula
37. If $A = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix}$ and $B = (1 \ 3 \ -6)$, then verify that $(AB)^T = B^T A^T$.
38. Find the area of the quadrilateral whose vertices are : $(-1, 6)$, $(-3, -9)$, $(5, -8)$ and $(3, 9)$
39. Find the equation of the perpendicular bisector of the straight line segment joining the points $(3, 4)$ and $(-1, 2)$
40. If all sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.
41. From the top of a tower of height 60 m, the angles of depression of the top and the bottom of a building are observed to be 30° and 60° respectively. Find the height of the building.
42. Radius and slant height of a solid right circular cone are in the ratio 3 : 5. If the curved surface area is 60π sq.cm., then find its total surface area.
43. Calculate the coefficient of variation of the following data : 20, 18, 32, 24, 26.
44. Three coins are tossed simultaneously. Using addition theorem on probability, find the probability that either exactly two tails or at least one head turn up.
45. (a) A cylindrical shaped well of depth 20m and diameter 14m is dug. The dug out soil is evenly spread to form a cuboid - platform with base dimension 20m x 14m. Find the height of the platform

(OR)

- (b) The ratio of the sums of first m and first n terms of an arithmetic series is $m^2 : n^2$. Show that the ratio of the m th and n th terms is $(2m - 1) : (2n - 1)$

SECTION - D

Note : (i) Each question carries TEN marks

(ii) Answer both the questions

2 x 10 = 20

46. (a) Construct a ΔABC in which $BC = 5.5$ cm, $\angle A = 60^\circ$ and the median AM from the vertex A is 4.5 cm.
- (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) Draw a graph of $y = 2x^2$ and hence solve $2x^2 + x - 6 = 0$.

(OR)

- (b) A cyclist travels from a place A to a place B along the same route at a uniform speed on different days. The following table gives the speed of his travel and the corresponding time he took to cover the distance.

Speed in km/hr x	2	4	6	10	12
Time in hrs y	60	30	20	12	10

- Draw the speed-time graph and use it to find. (i) the number of hours he will take if he travels at a speed of 5 km/hr. (ii) the speed with which he should travel if he has to cover the distance in 40 hrs.