COMMON SECOND REVISION TEST - 2025

T

Standard X

Reg.No.: [0][0][0][0][0][7]

MATHEMATICS

07

Time: 3.00 hrs.   Part – I   Marks: 100

I. Choose the correct answer:

14 x 1 = 14

1. A = {1,2}, B = {1,2,3,4}, C = {5,6} and D = {5,6,7,8}, then state which of the following statement is true.

   a) $(A \times C) \subset (B \times D)$

   b) $(B \times D) \subset (A \times C)$

   c) $(A \times B) \subset (A \times D)$

   c) $(D \times A) \subset (B \times A)$

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

   a) m^n b) n^m c) 2^{mn-1} d) 2^{mn}

3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

   a) 2025   b) 5220   c) 5025   d) 2520

4. $7^{4k} \equiv$ _____ (mod 100)

   a) 3   b) 1   c) 4   d) 2

5. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are

   a) 100,120   b) 10,12   c) –120 ,100   d) 12,10

6. Which of the following can be calculated from the given matrices

   $$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 4 & 6 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

   (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. If in triangles ABC and EDF, $\dfrac{AB}{DE} = \dfrac{BC}{FD}$ then they will be similar, when

   a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle F$

8. If A is a point on the Y axis whose ordinate is 8 and B is a point on the X axis whose abscissae is 5 then the equation of the line AB is

   a) 8x + 5y = 40   b) 8x – 5y = 40   c) x = 8   d) y = 5

9. If α, β are the roots of $ax^2 + bx + c = 0$ then one of the quadratic equations whose roots are $\dfrac{1}{\alpha}$ and $\dfrac{1}{\beta}$ is

   a) $ax^2 + bx + c = 0$ b) $bx^2 + ax + c = 0$ c) $cx^2 + bx + a = 0$ d) $cx^2 + ax + b = 0$

10. The angle of elevation of a cloud from a point h metres above a lake is β. The angle of depression of its reflection in the lake is 45°. The height of location of the cloud from the lake is
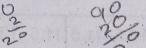
    a) $\dfrac{h(1+\tan\beta)}{1+\tan\beta}$ b) $\dfrac{h(1-\tan\beta)}{1+\tan\beta}$ c) $h\tan(45^o - \beta)$ d) None of these

11. 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

12. The Angle of inclination made by the line joining the points (1,−4) and (2, −3) with x−axis is
    a) 90°
    b) 30°
    c) 45°
    d) 60°

13. Which of the following is not a measure of dispersion?
    a) Range
    b) Standard deviation
    o) Arithmetic mean
    d) Variance

14. In a two children family, the probability that there is at least one girl in a family
    a) $\frac{1}{4}$
    b) $\frac{3}{4}$
    c) 1
    d) 0

Part - II

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

15. If R = {(x, −2), (−5,y)} represents an identity function, then find the value of x and y

16. The functions f and g are defined by f(x) = 6x + 8; g(x) = $\frac{x-2}{3}$. Calculate the value of $gg\left(\frac{1}{2}\right)$

17. Find all positive integers, when divided by 3 leaves remainder 2.

18. Find the sum $3 + 1 + \frac{1}{3} + \ldots\ldots\infty$

19. Construct a 3 x 3 matrix whose elements are $a_{ij} = i^2 j^2$

20. The number of volleyball games that must be scheduled in a league with n teams is given by $G(n) = \frac{n^2 - n}{2}$ where each team plays with every other team exactly once. A league schedules 15 games. How many teams are in the league?

21. Show that the straight lines 2x + 3y − 8 = 0 and 4x + 6y +18 = 0 are parallel.

22. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.

23. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos ec A - 1}{\cos ec A + 1}$

24. If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.

25. A garden roller whose length is 3 m long and whose diameter is 2.8 m is rolled to level a garden. How much area will it cover in 8 revolutions?

26. The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the coefficient of variation.

27. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.

28. In a garden containing several trees, three particular trees P, Q, R are located in the following way, BP = 2m, CQ = 3m, RA = 10m, PC = 6m, QA = 5m, RB = 2 m, where A, B, C are points such that P lies on BC, Q lies on AC and R lies on AB. Check whether the trees P, Q, R lie on a same straight line.

Part - III

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

29. Let A = The set of all natural numbers less than 8, B= The set of all prime numbers less than 8, C = The set of even prime number. Verify that A x (B–C)=(A x B) – (A x C)

30. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm,......, 24cm. How much area can be decorated with these colour papers?

31. The sum of three consecutive terms that are in A.P. is 27 and their product is 288. Find the three terms.

32. 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) $a^3 + b^3 + c^3 = 3abc$

33. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$, verify that $(AB)^T = B^T A^T$

34. Find the GCD of the polynomials $13m^3 + 13m^2 - 13m + 26$ and $22m^3 + 55m^2 + 55m - 33$

35. The hypotenuse of a right triangle is 6 m more than twice of the shortest side. If the third side is 2 m less than the hypotenuse, find the sides of the triangle.

36. Find the value of k, if the area of a quadrilateral is 28 sq. units, whose vertices are taken in the order (–4, –2), (–3, k), (3, –2) and (2, 3)

37. To a man standing outside his house, the angles of elevation of the top and bottom of a window are 60° and 45° respectively. If the height of the man is 180 cm and if he is 5 m away from the wall, what is the height of the window? $(\sqrt{3} = 1.732)$

38. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹40 per litre.

39. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hold?

40. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that
    (i) The student opted for NCC but not NSS.
    (ii) The student opted for NSS but not NCC.
    (iii) The student opted for exactly one of them.

41. The time taken by 50 students to complete a 100 meter race are given below. Find its standard deviation.

Time taken (sec)	8.5–9.5	9.5–10.5	10.5–11.5	11.5–12.5	12.5–13.5
Number of students	6	8	17	10	9

42. In electrical circuit theory, a circuit C(t) is called a linear circuit if it satisfies the superposition principle given by $C(at_1 + bt_2) = aC(t_1) + bC(t_2)$, where a,b are constants. Show that the circuit $C(t) = 3t$ is linear.

Part - IV

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

43. a) Draw a triangle ABC of base BC = 5.6 cm, $\angle A = 40°$ and the bisector of $\angle A$ meets BC at D such that CD = 4 cm.

    (OR)

    b) Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also, measure the lengths of the tangents.

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

    (OR)

    b) The following table shows the data about the number of pipes and the time taken to fill the same tank.

No. of pipes (x)	2	3	6	9
Time Taken (in min) (y)	45	30	15	10

    Draw the graph for the above data and hence
    (i) Find the time taken to fill the tank when five pipes are used
    (ii) Find the number of pipes when the time is 9 minutes.

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