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SK MODEL QUARTERLY - 10th STANDARD - PART - III - MATHEMATICS

Time Allowed: 3 Hours

Maximum Marks: 100

Instructions: (1) Check the Question paper for 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 and pencil to draw diagrams.

PART I

Note : (i) All questions are compulsory

14 X 1 = 14

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

1. If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is
 (1) 1 (2) 2 (3) 3 (4) 6
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) mn (2) nm (3) $2^{mn} - 1$ (4) 2^{mn}
3. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
 (1) 14400 (2) 14200 (3) 14280 (4) 14520
4. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \dots$ is
 (1) $\frac{1}{24}$ (2) $\frac{1}{2}$ (3) $\frac{1}{36}$ (4) $\frac{1}{18}$
5. For what value of k , will the system of equations $2x + 3y = k$ and $(k - 1)x + (k + 2)y = 3k$ has infinite solutions ?
 (1) -7 (2) 5 (3) 7 (4) 0
6. The solution of the system $x + y - 3z = -6, -7y + 7z = 7, 3z = 9$ is
 (1) $x = 1, y = 2, z = 3$ (2) $x = -1, y = 2, z = 3$ (3) $x = -1, y = -2, z = 3$ (4) $x = 1, y = 2, z = 3$
7. The solution of $(2x - 1)^2 = 9$ is equal to
 (1) -1 (2) 2 (3) -1, 2 (4) None of these
8. If $\triangle ABC$ is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5$ cm, then AB is
 (1) 2.5 cm (2) 5 cm (3) 10 cm (4) $\sqrt{2}$ cm
9. A tangent is perpendicular to the radius at the
 (1) centre (2) point of contact (3) infinity (4) chord

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10. When proving that a quadrilateral is a trapezium, it is necessary to show
- (1) Two sides are parallel. (2) Two parallel and two non-parallel sides.
 (3) Opposite sides are parallel. (4) All sides are of equal length
11. The slope of the line which is perpendicular to a line joining the points (0,0) and (-8,8) is
- (1) -1 (2) 1 (3) $\frac{1}{3}$ (4) -8
12. The x-intercept of the line $3x - 2y + 12 = 0$ is
- (1) 6 (2) -6 (3) 4 (4) -4
13. $\tan \theta \operatorname{cosec}^2 \theta - \tan \theta$ is equal to
- (1) $\sec \theta$ (2) $\cot^2 \theta$ (3) $\sin \theta$ (4) $\cot \theta$
14. If $\sin \theta + \cos \theta = a$ and $\sec \theta + \operatorname{cosec} \theta = b$, then the value of $b(a^2 - 1)$ is equal to
- (1) $2a$ (2) $3a$ (3) 0 (4) $2ab$

Part II - 2 Marks - Qn No 28 is Compulsory**10 X 2 = 20**

15. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B
16. A plane is flying at a speed of 500km per hour. Express the distance d travelled by the plane as function of time t in hours.
17. Find the 19th term of an A.P. -11, -15, -19,.....
18. Today is Tuesday. My uncle will come after 45 days. In which day my uncle will be coming?
19. Find the square root $\frac{400 x^4 y^{12} z^{16}}{100 x^8 y^4 z^4}$
20. Find the zeroes of the quadratic expression $x^2 + 8x + 12$
21. Determine the nature of roots for the quadratic equation $x^2 - x - 20 = 0$
22. If ΔABC is similar to ΔDEF such that $BC = 3$ cm, $EF = 4$ cm and area of $\Delta ABC = 54$ cm^2 . Find the area of ΔDEF
23. In ΔABC , D and E are points on the sides AB and AC respectively. Show that $DE \parallel BC$, $AB = 5.6$ cm, $AD = 1.4$ cm, $AC = 7.2$ cm and $AE = 1.8$ cm
24. Show that the points $P(-1.5, 3)$, $Q(6, -2)$, $R(-3, 4)$ are collinear.
25. The hill in the form of a right triangle has its foot at (19, 3). The inclination of the hill to the ground is 45° . Find the equation of the hill joining the foot and top
26. Prove that $\sqrt{\frac{1+\sin \theta}{1-\sin \theta}} = \sec \theta + \tan \theta$
27. Prove that $\sec \theta - \cos \theta = \tan \theta \sin \theta$
28. Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the point (6, 4).

Part III - 5 Marks - Qn No 42 is Compulsory**10 X 5 = 50**

29. Let $A = \{1, 2, 3, 4\}$ and $B = \{2, 5, 8, 11, 14\}$ be two sets. Let $f : A \rightarrow B$ 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. $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $f \circ (g \circ h) = (f \circ g) \circ h$
31. The sum of three consecutive terms that are in A.P. is 27 and their product is 288. Find the three terms
32. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.
33. Simplify : $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$

34. 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.
35. State and Prove Theorem: Angle Bisector Theorem
36. ABCD is a trapezium in which $AB \parallel DC$ and P,Q are points on AD and BC respectively, such that $PQ \parallel DC$ if $PD = 18$ cm, $BQ = 35$ cm and $QC = 15$ cm, find AD.
37. Without using Pythagoras theorem, show that the points (1,-4) , (2, -3) and (4, -7) form a right angled triangle.
38. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (-3, 8). Find its equation.
39. 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 $2y = x + 3$.
40. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = \theta$, then prove that $\theta (p^2 - 1) = 2p$ ii) If $\sin\theta (1 + \sin^2 \theta) = \cos^2 \theta$, then prove that $\cos^6 \theta - 4 \cos^4 \theta + 8\cos^2 \theta = 4$
41. If $\operatorname{cosec} q + \cot q = P$, then prove that $\cos \theta = \frac{p^2-1}{p^2+1}$
42. Find the sum to n terms of the series $7 + 77 + 777 + \dots$ to n terms

Part IV - 8 Marks - All Questions are Compulsory **2 X 8 = 16**

43. Construct a triangle similar to a given triangle PQR with its sides equal to $2/3$ of the corresponding sides of the triangle PQR (scale factor $2/3$). (or)
Draw ΔPQR such that $PQ = 6.8$ cm, vertical angle is 50° and the bisector of the vertical angle meets the base at D where $PD = 5.2$ cm.
44. A garment shop announces a flat 50% discount on every purchase of items for their customers. Draw the graph for the relation between the Marked Price and the Discount. Hence find (i) the marked price when a customer gets a discount of ₹3250 (from graph) (ii) the discount when the marked price is ₹2500 (or)
Draw the graph of $xy = 36$, $x, y > 0$ using the graph find, i. y when $x = 4$ and ii . x when $y = 6$

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