

Mathematics
PR – XI (A-I-A7) (25)

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

Time: 20 Min

SECTION-A

Marks: 20

- 1) The number of terms in the expansion of $(a+b)^{99}$ _____.
☐ 99 ☐ 100 ☒ 101 ☐ 102
- 2) If n is a negative integer or a fraction then the binomial expression $(1+x)^n$ is divergent if:
☒ $-1 < x < 1$ ☐ $x > 1$ and $x < -1$
☐ $0 < x < 1$ ☐ $x > -1$
- 3) A function f which is only onto is called ____ function.
☐ Surjective ☐ Injective ☐ Bijective ☒ Not a function
- 4) If $f(x) = \frac{2x}{x-2}$ then range of $f(x)$ is:
☐ All real number ☐ $R - \{1\}$ ☒ $R - \{2\}$ ☐ $R - \{0\}$
- 5) If we have $y < 0$, then solution region is ____ quadrants.
☐ 1st and 4th ☐ 1st and 2nd ☒ 2nd and 3rd ☐ 3rd and 4th
- 6) The angles which are connected with basic angles of measure θ by a right angle or its multiples are called:
☐ Double angles ☐ Half angles
☒ Allied angles ☐ Triple angles
- 7) The product $2 \sin 7\theta \sin 2\theta$ as sum/difference is _____.
☐ $\sin 5\theta + \cos 9\theta$ ☒ $\sin 5\theta - \cos 9\theta$
☐ $\cos 5\theta + \cos 9\theta$ ☐ $\cos 5\theta - \cos 9\theta$
- 8) Incircle is a circle drawn inside a triangle and touches:
☐ No side of a triangle ☐ Two sides of a triangle
☐ One side of a triangle ☒ All sides of a triangle
- 9) The function $f(x) = 2x^2 - x$ is ____ function.
☐ Even ☐ Odd ☐ Periodic ☒ Neither even nor odd
- 10) The property $\cos(\theta + 2\pi) = \cos \theta$ is called ____ property.
☐ Even ☒ Periodic ☐ Odd ☐ Translation

11) The simplest form of i^{-4} , $-i^2$ is:

- ☒ 1 ☐ -1 ☐ -i ☐ i

12) A square matrix $A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ is _____ matrix.

- ☒ Diagonal matrix ☐ Scalar matrix
☐ Unit matrix ☐ Null matrix

13) If $A = \begin{bmatrix} 1 & 3 & 1 \\ -1 & 2 & 0 \\ 2 & 0 & 2 \end{bmatrix}$, then $A_{33} =$ _____.

- ☐ 5 ☐ -2 ☐ -1 ☐ 0

14) If $A = \begin{bmatrix} 4 & 5 & 4 \\ 3 & 5 & 3 \\ -1 & 2 & -1 \end{bmatrix}$, then $|A| =$ _____.

- ☒ 0 ☐ 14 ☐ -15 ☐ -14

15) The condition for perpendicularity of two vectors is:

- ☒ $\vec{a} \cdot \vec{b} = 0$ ☐ $\vec{a} \cdot \vec{b} = 1$ ☐ $\vec{a} \times \vec{b} = 0$ ☐ $\vec{a} \times \vec{b} = 1$

16) If $\vec{u}$ and $\vec{v}$ are two non zero vectors then $\vec{u} \times \vec{v} =$ _____.

- ☒ $|\vec{u}||\vec{v}|\sin\theta$ ☐ $|\vec{u}||\vec{v}|\sin\theta\hat{n}$ ☐ $|\vec{u}||\vec{v}|\cos\theta\hat{n}$ ☐ $|\vec{u}| - |\vec{v}|\sin\theta\hat{n}$

17) The geometric mean between a and b if $a < 0$ and $b > 0$ is:

- ☐ $+\sqrt{ab}$ ☐ $-\sqrt{ab}$ ☐ $\pm\sqrt{ab}$ ☒ Does not exist

18) $1+2+3+\dots+100 =$ _____.

- ☐ 1275 ☒ 5050 ☐ 5000 ☐ 2807

19) $\frac{(n+2)!}{(n)!} =$ _____.

- ☐ $(n+1)$ ☐ $(n+2)$ ☒ $(n+2)(n+1)$ ☐ $(n+1)n$

20) If the occurrence of one event effect the occurrence of the other, then these events are:

● Dependent events

○ Independent events

○ Mutually exclusive event

○ Equality likely events

PR - XI (A-I-A7) (25)

Mathematics

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

SECTION-B

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

i) Factorize the polynomial into linear factors $P(z) = 2z^2 - zi + 1$.

ii) Prove that
$$\begin{vmatrix} -\alpha^2 & \alpha\beta & \alpha\gamma \\ \alpha\beta & \beta^2 & \beta\gamma \\ \alpha\gamma & \beta\gamma & -\gamma^2 \end{vmatrix} = 4\alpha^2\beta^2\gamma^2$$

iii) Reduce $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 8 \\ -1 & 4 & 2 \end{bmatrix}$ to reduced echelon form.

iv) Find the vector $\vec{r}$ whose magnitude is 5 and is in the direction of $\vec{v} = 4\vec{i} + 3\vec{j} - 2\vec{k}$.

v) Find the projection of $\vec{r} = -\vec{i} + 2\vec{j} - \vec{k}$ on $\vec{s} = 2\vec{i} - \vec{j} + 3\vec{k}$.

vi) If $q = \frac{p}{3} + \frac{p^2}{3^2} + \frac{p^3}{3^3} + \dots$ where $0 < p < 3$ then show that

$$p = \frac{3q}{1+q}.$$

vii) Find the sum to n terms of the series $1 + 2u + 3u^2 + 4u^3 + \dots$.

viii) Find the value of n if ${}^nP_5 = 5{}^nP_5$.

ix) Find the coefficient of x^{30} in $(x^2 - x)^{20}$.

x) Find the point of intersection graphically of the function $f(x) = 6x^2 - 1$ and $f(x) = 36x - 1$.

xi) Prove that
$$\frac{\sin 18^\circ + \sin 12^\circ}{\cos 18^\circ - \cos 12^\circ} = -\cot 3^\circ$$

xii) Find radius of a circle inscribed in a triangle whose sides are 12,

14 and 16.

- xiii) Find the maximum and minimum of the function

$$y = \frac{1}{14 - 4\cos(2\theta - 35)}$$

SECTION-C

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

- Q3 (a) If $z = -7 - 5i$, then show that $|z| = |-z| = |\bar{z}| = |-\bar{z}|$.

(b) Solve the following system of equations by Cramer's Rule

$$u - 2v = -4$$

$$2u + w = -1$$

$$3u + v = -5$$

- Q4 (a) Find the volume of tetrahedron with the following vectors as coterminal edges.

$$a = 2i + 3j$$

$$b = i + 2j + k$$

$$c = 10j + 2k$$

(b) Show that the sequence $\{a_n\} = 3^n$ is a geometric sequence, also find its common ratio.

- Q5 (a) In an exam, the probability of passing the two candidates is $\frac{1}{8}$ and $\frac{1}{6}$ respectively. Find the probability that both will pass the exam.

(b) Maximize $z = x + 2y$ subject to $x + y \leq 4, x + y \geq 4, x \geq 0, y \geq 0$.

- Q6 (a) Solve a triangle ABC having sides 10, 14 and 12 respectively and find the largest measure of angle in it.

(b) Show that $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{4}{3}\right) = \tan^{-1} 3$