Marks: 100 **SSLC MODEL PUBLIC EXAM** **Time: 3 hrs**

Mathematics

I. Choose the best answer:- **14 x 1 = 14**

1. Given f (x) = $(-1)^x$ is function from N to Z. Then the range of f is

(1) {1} **(2) N** **(3) {1, -1}** **(4) Z**

2. Let n(A) = m and n(B) = n then the total number of non-empty relations that can be defined from A to B is

(1) m^n **(2)** n^m **(3)** $2^{mn} - 1$ **(4)** 2^{mn}

3. $7^{4k} \equiv$ ____ $(mod\ 100)$

(1) 1 **(2) 2** **(3) 3** **(4) 4**

4. If the sequence $t_1, t_2, t_3, ..$ **are in A.P. then the sequence** $t_6, t_{12}, t_{18}, ...$ **is**

(1) a Geometric Progression **(2) an Arithmetic Progression**

(3) neither an Arithmetic Progression nor a Geometric Progression

(4) a constant sequence

5. Which of the following should be added to make $x^4 + 64$ **a perfect square**

(1) $4x^2$ **(2)** $16x^2$ **(3)** $8x^2$ **(4)** $-8x^2$

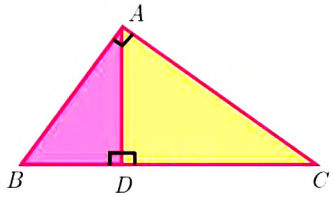
6. If A is a 2×3 **matrix and B is a** 3×4 **matrix, how many columns does AB have**

(1) 3 **(2) 4** **(3) 2** **(4) 5**

7. In the adjacent figure $\angle BAC = 90°$ **and** $AD \perp BC$ **then**

(1) $BD.CD = BC^2$ **(2)** $AB.AC = BC^2$

(3) $BD.CD = AD^2$ **(4)** $AB.AC = AD^2$



8. If slope of the line PQ **is** $\frac{1}{\sqrt{3}}$ **then the slope of the perpendicular bisector of** PQ **is**

(1) $\sqrt{3}$ **(2)** $-\sqrt{3}$ **(3)** $\frac{1}{\sqrt{3}}$ **(4) 0**

9. $a\cot\theta + b\,cosec\,\theta = p$ and $b\cot\theta + a\,cosec\,\theta = q$ then $p^2 - q^2$ is equal to

(1) $a^2 - b^2$ (2) $b^2 - a^2$ (3) $a^2 + b^2$ (4) $b - a$

10. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is

(1) 1 : 2 (2) 1 : 4 (3) 1 : 6 (4) 1 : 8

11. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is

(1) $\frac{4}{3}\pi$ (2) $\frac{10}{3}\pi$ (3) 5π (4) $\frac{20}{3}\pi$

12. The top of two poles of height 18.5 m and 7 m are connected by a wire. If the wire makes an angle of measure 30 ° with horizontal, then the length of the wire is

(1) 23 m (2) 18 m (3) 28 m (4) 25. 5 m

13. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is

(1) 3 (2) 15 (3) 5 (4) 225

14. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$ then the value of x is

(1) 2 (2) 1 (3) 3 (4) 1. 5

II. <u>Answer any 10 questions. (Q.NO : 28 compulsory)</u> 10 x 2 = 20

15. Define `Cartesian Product'.

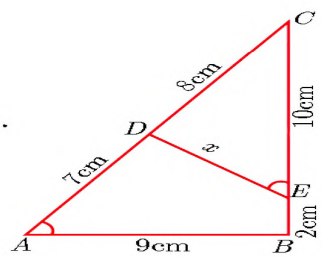
16. A function f is defined by $f(x) = 3 - 2x$. Find x such that $f(x^2) = (f(x))^2$.

17. If the first term of an infinite G.P. is 8 and its sum to infinity is $\frac{32}{3}$ then find the common ratio.

18. Simplify : $\frac{4x}{x^2-1} - \frac{x+1}{x-1}$

19. Solve by completing square method : $x^2 - 3x - 2 = 0$

20. In the figure $\angle A = \angle CED$,then find the value of x .



21. Find the slope of the line which is perpendicular to the line $x = -11$.

22. Find the value of 'a' , if the points (2,3), (4,a) and (6,−3) are collinear

23. Prove that $\sec\theta - \cos\theta = \tan\theta \sin\theta$.

24. A garden roller whose length is 3m long and whose diameter is 2.8m is rolled to level a garden. How much area will it cover in 8 revolutions

25. The ratio of the volumes of two cones is 2:3. Find the ratio of the radii if the height of second cone is double the height of the first.

26. A group of 100 candidates have their average height 163.8 cm with coefficient of variation 3.2. What is the standard deviation of their heights?

27. The probability that at least one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(\overline{A}) + P(\overline{B})$.

28. Today is Tuesday. My uncle will come after 45 days. In which day my uncle will be coming?

III. <u>Answer any 10 questions. (Q.NO : 28 compulsory)</u> 10 x 5 = 50

29. Let A={ $x \in N$ / 1 < x < 4}, B ={ $x \in W$ | 0 ≤ x < 2} and C={ $x \in N$ | x < 3}. Then verify that Ax(B−C) = (AxB) − (AxC)

30. The functions f and g are defined by $f(x) = 6x + 8$; $g(x) = \frac{x-2}{3}$

    (i) Calculate the value of $gg(\frac{1}{2})$ (ii) Write an expression for $gf(x)$ in its simplest form iii) Write an expression for $fg(x)$ in it simplest form

31. Find the sum of all natural numbers between 602 and 902 which are not divisible by 4.

32. Find the LCM of $xy(k^2+1)+k(x^2+y^2)$ and $xy(k^2-1)+k(x^2-y^2)$.

33. Given that A= $\begin{pmatrix} 1 & 3 \\ 5 & -1 \end{pmatrix}$, B=$\begin{pmatrix} 1 & -1 & 2 \\ 3 & 5 & 2 \end{pmatrix}$, C= $\begin{pmatrix} 1 & 3 & 2 \\ -4 & 1 & 3 \end{pmatrix}$

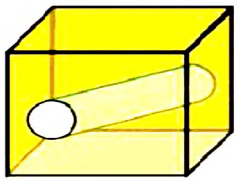
    verify that A(B+C) = AB+AC.

34. State and prove Alternate Segment Theorem.

35. A triangular shaped glass with vertices at A(−5,− 4), B(1,6) and C(7,−4) has to be painted. If one bucket of paint covers 6 sq. ft., how many buckets of paint will be required to paint the whole glass, if only one coat of paint is applied.

36. **A lift in a building of height 90 feet with transparent glass walls is descending from the top of the building. At the top of the building, the angle of depression to a fountain in the garden is 60°. Two minutes later, the angle of depression reduces to 30°. If the fountain is $30\sqrt{3}$ feet from the entrance of the lift, find the speed of the lift which is descending.**

37. **As shown in the figure a cylinder with diameter 7cm is cut out from a cubical solid of side 7cm. Find the surface area of the remaining solid.**



38. **The time taken by 50 students to complete a100m race is given below. Find its variance.**

Time taken(sec)	8.5-9.5	9.5-10.5	10.5-11.5	11.5-12.5	12.5-13.5
Number of students	6	8	17	10	9

39. **If two dice are rolled, then find the probability of getting the product of face value 6 or the difference of face value 5.**

40. **A solid sphere of radius 6cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5cm and its height is 32cm, then find the thickness of the cylinder.**

41. **Rekha has 15 square colour papers of sizes 10cm, 11cm, 12cm,..., 24cm. How much area can be decorated with these colour papers?**

42. **Find the image of the point (3,8) with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.**

IV. **Answer both questions** **2 x 8 = 16**

43. **a) Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$.** **(or)**

b) The number of seats in a row is equal to the total number of rows in a hall. The total number of seats in the hall will increase by 375 if the number of rows is doubled and the number of seats in each row is reduced by 5. Find the number of rows in the hall at the beginning.

44. **a) Construct a ΔPQR in which QR=5cm, ∟P=40° and the median PG from P to QR is 4.4cm. Find the length of the altitude from P to QR.** **(or)**

b) In the fig, O is the centre of the circle with radius 5cm. T is a point such that OT=13cm and OT intersects the circle E, if AB is the tangent to the circle at E, find the length of AB.