ONE TWO ACADEMY CHALLENGE QUESTION PAPER 2022 – 23

SSLC MATHEMATICS

Maximum Marks: 100 marks Duration 3.00 Hours

Instructions: (1) Check the question paper for the fairness of printing. If there is any lack of fairness inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline.

PART – I

Note : (i) Answer **all** the questions.

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

1. Identify the incorrect statement

(a)If n(A) = n(B), then f is bijection from A to B

(b) *g o f(x)* exists only when the range of g is a subset of the domain of f

(c) If f is a bijection from A to B, then n(A) = n(B)

(d)Linear functions are one – one

2. $f(x) = (x+1)^3 + (x-1)^3$ represents a function which is

(a) linear (b) cubic (c) reciprocal (d) quadratic

3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

(a) 2025 (b) 5220 (c) 5025 (d) 2520

4. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P must be taken for their sum to be equal to 120 ?

(a) 6 (b) 7 (c) 8 (d) 9

5. If A is 2 x 3 matrix and B is a 3 x 4 matrix, how many columns does AB have

(a) 3 (b) 4 (c) 2 (d) 5

6. If (x-6) is the HCF of $x^2 – 2x - 24$ and $x^2 - kx – 6$ then value of k is

(a) 3 (b) 5 (c) 6 (d) 8

7. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X-axis is

(a) 0 (b) 1 (c) 2 (d) 0 or 1

8.In a $\triangle ABC$, AD is a bisector of $\angle BAD$. If AB = 8 cm, BD = 6 cm and DC = 3 cm. The length of the side AC is

(a) 6cm (b) 4 cm (c) 3 cm (d) 8 cm

9.The point of intersection of $3x - y = 4$ and $x + y = 8$.

(a) (5,3) (b) (2,4) (c) (3,5) (d) (4,4)

10. When proving that a quadrilateral is a parallelogram by using slopes you must find

(a) The slope of two sides (b) The slopes of two pairs of opposites sides

(c) The length of all sides (d) Both the length and slope of two sides

11.If $x = a\tan\theta$ and $y = b\sec\theta$ then,

(a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ (b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (c) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (d) $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$

12. The Variance of first 20 natural numbers is

(a) 32.5 (b) 44.25 (c) 33.25 (d) 30

13.The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

14. The probability a blue marble selected at random from a jar containing p red, q blue and r green marble is

(a) $\frac{q}{p+q+r}$ (b) $\frac{q}{p+q+r}$ (c) $\frac{p+q}{p+q+r}$ (d) $\frac{p+r}{p+q+r}$

PART – II

Note : Answer **all** the questions.

15. If A X B = { (3,2), (3,4), (5,2), (5,4) } then find A and B.

16. Write the domain of the following function $f(x) = \frac{2x+1}{x-9}$.

17. What is the probability that a leap year selected at random will contain 53 Saturdays.

18.If $1 + 2 + 3 + \ldots + k = 325$, then find $1^3 + 2^3 + \ldots + k^3$.

19. Pari needs 4 hours to complete a work. His friend Yuvan needs 6 hours to complete the same work. Prove that it takes 2 hours 24 minutes if they both work together.

20.Construct a 3 x 3 matrix whose elements are given by $a_{ij} = | i-2j |$.

21. If radii of two concentric circles are 4 cm and 5 cm then find the length of the chord of one circle which is tangent to the other circle.

22.The line through the points (-2,a) and (9,3) has slope $\frac{-1}{2}$. Find the value of a.

23.Find the intercepts made by the line $4x - 9y + 36 = 0$ on co-ordinate axes.

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

25.The volume of a solid right circular cone is 11088 cm^3 . If the height is 24 cm then find the radius of the cone.

26. Find the diameter of the sphere whose surface area is 154 m^2.

27.The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the Coefficient of variation.

28. Find n so that n^{th} term of the following two A.P's are same 1,7,13,19,… and 100,95,90,85,…

PART – III

Note : (i) Answer **all** the questions.

29. Let A = {1,2,3,4} and B = { 2,5,8,11,14 } be two sets. Let f : A→ B be a function given by f(x) = 3x -1. Represent this function

(i) by arrow diagram (ii) in a table form

(iii) as a set of ordered pairs (iv) in a graphical form.

30. Find the sum to n terms of the series: 3 + 33 + 333 + … to n terms.

31. Find the HCF of 396, 504 and 636.

32.Prove that the following system of linear equation is inconsistent and has no solution.

$3x + y - 3z = 1$;

$-2x + y + 2z = 1$;

$-x - y + z = 2$.

33. A passenger train takes 1 hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the trains.

34. If $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 1 & 5 \\ 7 & 2 & -1 \end{bmatrix}$ and $B = C^T$, Prove that $(AB)^T = B^T A^T$.

35.State and prove Baudhyana Theorem.

36.Find the area of the quadrilateral whose vertices are at (-9,0), (-8,6), (-1,-2) and (-6,-3).

37. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of frustum.

38.From the top of a 12m high building, the angle of elevation of the top of the cable tower is 60^o and the angle of depression of its foot is 30^o.Determine the height of the tower.

39. In a class of 35, students are numbered from 1 to 35. The ratio of boys to girls is 4:3. The roll numbers of students begin with boys and end with girls. Find the probability that a student selected is either a boy with prime roll number or a girl with composite roll number or an even roll number.

40. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.

41. The mean and standard deviation of 15 observations are found to be 10 and 5 respectively. On rechecking it was found that one of the observation with value 8 was incorrect. Calculate the correct mean and standard deviation if the correct observation value was 23?

42. If the equation $(1+m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, then prove that $c^2 = a^2 (1 + m^2)$

PART – IV

Note : Answer **all** the questions

43. a) Draw a circle of diameter 6 cm from a point P, which is 8 cm away from it's centre. Draw two tangents PA and PB to the circle and measure their lengths

OR

(b) Draw a right triangle ABC with base 3cm and height 4 cm. and Construct a similar triangle with scale factor = 2.

44. . (a) Draw the graph of $y = x^2 + 3x - 4$ and hence solve $x^2 + 3x - 4 = 0$

OR

(b) A school announces that for a certain competitions, the cash prize will be distributed for all the participants equally as shown below

No. of participants (x)	2	4	6	8	10
Amount for each participant in Rs (y)	180	90	60	45	36

(i) Find the constant of variation.

(ii) Graph the above data and hence, find how much will each participant get if the number of participants are 12.