

Mathematics
PR - XI (A-I-AP5) (26)

- ۱۔ ہر سوال کے سامنے چار دائرے دیئے گئے ہیں۔ صرف صحیح جواب والا دائرہ بھر دیں۔
۲۔ دائروں کو شیڈ (بھرنے) کے لیے نیلے یا کالے رنگ کا پن استعمال کریں۔
۳۔ جواب میں ایک سے زائد دائرے بھرنے سے جواب غلط تصور ہوگا۔

Time: 20 Min

SECTION-A

Marks: 20

- 1) The sum of the series $(4+5+6+7+8+\dots+55)$ is:
☐ 1355 ☐ 1415 ☐ 1459 ☐ 1479
- 2) The third coefficient in the row of Pascal's Triangle for $(x+y)^9$ is:
☐ 9 ☐ 36 ☐ 84 ☐ 126
- 3) The Domain of the function $f(x) = \sqrt{25-x^2}$ is:
☒ $-5 \leq x \leq 5$ ☐ $x \leq 5$ ☐ $x \geq -5$ ☐ All real numbers
- 4) The graph of the function $f(x) = \frac{3}{x^9} + 5$ is:
☐ X-axis ☐ Y-axis ☐ Origin ☐ Z-axis
- 5) The corner points for the region bounded by $x+y \leq 6$, $x-y \leq 2$ & $x \geq 0$ are:
☐ $(0,5)$ $(3,5)$, $(0,8)$ ☐ $(0,6)$ $(2,4)$, $(2,0)$
☐ $(6,0)$ $(2,0)$, $(4,2)$ ☐ $(0,6)$ $(4,2)$, $(2,0)$
- 6) The value of $\tan(\pi - \alpha) =$ _____.
☐ $-\tan \alpha$ ☐ $\tan \alpha$ ☐ $\cot \alpha$ ☐ $-\cot \alpha$
- 7) When θ lies in the 3rd quadrant then $\frac{\sin \theta}{2}$ equal to:

☐ $\sqrt{\frac{1-\cos \theta}{2}}$
☐ $\sqrt{\frac{1+\cos \theta}{2}}$

☐ $-\sqrt{\frac{1-\cos \theta}{2}}$
☐ $-\sqrt{\frac{1+\cos \theta}{2}}$
- 8) In any oblique triangle, the relation $b^2 = a^2 + c^2 - 2ca \cos \beta$ is known as:
☐ Law of Sines ☒ Law of Cosines
☐ Law of Tangents ☐ Law of Cotangents
- 9) The minimum value of the function $y = 3 + 6 \sin \theta$ is:
☐ 0 ☐ 1 ☐ 3 ☒ -3
- 10) The graph of $y = \operatorname{Cosec} x$ is discontinuous at:

☐ Every value of x

☐ All odd multiples of π

☒ All integer multiples of π

☐ All odd multiples of $\frac{\pi}{2}$

11) The modulus of the complex number $-5+12i$ is:

☐ $\sqrt{7}$

☐ 7

☒ 13

☐ 17

12) A square matrix $A = [a_{ij}]$ is called an Upper Triangular matrix if $a_{ij} = 0$ for all:

☐ $i=j$

☐ $i \neq j$

☒ $i > j$

☐ $i < j$

13) The cofactor of the element a_{32} of the matrix $A = \begin{bmatrix} 1 & 6 & 7 \\ 2 & 5 & 8 \\ 3 & 4 & 9 \end{bmatrix}$ is:

☐ -6

☐ 6

☒ -18

☐ 18

14) The Determinant of the matrix $\begin{bmatrix} 1 & 6 & 3 \\ 5 & 5 & 6 \\ 0 & 0 & 0 \end{bmatrix}$ is:

☐ -25

☐ 0

☐ 25

☐ 40

15) The unit vector in the direction of the vector $5i + 12j$ is:

☐ $\frac{5}{17}i - \frac{12}{17}j$

☐ $\frac{5}{17}i + \frac{12}{17}j$

☒ $\frac{5}{13}i + \frac{12}{13}j$

☐ $\frac{5}{13}i - \frac{12}{13}j$

16) The magnitude of the vector $a=2i+6j+3k$ is:

☐ 5

☐ $3\sqrt{5}$

☒ 7

☐ $5\sqrt{3}$

17) The Arithmetic Mean of 9 & 17 is:

☐ 12

☒ 13

☐ 14

☐ 15

18) The sum of the cubes of the first 7 natural numbers is:

☐ 686

☐ 696

☐ 755

☒ 784

19) The number of different arrangements of the letters of the word "Book" is:

☒ 12

☐ 15

☐ 18

☐ 20

20) The number of ways a committee of 4 members can be formed from a group of 10 people:

☐ 110

☒ 210

☐ 220

☐ 250

Mathematics

Note: Time allowed for Section-B and Section-C is 2 Hours and 40 minutes.

SECTION-B

Q2: Answer any TEN parts. Each part carries FIVE marks.

1. Find the additive and multiplicative inverse of complex number, $8-3i$.

2. Using cofactor find determinant of the Matrix: $A = \begin{bmatrix} 2 & 5 & 4 \\ 6 & 5 & 1 \\ 3 & 1 & 7 \end{bmatrix}$.

3. Reduce the given matrix to its Row Echelon Form: $\begin{bmatrix} 4 & -2 & 5 \\ 7 & 5 & 3 \\ 6 & -5 & 5 \end{bmatrix}$

4. Find the direction cosines of the vector from point $A(1,3,-4)$ to $B(3,2,1)$.

5. Find the angle between two vectors $\overline{OA}$ & $\overline{OB}$ where $\overline{OA} = 7i + 5j$ $\overline{OB} = 2i + j$

6. Find the sum of the infinite series $\frac{3}{4}, -\frac{3}{8}, +\frac{3}{16}, -\frac{3}{32}, +\dots$ to n term.

7. Find the sum of the series $1 * 2 + * 4 + 3 * 3 + 4 * 16 + \dots$ to n term.

8. If a pair of dice is rolled, find the probability that the sum of the digits is either 2, 3 or 12.

9. Using binomial expansion, find $\sqrt[3]{7}$ correct up to four decimal places.

10. Without graphing, determine the vertex, axis, and opening direction for $f(x) = x^2 + 5x + 1$.

11. Prove that $\sin 2\theta - 4\sin^3 \theta \cos \theta = \sin 2\theta \cos 2\theta$.

12. Find measure of the angles of a triangle whose sides are 9, 12 & 14.

13. Find Domain and Range of $y = 3\sin 2x + 4$.

SECTION-C

Note: Attempt any THREE questions. Each question carries equal marks.

Q3 (a) Factorize the polynomial $P(z) = z^3 - 3z^2 + 4z - 2$ into linear factors.

(b) Using elementary row operations find inverse of the Matrix:

$$A = \begin{bmatrix} 2 & -3 & 1 \\ 5 & 2 & -4 \\ 1 & 7 & 5 \end{bmatrix}$$

Q4 (a) For what value of m the following vectors are coplanar?

$$\vec{a} = i - 2j + 3k$$

$$\vec{b} = mi - 3j + 4k$$

$$\vec{c} = 2i - j + 2k$$

(b) Find the 7th term of the harmonic sequence: $3, \frac{3}{4}, \frac{3}{7}, \dots$

Q5 (a) A lab has 8 different microscopes. A teacher needs to pick 3 for a class experiment. In how many ways can the choice be made if: (a) Two specific high-resolution microscopes are always included. (b) Two broken microscopes are always excluded.

(b) A company assembles Radios and Televisions. It has a total 240 square feet of storage space. A radio takes up 2 sq ft and a TV takes 6 sq ft. The assembly line can work for a maximum of 100 hours per week. A radio takes 1 hour to assemble, and a TV takes 4 hours. If the profit is Rs.500 per radio and Rs.1,800 per TV, what is the best production mix?

Q6 (a) Find the circumscribing radius for a triangle whose sides are 11, 10 & 9.

(b) Describe the Amplitude, Period & Frequency without drawing the graph of the function: $y = 3\sin 2x$.