



Sign & Stamp of Supdt.

Roll No.

C No. 62

Name:

Time Allowed: 20 Minutes

SECTION-A

Marks:20

- The sum of the series $(6 + 7 + 8 + \dots + 50)$ is
A. 1275 B. 1265 C. 1260 D. 1245
- The third coefficient in the row of Pascal's Triangle for $(x + y)^7$ is:
A. 21 B. 15 C. 8 D. 7
- The Domain of the function $f(x) = \sqrt{16 - x^2}$ is:
A. $-4 \leq x \leq 4$ B. $x \leq 4$ C. $x \geq -4$ D. All real numbers
- The graph of the function $f(x) = \frac{2}{x^2} + 6$ is symmetric about:
A. X-axis B. Y-axis C. Origin D. Neither A nor B
- The corner points for the region bounded by $y \geq 4$, $x + y \leq 7$ & $x \geq 0$ are.
A. (0,4), (4,2), (0,7) B. (0,4), (3,4), (0,7) C. (4,7), (4,4), (0,4) D. (0,7), (4,7), (0,0)
- The value of $\sin(\pi + \beta) =$
A. $-\cos\beta$ B. $\cos\beta$ C. $\sin\beta$ D. $-\sin\beta$
- The following identities are equal to $\cos 2\theta$ EXCEPT.
A. $2 \sin\theta \cos\theta$ B. $\cos^2\theta - \sin^2\theta$ C. $1 - 2 \sin^2\theta$ D. $2 \cos^2\theta - 1$
- The law of cosines is used when
A. Only angles are known B. Two angles and one side are known C. Two sides and included angle are known D. Only one side is known
- The minimum value of the function $y = 2 + 3 \cos(2\theta + 3)$ is
A. -1 B. 1 C. 2 D. 3
- The functions has no maximum or minimum value is.
A. $y = \sin x$ B. $y = \cos x$ C. $y = \sin^2 x$ D. $y = \tan x$
- The modulus of the complex number $-6 + 8i$ is.
A. $\sqrt{2}$ B. $\sqrt{14}$ C. 10 D. 100
- If in a matrix $[a_{ij}]$, $a_{ij} = 0$ for all $i < j$, such matrix is called.
A. Diagonal Matrix B. Symmetric Matrix C. Upper Triangular Matrix D. Lower Triangular Matrix
- The cofactor of the element a_{22} of the matrix $A = \begin{bmatrix} 1 & 6 & 7 \\ 2 & 5 & 8 \\ 3 & 4 & 9 \end{bmatrix}$ is:
A. -12 B. 12 C. -30 D. 30
- The given matrices are symmetric EXCEPT.
A. $\begin{bmatrix} 1 & 0 & 7 \\ 0 & 2 & 0 \\ 7 & 3 & 9 \end{bmatrix}$ B. $\begin{bmatrix} 4 & 1 & 7 \\ 1 & 2 & 8 \\ 7 & 8 & 9 \end{bmatrix}$ C. $\begin{bmatrix} 7 & 6 & 1 \\ 6 & 5 & 2 \\ 1 & 2 & 3 \end{bmatrix}$ D. $\begin{bmatrix} 1 & 6 & 7 \\ 6 & 5 & 8 \\ 7 & 8 & 9 \end{bmatrix}$
- The unit vector in the direction of the vector $3i - 4j$ is
A. $\frac{4}{5}i - \frac{3}{5}j$ B. $\frac{3}{5}i + \frac{4}{5}j$ C. $\frac{4}{5}i + \frac{3}{5}j$ D. $\frac{3}{5}i - \frac{4}{5}j$
- The magnitude of the vectors $\alpha = 2i + j + 2k$ is:
A. 3 B. 4 C. 8 D. 10
- The Arithmetic Mean of 9 & 7 is
A. 4 B. 8 C. 10 D. 12
- The sum of the squares of the first 10 natural number is. 126234
A. 295 B. 355 C. 385 D. 395
- The number of different arrangements of the letters of the word "Banana" is:
A. 30 B. 60 C. 120 D. 240
- The number of ways a committee of 5 members can be formed from a group of 8 people is
A. 40 B. 50 C. 56 D. 60

Write Roll No. in the boxes and shade the appropriate circle.

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

Shade the correct answers for each question below.

1.	☒	☐ B	☐ C	☐ D
2.	☒	☐ B	☐ C	☐ D
3.	☒	☐ B	☐ C	☐ D
4.	☐ A	☐ B	☒	☐ D
5.	☐ A	☐ B	☐ C	☒
6.	☒	☐ B	☐ C	☐ D
7.	☒	☐ B	☐ C	☐ D
8.	☐ A	☐ B	☒	☐ D
9.	☒	☐ B	☐ C	☐ D
10.	☐ A	☐ B	☐ C	☒
11.	☐ A	☐ B	☒	☐ D
12.	☐ A	☐ B	☒	☐ D
13.	☐ A	☐ B	☐ C	☒
14.	☐ A	☐ B	☐ C	☒
15.	☐ A	☐ B	☐ C	☒
16.	☒	☐ B	☐ C	☐ D
17.	☐ A	☒	☐ C	☐ D
18.	☐ A	☐ B	☒	☐ D
19.	☐ A	☒	☐ C	☐ D
20.	☐ A	☐ B	☒	☐ D

Mathematics (Part - I)Section "B"

Marks: 50

Q.2 Attempt any TEN parts. All parts carry equal marks.

- i. Find the additive and multiplicative inverse of complex number, $4 - 5i$. 2+2+1
- ii. Using cofactors find determinant of the Matrix: $A = \begin{bmatrix} 2 & 3 & 1 \\ 4 & 5 & 2 \\ 5 & 1 & 6 \end{bmatrix}$. 2+2+1
- iii. Reduce the given matrix to its Row Echelon Form: $\begin{bmatrix} 6 & -2 & 1 \\ 4 & 5 & 2 \\ 1 & -3 & 5 \end{bmatrix}$. 1+2+2
- iv. Find the direction cosines of the vector from point A (2, 3, -2) to B (3, 5, 3). 1+1+2+1
- v. Find the angle between two vectors $\vec{OA}$ & $\vec{OB}$ where $\vec{OA} = 3i + 4j$
 $\vec{OB} = 5i + 12j$ 1+2+2
- vi. Find the sum of the infinite series: $\frac{3}{4}, -\frac{3}{8}, +\frac{3}{16}, -\frac{3}{32}, +\dots$ 1+2+2
- vii. Find the sum of the series $1 \cdot 2 + 2 \cdot 4 + 3 \cdot 8 + 4 \cdot 16 + \dots$ to n term. 1+3+1
- viii. If a pair of dice is rolled, find the probability that the sum of the digits is either 3 or 4. 1+1+2+1
- ix. Find $\sqrt[3]{\frac{8}{7}}$ correct up to four decimal places. 1+3+1
- x. Without graphing, Determine the vertex, axis, and opening direction for $f(x) = x^2 + 8x + 1$. 1+2+1+1
- xi. Express $\cos\theta + 2\cos 3\theta - \cos 4\theta$ as a product 1+1+2+1
- xii. Find measure of the angles of a triangle whose sides are 10, 12 & 15. 1+3+1
- xiii. Find Domain and Range of $y = 3\sin 4x$. 1+2+2

Section "C"

Marks: 30

Note: Attempt any THREE questions. All questions carry equal marks.

- Q.3 a). Factorize the polynomial $P(x) = x^3 - 6x^2 + 11x - 6$ into linear factors. 1+1+2+1
- b). Using elementary row operations find inverse of the Matrix: $A = \begin{bmatrix} 5 & 7 & 1 \\ 3 & 2 & -2 \\ 1 & 3 & 2 \end{bmatrix}$. 1+3+1
- Q.4 a). For what value of m the following vectors are coplanar? 1+1+2+1
 $\vec{a} = i + 2j + 3k, \vec{b} = 2i - j + k, \vec{c} = 3i + j + mk$
- b). Find the 8th term of the harmonic sequence: $1, \frac{1}{3}, \frac{1}{5}, \dots$ 1+1+1+1+1+1
- Q.5 a). Out of 10 available research papers, 4 must be selected for a presentation. How many ways can they be chosen if: (i) One particular paper on "Ethics" must be included. 1+2+2
(ii) One particular paper is deemed irrelevant and must be excluded.
- b). A farmer wants to plant Tomatoes and Potatoes on a 50-acre plot. 1+2+2
Tomatoes require 4 bags of fertilizer per acre, and Potatoes require 2 bags. Only 160 bags of fertilizer are available. If the profit is Rs. 1,200 per acre for Tomatoes and Rs. 800 per acre for Potatoes, find the optimal allocation of land.
- Q.6 a). Find the circumscribing radius for a triangle whose sides are 6, 8 & 10. 1+1+2+1
- b). Describe the Amplitude, Period & Frequency without drawing the graph of the function: $y = 3\sin 4x$. 1+2+2