# COMMON SECOND REVISION TEST - 2020

TC

Standard X

MATHEMATICS

Part - I

Reg No 1 0 1 1 0

Time: 3.00 hours

Marks: 100



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

1. If the ordered pairs (a+2, 4) and (5, 2a+b) are equal then (a,b) is
   a) (2, −2) b) (5, 1) c) (2, 3) d) (3, −2)
2. Let $f(x) = \sqrt{1+x^2}$, then
   a) $f(xy) = f(x) \cdot f(y)$ b) $f(xy) \geq f(x) \cdot f(y)$ c) $f(xy) \leq f(x) \cdot f(y)$ d) none of these
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 average of first 100 natural numbers is _____.
   a) 50.8 b) 50.5 c) 40.5 d) 40.6
5. If (x − 6) is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
   a) 3 b) 5 c) 6 d) 8
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. In $\Delta LMN$, $\angle L = 60^\circ$, $\angle M = 50^\circ$. If $\Delta LMN \sim \Delta PQR$ then the value of $\angle R$ is
   a) $40^\circ$ b) $70^\circ$ c) $30^\circ$ d) $110^\circ$
8. The slope of the line which is perpendicular to a line joining the points (0, 0) and (−8, 8) is
   a) −1 b) 1 c) $\frac{1}{3}$ d) −8
9. 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)
10. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta)$ is equal to
    a) 0 b) 1 c) 2 d) −1
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) $\frac{56\pi h^2}{9}$ sq.units
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. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is
    a) 3.5 b) 3 c) 4.5 d) 2.5

14. The set of all possible outcomes is called _____.
    a) sample space b) random experiment
    c) sample point d) events

## Part - II

**II. Answer any 10 questions:** 10 x 2 = 20

15. If $f(x) = 4 + x$, $g(x) = x - 5$, find fog.
16. Show that the function $f : N \to N$ defined by $f(x) = 2x - 1$ is one-one but not onto.
17. If $1 + 2 + 3 + \ldots\ldots\ldots + k = 325$, then find $1^3 + 2^3 + 3^3 + \ldots\ldots + k^3$.
18. Find $\frac{x^2-16}{x+4} \div \frac{x-4}{x+4}$.
19. Find the sum and product of the roots for $3 + \frac{1}{a} = \frac{10}{a^2}$ quadratic equation.
20. If $A = \begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$, then find $2A + B$.
21. State Menelaus Theorem.
22. Find the slope of the line which is parallel to $3x - 7y = 11$
23. Find the equation of a line whose inclination is $30^\circ$ and making an intercept $-3$ on the Y-axis.
24. Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.
25. The curved surface area of a right circular cylinder of height 14 cm is 88 $cm^2$. Find the Diameter of the cylinder.
26. A metallic sphere of radius 16 cm is melted and recast into small spheres each of radius 2 cm. How many small spheres can be obtained?
27. The mean of a data is 25.6 and its coefficient of variation is 18.75. Find the standard deviation.
28. Write the sample space for tossing three coins using tree diagram.

## Part - III

**III. Answer any 10 questions:** 10 x 5 = 50

29. A function $f : [-5, 9] \to R$ is defined as follows:

$$f(x) = \begin{cases} 6x+1 & -5 \le x < 2 \\ 5x^2 - 1 & 2 \le x < 6 \\ 3x - 4 & 6 \le x \le 9 \end{cases}$$, find $\frac{2f(-2)-f(6)}{f(4)-f(-2)}$.

30. Let $f$ be a function $f : N \to N$ be defined by $f(x) = 3x + 2$; $x \in N$
    i) Find the images of 1,2,3 ii) Find the pre-images of 29, 53
    iii) Identify the type of function
31. Find the LCM and HCF of 408 and 170 by applying the fundamental theorem of arithmetic.
32. Find the sum $\left[\frac{a-b}{a-b} + \frac{3a-2b}{a-b} + \frac{5a-3b}{a-b} + \ldots\ldots\ldots \text{ to 12 terms}\right]$

33. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are real and equal prove that either $a = 0$ (or) $a^3 + b^3 + c^3 = 3abc$

34. If $A = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} -2 & 5 \\ 6 & 7 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 1 \\ -5 & 3 \end{pmatrix}$. Verify that $A(B + C) = AB + AC$

35. State and prove Alternate segment theorem.

36. Prove analyticaly 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.

37. If the points P(–1,–4), Q(b,c) and R(5,–1) are collinear and if $2b + c = 4$, then find the values of b and c.

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.

39. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

40. If the volume of a hollow sphere is $\frac{11352}{7}$ cm³ and outer radius is 8 cm. Find inner radius of the sphere. $\left(\pi = \frac{22}{7}\right)$

41. The marks scored by 10 students in a class test are 25, 29, 30, 33, 35, 37, 38, 40, 44, 48. Find the standard deviation.

42. If A,B,C are any three events such that probability of B is twice as that of probability of A and probability of C is thrice as that of probability of A and if $P(A \cap B) = \frac{1}{6}$, $P(B \cap C) = \frac{1}{4}$, $P(A \cap C) = \frac{1}{8}$, $P(A \cup B \cup C) = \frac{9}{10}$, $P(A \cap B \cap C) = \frac{1}{15}$, then find P(A), P(B) and P(C)?

## Part - IV

**IV. Answer both the questions choosing either of the alternative:** 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 circle of radius 4 cm. At a point L on it draw a tangent to the circle using the alternate segment.

44. a) Discus the nature of solutions of the quadratic equation $x^2 + 2x - 12 = 0$

*(or)*

b) Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$

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