



Sri Raghavendra Tuition Center

Second Mid Term Test

10th Standard

Maths

Date : 15-11-24

Reg.No. :

Exam Time : 01:30 Hrs

Total Marks : 50

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Centum Book Available

I. Multiple Choice Question.

10 x 1 = 10

- 1) If $n(A \times B) = 6$ and $A = \{1,3\}$ then $n(B)$ is
(a) 1 (b) 2 (c) 3 (d) 6
- 2) 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) $(3,-2)$
- 3) If $f: A \rightarrow B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
(a) 7 (b) 49 (c) 1 (d) 14
- 4) The sum of the exponents of the prime factors in the prime factorization of 1729 is
(a) 1 (b) 2 (c) 3 (d) 4
- 5) 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
- 6) Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
(a) 3 (b) 5 (c) 8 (d) 11
- 7) An A.P. consists of 31 terms. If its 16th term is m , then the sum of all the terms of this A.P. is
(a) $16m$ (b) $62m$ (c) $31m$ (d) $\frac{31}{2}m$
- 8) If the sequence t_1, t_2, t_3, \dots are in A.P. then the sequence $t_6, t_{12}, t_{18}, \dots$ is
(a) a Geometric Progression (b) an Arithmetic Progression (c) neither an Arithmetic Progression nor a Geometric Progression
(d) a constant sequence
- 9) For the given matrix $A = \begin{pmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{pmatrix}$ the order of the matrix A^T is
(a) 2×3 (b) 3×2 (c) 3×4 (d) 4×3

10) If $A = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 \\ 2 & -1 \\ 0 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 0 & 1 \\ -2 & 5 \end{pmatrix}$, Which of the following statements are correct?

(i) $AB + C = \begin{pmatrix} 5 & 5 \\ 5 & 5 \end{pmatrix}$

(ii) $BC = \begin{pmatrix} 0 & 1 \\ 2 & -3 \\ -4 & 10 \end{pmatrix}$

(iii) $BA + C = \begin{pmatrix} 2 & 5 \\ 3 & 0 \end{pmatrix}$

(iv) $(AB)C = \begin{pmatrix} -8 & 20 \\ -8 & 13 \end{pmatrix}$

(a) (i) and (ii) only (b) (ii) and (iii) only (c) (iii) and (iv) only (d) all of these

II. Answer any six question.

6 x 2 = 12

- 11) Let $A = \{1, 2, 3, 4, \dots, 45\}$ and R be the relation defined as "is square of a number" on A . Write R as a subset of $A \times A$. Also, find the domain and range of R .
- 12) If $A \times B = \{(3,2), (3, 4), (5,2), (5, 4)\}$ then find A and B .
- 13) Let $A = \{1,2,3\}$ and $B = \{x \mid x \text{ is a prime number less than } 10\}$. Find $A \times B$ and $B \times A$.
- 14) If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$ find A and B .
- 15) If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if $f \circ g = f \circ f$, then find the value of k .
- 16) Check whether the following sequences are in A.P.
 $a - 3, a - 5, a - 7, \dots$
- 17) If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$
- 18) Show that the matrices $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ satisfy commutative property $AB = BA$
- 19) If $A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$ prove that $AA^T = I$.

III. Answer any six question.

4 x 5 = 20

- 20) a) Let $f: A \rightarrow B$ 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 f by
- (i) set of ordered pairs
(ii) a table
(iii) an arrow diagram
(iv) a graph

(OR)

- b) If the function f is defined by
- $$f(x) = \begin{cases} x + 2 & \text{if } x > 1 \\ 2 & \text{if } -1 \leq x \leq 1 \\ x - 1 & \text{if } -3 < x < -1 \end{cases}$$
- find the values of
- i) $f(3)$
ii) $f(0)$
iii) $f(-1.5)$
iv) $f(2) + f(-2)$

- 21) a) Let $A = \{x \in W \mid x < 2\}$, $B = \{x \in N \mid 1 < x \leq 4\}$ and $C = (3,5)$. Verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

(OR)

- b) Find the area of the triangle whose vertices are $(-3, 5)$, $(5, 6)$ and $(5, -2)$

22) a) Find the sum to n terms of the series $5 + 55 + 555 + \dots$

(OR)

b) Find the sum of
 $9^3 + 10^3 + \dots + 21^3$

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

(OR)

b) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

IV. Answer all question.

1 x 8 = 8

24) a) Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.

(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 200 days, how many workers are required?
