COMMON SECOND REVISION TEST – 2023

Standard X

Reg.No. :

MATHEMATICS

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

I. Choose the correct answer: **14 x 1 = 14**

1. If there are 1024 relations from a set to A = {1,2,3,4,5} to a set B, then the number of elements in B is
   a) 3 b) 2 c) 4 d) 8
2. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is
   a) linear b) cubic c) reciprocal d) quadratic
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 value of $(1^3 + 2^3 + 3^3 + \ldots\ldots + 15^3) - (1 + 2 + 3 + \ldots\ldots + 15)$ is
   a) 14400 b) 14200 c) 14280 d) 14520
5. The solution of $(2x - 1)^2 = 9$ is equal to
   a) –1 b) 2 c) –1,2 d) none of these
6. $\frac{x^3}{x-y} + \frac{y^3}{y-x} =$
   a) $x^3 + y^3$ b) $x^2 - y^2$ c) $x^2 + xy + y^2$ d) $x^2 - xy + y^2$
7. How many tangents can be drawn to the circle from a exterior point?
   a) one b) two c) infinite d) zero
8. The area of triangle formed by the points (–5,0), (0,–5) and (5,0) is
   a) 0 sq.units b) 25 sq.units c) 5 sq.units d) none of these
9. (2,1) is the point of intersection of two lines
   a) $x - y - 3 = 0 ; 3x - y - 7 = 0$ b) $x + y = 3 ; 3x + y = 7$
   c) $3x + y = 3 ; x + y = 7$ d) $x + 3y - 3 = 0 ; x - y - 7 = 0$
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 total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is
    a) $\frac{9\pi h^2}{8}$ sq.units b) $24\pi h^2$ sq.units
    c) $\frac{8\pi h^2}{9}$ sq.units d) $\frac{56\pi h^2}{8}$ sq.units
12. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$, then the value of x is
    a) 2 b) 1 c) 3 d) 1.5

13. Variance of first 20 natural number is
    a) 32.25 b) 44.25 c) 33.25 d) 30
14. The ratio of the volumes of cylinder, a cone and a sphere, if each has the same radius and same height is
    a) 1 : 2 : 3 b) 2 : 1 : 3 c) 3 : 1 : 4 d) 3 : 1 : 2

Part - II

II. Answer any 10 questions. (Q.No.28 is compulsory) **10 x 2 = 20**

15. Let X = {1,2,3,4} and Y = {2,4,6,8,10} and R = {(1,2), (2,4), (3,6), (4,8)}. Show that R in a function and find its domain, co-domain and range.
16. Find k if fof(k) = 5 where f(k) = 2k – 1
17. If $13824 = 2^a \times 3^b$ then find a and b
18. Find the sum of $1^3 + 2^3 + 3^3 + \ldots\ldots\ldots + 16^3$
19. If $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$, then find the transpose of A.
20. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and the radius of the circle is 3 cm.
21. Show that the given points are collinear : (–3,–4), (7,2) and (12,5)
22. Find the equation of a straight line passing through (5,–3) and (7,–4)
23. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$
24. Find the top of a rock $50\sqrt{3}$ m high, angle of depression of a car on the grouped is observed to be 30°. Find the distance of the car from the rock.
25. The radius of a sphere increase by 25%. Find the percentage increase in its surface area.
26. If the circumference of a conical wooden piece 484 cm, then find its volume when its height is 105 cm.
27. What is the probability that a leap year selected at random will contain 53 Saturdays.
28. Find LCM : $x^3 - 27$, $(x-3)^2$, $x^2 - 9$

Part - III

III. Answer any 10 questions. (Q.No.42 is compulsory) **10 x 5 = 50**

29. Let A = {x ∈ W / x < 2}, B = {x ∈ N / 1 < x ≤ 4} and C = {3,5}, verify that A x (B∪C) = (A x B) ∪ (A x C)
30. Let f : A→B be a function defined by $f(x) = \frac{x}{2} = 1$, where A = {2,4,6,10,12}, B = {0,1,2,4,5,9} represent by (i) set of ordered pairs ; (ii) a table (iii) an arrow diagram (iv) a graph
31. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.
32. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm .... 24 cm. How much area can be decorated with these colour papers?

33. $ax^4 + bx^3 + 361x^2 + 220x + 100$ is a perfect square, find the values of a and b.

34. $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, show that $A^2 - (a + d) A = (bc - ad) I_2$

35. State and prove Pythagoras theorem.

36. Let A(3,–4), B(9,–4), C(5,–7), D(7,–7). Show that ABCD is a trapezium.

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. Prove that $\tan^2 A - \tan^2 B = \dfrac{\sin^2 A - \sin^2 B}{\cos^2 A \cos^2 B}$

39. Arul has to make arrangements for the accommodation of 150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by a cone. Each person occupies 4 sq.m of the space on ground and 40 cu.meter of air to breadthe. What should be the height of the conical part of the tent if the height of cylindrical par is 8 m?

40. The amount of rain fall 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. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.

42. Two ships are sailing in the sea on either side of the Lighthouse. The angles of depression of two ships as observed from the top of the Lighthouse are 60° and 45° respectively. If the distance between the ship is $200\left(\dfrac{\sqrt{3}+1}{\sqrt{3}}\right)$ metres, find the height of the Lighthouse.

Part - IV

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

43. a) Construct a ΔPQR in which PQ = 8 cm, $\angle R = 60°$ and the median RG from R to PQ is 5.8 cm. Find the length of the altitude from R to PQ.

(OR)

b) Draw two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also, measure the lengths of the tangents.

44. a) A garments 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 Discount. Hence find

i) the marked price when a customer gets a discount of ₹3250 (from graph)

ii) the discount when the market prices ₹2500.

(OR)

b) Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$

******