MODEL PUBLIC EXAMINATION

10th Standard **Model Exam** **Total Marks : 100**

Subject : MATHEMATICS **Time : 03:00 Hrs**

` Part- A **14x1=14**

Answer all the questions

Choose the correct answer

1. If n(A x B) =6 and A={1,3} then n(B) is (a) 1 (b) 2 (c) 3 (d) 6

2. The sequence –3, –3, –3,…… is
(a) an A.P. only (b) a G.P. only (c) neither A.P. nor G.P (d) both A.P. and G.P.

3. If the HCF of 65 and 117 is expressible in the form of 65m - 117 , then the value of m is
(a) 4 (b) 2 (c) 1 (d) 3

4. The number of real excluded value/s of the expression $\frac{x}{x^2+1}$

(a) 0 (b) 1 (c) 2 (d) 3

5. Which of the following can be calculated from the given matrices $A=\begin{pmatrix}1 & 2\\ 3 & 4\\ 5 & 6\end{pmatrix}, B=\begin{pmatrix}1 & 2 & 3\\ 4 & 5 & 6\\ 7 & 8 & 9\end{pmatrix}$

(i) A^2 (ii) B^2 (iii) AB (iv) BA

(a) (i) and (ii) only (b) (ii) and (iii) only (c) (ii) and (iv) only (d) all of these

6. If $\triangle ABC$ is an isosceles triangle with $\angle C=90^o$ and AC = 5 cm, then AB is

(a) 2.5 cm (b) 5 cm (c) 10 cm (d) $5\sqrt{2}$cm

7. The side of a square is equal to the side of an equilateral triangle. The ratio of their areas is

(a) 4:3 (b) 2:$\sqrt{3}$ (c) 4:$\sqrt{3}$ (d) none of these

8. Consider four straight lines (i) l_1 : 3y = 4x + 5(ii) l_2 : 4y = 3x - 1(iii) l_3 : 4y + 3x =7(iv) l_4 : 4x + 3y = 2
Which of the following statement is true?
(a) l_1 and l_2 are perpendicular (b) l_1 and l_4 are parallel (c) l_2 and l_4 are perpendicular (d) l_2 and l_3 are parallel

9. if $\cos(\alpha+\beta)=0$, $\sin(\alpha-\beta)$ is equal to

(a) $\sin\alpha$ (b) $\cos\beta$ (c) $\sin 2\alpha$ (d) $\cos 2\beta$

. 10. Two persons are standing 'x' metres apart from each other and the height of the first person is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shorter person (in metres) is

(a) $\sqrt{2}$ x (b) $x/2\sqrt{2}$ c) $\frac{x}{\sqrt{2}}$ (d) 2x

11. If the volume and surface area of a sphere are numerically equal, then the radius of the sphere is _____.

(a) 4 (b) 3 c) 3π (d) $3/\pi$

12. A shuttle cock used for playing badminton has the shape of the combination of

(a) a cylinder and a sphere (b) a hemisphere and a cone

(c) a sphere and a cone (d) frustum of a cone and a hemisphere

13. An experiment in which a particular outcome cannot be predicted is called ------ event

(a) Random (b) Impossible (c) Mutually exclusive (d) Sample

14. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is 19, then the number of tickets bought by Kamalam is

(a) 5 (b) 10 (c) 15 (d) 20

Part-B **10 x 2 = 20**

Answer any 10 questions and Qn No. 28 is compulsory

15. Let A = {1,2,3} and B = {x | x is a prime number less than 10}. Find AXB and BXA.

16. Let X = {3, 4, 6, 8}. Determine whether the relation R = {(x, f (x)) | x _ X, f (x) = x^2 +1}

is a function from X to N?

17. If 13824 = $2^a \times 3^b$ then find a and b.

18. Solve: $x^4 - 13x^2 + 42 = 0$

. 19.

$$\text{If } A = \begin{pmatrix} 2 & -2\sqrt{2} \\ \sqrt{2} & 2 \end{pmatrix} \text{ and } B = \begin{pmatrix} 2 & 2\sqrt{2} \\ -\sqrt{2} & 2 \end{pmatrix}$$

Show that A and B satisfy commutative property with respect to matrix multiplication.

20. In ΔABC, D and E are points on the sides AB and AC respectively. For each of the following cases show that $DE \parallel BC$ AB = 12 cm, AD = 8 cm, AE = 12 cm and AC = 18 cm.

21. The floor of a hall is covered with identical tiles which are in the shapes of triangles. One such triangle has the vertices at (-3,2) , (-1,-1) and (1,2) . If the floor of the hall is completely covered by 110 tiles, find the area of the floor

22. Find the equation of a line passing through the point A(1,4) and perpendicular to the line joining points (2, 5) and (4, 7).

23. Prove that $\sin^2 A\cos^2 B+\cos^2 A\sin^2 B+\cos^2 A\cos^2 B+\sin^2 A\sin^2 B=1$

24. A tower stands vertically on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is $30°$. Find the height of the tower

25. The radius of a conical tent is 7 m and the height is 24 m. Calculate the length of the canvas used to make the tent if the width of the rectangular canvas is 4 m?

26. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3, …12. What is the probability that it will point to (i) 7 (ii) a prime number

27. Find the range and coefficient of range of the following data: 25, 67, 48, 53, 18, 39, 44.

28. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture initially, how many bacteria will be present at the end of 14^{th} hour?

Part-C **10 x 5 = 50**

Answer any 10 questions and Qn No. 42 is compulsory

29. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible.
(i) $\{(x,y)\,|\,x = 2y,\ x \in \{2,3,4,5\},\ y \in \{1,2,3,4\}$ (ii) $\{(x,y)\,|\,y = x+3,\ x, y$ are natural numbers $< 10\}$

30. If $f(x) = x^2$, $g(x) = 3x$ and $h(x) = x - 2$, Prove that $(f \circ g) \circ h = f \circ (g \circ h)$.

31. Find the sum to n terms of the series $3 + 33 + 333 + \cdots$ to n terms

32. In an A.P., sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers.

33. Find the square root of the polynomial by division method $121x^4 - 198x^3 - 183x^2 + 216x + 144$

34. Let $A = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix}$, $C = \begin{pmatrix} 2 & 0 \\ 1 & 2 \end{pmatrix}$ Show that (i) $A(BC) = (AB)C$

35. State and prove Thales theorem.

36. The floor of a hall is covered with identical tiles which are in the shapes of triangles. One such triangle has the vertices at (-3,2) , (-1,-1) and (1,2) . If the floor of the hall is completely covered by 110 tiles, find the area of the floor.

37. Find the equation of a straight line joining the point of intersection of $3x + y + 2 = 0$ and $x - 2y - 4 = 0$ to the point of intersection of $7x - 3y = -12$ and $2y = x + 3$

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

39. A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the toy is 25cm. Find
the total surface area of the toy if its common diameter is 12 cm..

40. The outer and the inner surface areas of a spherical copper shell are 576π cm^2 and 324π cm^2 respectively. Find the volume of the material required to make the shell.

41. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.

42. The speed of a boat in still water is 15 km/hr. It goes 30 km upstream and return downstream to the original point in 4 hrs 30 minutes. Find the speed of the stream.

Part-D 2 x 8 = 16

Answer all questions

43. a) Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Ponmozhi, , Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively Draw the speed-time. graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr.

(OR)

b.) Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$

44.a) Construct a $\triangle PQR$ which the base PQ= 4.5 cm,$\angle R=35^o$and the median from R to RG is 6 cm.

(OR)

b) . Draw a tangent to the circle from the point *P* having radius 3.6 cm, and centre at *O*.

Point *P* is at a distance 7.2 cm from the centre.

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