COMMON SECOND REVISION TEST - 2023

Standard X

Reg.No.

Ramipet District

MATHEMATICS

Time : 3.00 hrs 　　　　　　　　**Part - I** 　　　　　　　　**Marks : 100**

I. Choose the correct answer: 　　　　　　　　$14 \times 1 = 14$

1. The range of the relation R = {(x, x^2 / x is a prime number less than 13) is
   a) {2,3,5,7} 　　 b) {2,3,5,7,11} 　　 c) {4,9,25,49,121} 　　 d) {1,4,9,25,49,121}

2. If f(x) = $2x^2$ and g(x) = $\frac{1}{3x}$, then fog is

   a) $\frac{3}{2x^2}$ 　　　 b) $\frac{2}{3x^2}$ 　　　 c) $\frac{2}{9x^2}$ 　　　 d) $\frac{1}{6x^2}$

3. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   a) 1 　　　 b) 2 　　　 c) 3 　　　 d) 4

4. The value of $(1^3 + 2^3 + 3^3 + ... + 15^3) - (1 + 2 + 3 ..... + 15)$ is
   a) 14400 　　　 b) 14200 　　　 c) 14280 　　　 d) 14520

5. The LCM of a^k, a^{k+3}, a^{k+5} where k∈N is _____.
   a) a^{k+9} 　　　 b) a^k 　　　 c) a^{k+6} 　　　 d) a^{k+5}

6. 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

7. The two tangents from an external points P to a circle with centre at O are PA and PB. If ∠APB = 70° then the value of ∠AOB is
   a) 100° 　　　 b) 110° 　　　 c) 120° 　　　 d) 130°

8. The point of intersection of 3x – y = 4 and x + y = 8 is
   a) (5,3) 　　　 b) (2,4) 　　　 c) (3,5) 　　　 d) (4,4)

9. When proving that a quadrilateral is a parallelogram by using slopes you must find
   a) the slopes of two sides
   b) the slopes of two pair of opposite sides
   c) the lengths of all sides
   d) both the lengths and slopes of two sides

10. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure
    a) 45° 　　　 b) 30° 　　　 c) 90° 　　　 d) 60°

11. 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

12. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is
    a) 2 : 1 　　　 b) 1 : 2 　　　 c) 4 : 1 　　　 d) 1 : 4

13. Which of the following is not a measure of dispersion?
    a) range
    b) standard deviation
    c) arithmetic mean
    d) variance

14. The probability of getting a job for a person is $x/3$. If the probability of not getting the job is $2/3$. Then the value of x is
    a) 2
    b) 1
    c) 3
    d) 1 5

Part - II

II. Answer any 10 questions. (Q.No.28 is compulsory) $10 \times 2 = 20$

15. If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$, find A and B.

16. Represent the function $f = \{(1,2), (2,2), (3,2), (4,3), (5,4)\}$ through
    i) an arrow diagram   ii) a table form   iii) a graph

17. Find the next three terms of the sequence : 8, 24, 72, ...

18. Find the sum of $1 + 3 + 5 + \ldots\ldots + 55$

19. Reduce the rational expressions to its lowest form $\dfrac{x-3}{x^2-9}$

20. If $A = \begin{vmatrix} 5 & 4 & 3 \\ 1 & -7 & 9 \\ 3 & 8 & 2 \end{vmatrix}$ then find the transpose of A.

21. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

22. Find the slope of the straight line $5y - 3 = 0$

23. Prove that $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$

24. If the base area of a hemispherical solid is 154 sq.metres, then find its total surface area.

25. If the ratio of radii of two spheres is 4 : 7, find the ratio of their volumes.

26. Find the range and the coefficient of range of the following data :
    16, 18, 20, 22, 24, 26, 28

27. Two coins are tossed together. What is the probability of getting different faces on the coins?

28. Show that the points $P(-1.5, 3)$, $Q(6, -2)$, $R(-3,4)$ are collinear.

Part - III

III. Answer any 10 questions. (Q.No.42 is compulsory) $10 \times 5 = 50$

29. Given $A = \{1, 2, 3\}$ $B = \{2, 3, 5\}$, $C = \{3, 4\}$ and $D = \{1, 3, 5\}$, check if $(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$ is true?

30. If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if $fog = gof$, then find the value of k.

31. Find the HCF of 396, 504, 636

32. Find the sum to n terms of the series $3 + 33 + 333 + \ldots\ldots$, to n terms.

33. Find the square root of the polynomials by division method : $37x^2 - 28x^3 + 4x^4 + 42x + 9$

34. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$, show that $(AB)^T = B^T A^T$

35. State and prove Angle Bisector Theorem.

36. Find the area of the quadrilateral whose vertices are at $(-9,-2)$, $(-8,-4)$, $(2,2)$ and $(1,-3)$

37. Find the equation of the straight line which passes through the point of intersection of the lines $5x - 6y = 1$ and $3x + 2y + 5 = 0$ and is perpendicular to the straight line $3x - 5y + 11 = 0$

38. Two ships are sailing in the sea on either sides of a Lighthouse. The angle of elevation of the top of the Lighthouse as observed from the ships are $30°$ and $45°$ respectively.

   If the Lighthouse is 200 m high, find the distance between the two ships. $\left(\sqrt{3} = 1.732\right)$

39. The internal and external diameter of a hollow hemispherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, then find the height of the cylinder.

40. The amount of rainfall in a particular season for 6 days are given as 17.8 cm, 19.2 cm, 16.3 cm, 12.5 cm, 12.8 cm and 11.4 cm. Find its standard deviation.

41. Three unbiased coins are tossed once, find the probability of getting atmost 2 tails or atleast 2 heads.

42. An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10 cm and 4 m and whose height is 4 m. Find the curved and total surface area of the bucket.

Part - IV

IV. **Answer all the questions.**   2 x 8 = 16

42. a)   Construct a triangle ∆PQR such that QR = 5 cm, $\angle P = 30°$ and the altitude from P to QR is of length 4.2 cm.

   (OR)

   b)   Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from the point.

44. a)   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 200 days, how many workers are required?

   (OR)

   b)   Graph the quadratic equation and state their nature of solutions:
   $x^2 - 6x + 9 = 0$

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