

SK-MDU-QP3

REGISTER NUMBER

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SK MODEL QUARTERLY - 10<sup>th</sup> 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.

- If  $\{(a, 8), (6, b)\}$  represents an identity function, then the value of a and b are respectively
  - (8, 6)
  - (8, 8)
  - (6, 8)
  - (6, 6)
- $f : X \rightarrow Y$  where  $X = \{-1, -2, -3\}$ ,  $Y = \{3, 4, 5\}$  is given by  $f(x) = x + 6$ ,  $x \in X$ , then f is
  - onto
  - many to one
  - constant function
  - bijective
- If the HCF of 65 and 117 is expressible in the form of  $65m - 117$ , then the value of m is
  - 4
  - 2
  - 1
  - 3
- The 3<sup>rd</sup> term of a G.P is the square of first term. If the 2<sup>nd</sup> term is 8, then the 6<sup>th</sup> term is
  - 120
  - 124
  - 128
  - 132
- The solution set of the equation  $(x-3)^2 = 9$  is
  - $\{0, 3\}$
  - $\{3, 3\}$
  - $\{3, 6\}$
  - $\{0, 6\}$
- The solution of the system  $x + y - 3z = -6$ ,  $-7y + 7z = 7$ ,  $3z = 9$  is
  - $x = 1, y = 2, z = 3$
  - $x = -1, y = 2, z = 3$
  - $x = -1, y = -2, z = 3$
  - $x = 1, y = 2, z = 3$
- A system of three linear equations in three variables is inconsistent if their planes
  - intersect only at a point
  - intersect in a line
  - coincides with each other
  - do not intersect
- In  $\triangle LMN$ ,  $L = 60^\circ$ ,  $M = 50^\circ$ . If  $\triangle LMN \sim \triangle PQR$  then the value of  $\angle R$  is
  - $40^\circ$
  - $70^\circ$
  - $30^\circ$
  - $110^\circ$
- If in  $\triangle ABC$ ,  $DE \parallel BC$ .  $AB = 3.6$  cm,  $AC = 2.4$  cm and  $AD = 2.1$  cm then the length of AE is
  - 1.4 cm
  - 1.8 cm
  - 1.2 cm
  - 1.05 cm

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[ As Per Government Pattern ]

Std	Full Portion Questions	One Mark Test Series	Half Portion Questions
10 <sup>th</sup>	15 Questions - A & B Types	10 Models	10 Models
11 <sup>th</sup>	15 Questions - A & B Types	10 Models	10 Models
12 <sup>th</sup>	15 Questions - A & B Types	10 Models	10 Models

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10. The equation of a line passing through the origin and perpendicular to the line  $7x - 3y + 4 = 0$  is  
 (1)  $7x - 3y + 4 = 0$       (2)  $3x - 7y + 4 = 0$       (3)  $3x + 7y = 0$       (4)  $7x - 3y = 0$
11. If  $(5,7)$ ,  $(3,p)$  and  $(6,6)$  are collinear, then the value of  $p$  is  
 (1) 3      (2) 6      (3) 9      (4) 12
12. The x-intercept of the line  $3x - 2y + 12 = 0$  is  
 (1) 6      (2) -6      (3) 4      (4) -4
13. The value of  $\sin \theta \cdot \operatorname{cosec} \theta + \cos \theta \sec \theta$  is  
 (1) 1      (2) 0      (3) -1      (4) -2
14.  $\tan \theta \operatorname{cosec}^2 \theta - \tan \theta$  is equal to  
 (1)  $\sec \theta$       (2)  $\cot^2 \theta$       (3)  $\sin \theta$       (4)  $\cot \theta$

Part II - 2 Marks - Q.No 28 is Compulsory

10 x 2 = 20

15. Let  $A = \{-1, 1\}$  and  $B = \{0, 2\}$ . If the function  $f : A \rightarrow B$  defined by  $f(x) = ax + b$  is an onto function? Find  $a$  and  $b$
16. If  $f(x) = 1x + 5$ ,  $g(x) = 2x + 3$ , find  $l$  such that  $f \circ g = g \circ f$ .
17. Find the 8th term of the G.P. 9, 3, 1, ...
18. If  $13824 = 2^a \times 3^b$  then find  $a$  and  $b$
19. Find the LCM  $q^2 - 4$ ,  $q^3 - 8$ ,  $q^2 - 6q + 8$
20. Find the square  $4x^2 + 20x + 25$
21. Find 'k' if the following equations have real & equal roots.  $2x^2 - 10x + k = 0$
22. If AD is the bisector of  $\angle A$ . If  $BD = 4$  cm,  $DC = 3$  cm and  $AB = 6$  cm, find AC
23. Find the value of 'a', if the line through  $(-2, 3)$  and  $(8, 5)$  is perpendicular to  $y = ax + 2$ .
24. A cat is located at the point  $(-6, -4)$  in xy plane. A bottle of milk is kept at  $(5, 11)$ . The cat wish to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk
25. Find the slope and y-intercept of the line  $10x + 15y + 6 = 0$
26. Prove the identity  $\cot \theta + \tan \theta = \sec \theta \operatorname{cosec} \theta$
27. Prove that  $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sec \theta + \tan \theta$
28. A vertical stick of length 6 m casts a shadow 400 cm long on the ground and at the same time a tower casts a shadow 28 m long. Using similarity, find the height of the tower

Part III - 5 Marks - Q.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. 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. The ratio of 6<sup>th</sup> and 8<sup>th</sup> term of an A.P. is 7 : 9. Find the ratio of 9<sup>th</sup> term to 13<sup>th</sup> term
32. The sum of first,  $n$ ,  $2n$  and  $3n$  terms of an A.P. are  $S_1$ ,  $S_2$  and  $S_3$  respectively. Prove that  $S_3 = 3(S_2 - S_1)$ .
33. Find the values of  $m$  and  $n$  if the expressions are perfect square  
 $4x^4 - 12x^3 + 37x^2 + bx + a$

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. If one root of the equation  $2y^2 - ay + 64 = 0$  is twice the other then find the values of a.
36. Theorem : Thales Theorem
37. If the points A(-3, 9) , B (a, b) and C(4,-5) are collinear and if  $a+b = 1$  ,then find a and b
38. Prove analytically that the line segment joining the mid-points of two sides of a triangle is parallel to the third side and is equal to half of its length
39. If  $\cot \theta + \tan \theta = x$  and  $\sec \theta - \cos \theta = y$ , then prove that  $(x^2y)^{2/3} - (xy^2)^{2/3} = 1$
40. If  $\tan \theta + \sin \theta = p$ ,  $\tan \theta - \sin \theta = q$ , prove that  $p^2 - q^2 = \sqrt{pq}$
41. Two vertical poles of heights 6 m and 3 m are erected above a horizontal ground AC. Find the value of y.
42. Find the equation of a line passing through (6,-2) and perpendicular to the line joining the points (6,7) and (2,-3)

Part IV – Answer All the Questions

2 x 8 = 16

43. a. Construct a triangle similar to a given triangle ABC with its sides equal to  $\frac{6}{5}$  of the corresponding sides of the triangle ABC (scale factor  $\frac{6}{5}$ ) (or)
- b. Draw a triangle ABC of base BC = 8 cm,  $\angle A = 60^\circ$  and the bisector of  $\angle A$  meets BC at D such that BD = 6 cm.
44. 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, Jeyanth, 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. A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x) 40 50 60 75

Number of days (y) 150 120 100 80

- (i) Graph the above data and identify the type of variation.
- (ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?
- (iii) If the work has to be completed by 30 days, how many workers are required?

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