1

Which of the following is the area of the triangle whose vertices are the points

which represent the cubic roots of unity on Argand's plane?

- $\frac{3\sqrt{3}}{4}$
- $\frac{\sqrt{3}}{2}$
- $\frac{3\sqrt{3}}{2}$
- $\frac{\sqrt{3}}{4}$

2

The number of ways can a person in a sport club participates in 3 games

at least from the set { football , hand ball , volley ball , basket ball } equals ....

- ${}^{4}C_{3} + {}^{4}C_{4}$
- ${}^{4}C_{3} \times {}^{4}C_{4}$
- ${}^{4}P_{3} + {}^{4}P_{4}$
- ${}^{4}P_{3} \times {}^{4}P_{4}$

3

In the expansion of $\left(x^2 - \frac{1}{x}\right)^{15}$ according to the descending powers of x ,

the value of the term free of x equals ....

- ${}^{15}C_5$
- $-{}^{15}C_5$
- ${}^{15}C_9$
- $-{}^{15}C_9$

4

If the two planes:

$18x + 15y - 6z + 1 = 0$, $ax + by + 2z + 1 = 0$ are parallel,

then ab = ………..

- 30
- **- 30**
- 90
- - 90

5

If A = $\begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$ *then* $(A^2)^{-1}$ **= ....**

- $\begin{pmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{pmatrix}$
- $\begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$
- $\begin{pmatrix} -\cos\theta & -\sin\theta \\ -\sin\theta & -\cos\theta \end{pmatrix}$
- $\begin{pmatrix} \cos 2\theta & \sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{pmatrix}$

6

If the straight line $\frac{x-2}{3} = \frac{y+1}{-4} = \frac{z+3}{5}$ makes with the planes $x\ y$, $y\ z$, $z\ x$ angles of measures

L, M, N respectively, then $\sin^2 L + \sin^2 M + \sin^2 N$ =……….

- 1
- 2
- $\sqrt{3}$
- $\frac{3}{2}$

7

If 1 , ω , ω^2 **are the cubic roots of unity , then** $\left(\frac{a}{\omega} - \frac{a}{\omega^2} + \frac{3\,a}{\omega^4} - \frac{3\,a}{\omega^5}\right)^2 =$ ....

- **$-48\,a^2$**
- **$48\,a^2$**
- **$16\,a^2$**
- **$-16\,a^2$**

8

In the expansion of $\left(a\,x^{2}-\frac{b}{x}\right)^{12}$ **according to the descending powers of *x*.**

T_7 **is …….**

- The term containing x^6
- The term free of x
- The term before the last
- The term containing x^7

9

The code of a lock consists of 3 different digits number chosen from the digits { 1 , 2 , 3 , ... , 9 } .

By how many ways we can form a code contains the digit 6 ?

- **168**
- **126**
- **336**
- **224**

10

If the coefficient of the ninth term in the expansion of $\left(a\sqrt{x} - \frac{1}{a\sqrt{x}}\right)^{12}$

according to the desconding power of X equals 7920 , then a = ...

- $\pm \frac{1}{2}$
- ± 2
- $\pm \frac{1}{4}$
- ± 4

11

$$\begin{vmatrix} x & y & y \\ y & x & y \\ y & y & x \end{vmatrix} = (x + 2y) \times \text{..........}$$

- $\begin{vmatrix} 1 & y & y \\ 0 & x-y & 0 \\ 0 & 0 & x-y \end{vmatrix}$

- $\begin{vmatrix} 1 & y & y \\ 0 & x+y & 0 \\ 0 & 0 & x+y \end{vmatrix}$

- $\begin{vmatrix} 1 & y & 0 \\ 0 & x+y & 0 \\ 0 & 0 & x-y \end{vmatrix}$

- $\begin{vmatrix} 1 & y & y \\ 0 & x-y & 2y \\ 0 & 0 & x+y \end{vmatrix}$

12

If A (3 , - 4 , 0) , B (15 , 0 , 2) , C (0 , -8 , 4) are three points in the space and they are the vertices of ∆ ABC ,then the distance between the centroid point of the ∆ ABC and the plane X Z is ....

- greater than its distance from the plane x y
- greater than its distance from the plane y z
- smaller than or equal to its distance from the plane x y
- greater than or equal to its distance from the plane y z

13

The possible values of K which make the distance between the two points

A (2 , K , 3) , B (-4 , 4 , 2) equals $\sqrt{62}$ **are ....**

- **–1 or 9**
- **– 5 or – 9**
- **1 or 5**
- 1 or – 9

14

If the shortest distance between the point A (3 , 5 , 1) and the surface of the sphere whose centre M (1 , 2 , - 5) is 2 length unit , then the radius of the sphere = ... length unit.

- **5**
- **2**
- **7**
- **12**

15

If the measure of the angle between the two planes :

$\vec{r}\cdot(3,-4,2)=7$ **and 3x + 4y - m z = 12 is** 90° **, then m = ...**

- $\frac{-7}{2}$
- $\frac{-3}{2}$
- $\frac{-25}{2}$
- $\frac{3}{2}$

16

If $Z_1 = 3(\cos 300^\circ + i \sin 300^\circ)$, $Z_2 = 2(\sin 240^\circ + i \cos 240^\circ)$

, then which of the following represents the exponential form of $Z_1 Z_2$?

- $6e^{\frac{5}{6}\pi i}$
- $6e^{\pi i}$
- $\frac{3}{2}e^{\frac{5}{6}\pi i}$
- $\frac{3}{2}e^{\pi i}$

17

If $2\ {}^{n+1}C_r = {}^{n+1}P_r$, $\frac{{}^{n}C_{r+1}}{{}^{n}C_r} = \frac{5}{3}$

, then ${}^{n}C_r + {}^{n}P_r =$ ....

- 63
- 33
- 60
- 36

18

If $\vec{A}$, $\vec{B}$ are two vectors where $\|\vec{A}\|$ = 5 ,

and the component of vector $\vec{B}$ in the direction of vector $\vec{A}$ is 3 , then $\vec{A} \cdot \vec{B}$ = ...

- 15
- $\frac{5}{3}$
- $\frac{3}{5}$
- 8

19

If $a\, e^{2\theta i} + b\, e^{-2\theta i} = 5 \cos 2\theta - i \sin 2\theta$ where a , b are two positive real numbers,

$\theta \in \,]0 , \frac{\pi}{2}[$, $i^2 = -1$, then: $a\, b =$ ....

- 6
- 2
- 5
- 3

20

If $^{n+1}P_r > {}^{n+1}P_{r-1}$ **,then n > ....**

- **r – 1**
- **r – 3**
- **r + 1**
- **1 – r**

21

If the greatest coefficient in the expansion of (a + x)^{20} is the coefficient of T_{11},

then a $\in$ **.............. where a** $\in R^{+}$

- $\left[\frac{10}{11}, \frac{11}{10}\right]$
- $[10, 11]$
- $\left[\frac{-11}{10}, \frac{10}{11}\right]$
- $\left[\frac{9}{11}, \frac{10}{11}\right]$

22

If A^* is the augmented matrix for the linear system of equations

$3x + 2y - z = 4$, $x + y - z = 3$, $x = 2z$, then ....

- $2 < Rk(A^*) < 4$
- $Rk(A^*) < 3$
- $1 < Rk(A^*) \leq 2$
- $1 \leq Rk(A^*) < 3$

23

If $\vec{A}$, $\vec{B}$, $\vec{C}$ represent three adjacent edges in a parallelepiped , $\|\vec{A}\|$ = 2

and the direction angles of vector $\vec{A}$ are $(135^{\circ}, 60^{\circ}, 120^{\circ})$, $\vec{B} = (1, \sqrt{2}, 0)$, $\vec{C} = (\sqrt{2}, 3, 5)$,

then the volume of the parallelepiped = ... cubic unit .

- **16**
- $6\sqrt{2}$
- **11**
- $16\sqrt{2}$

If the plane 2 $x - y + 2z = 6$ touches the surface of the sphere whose equation $x^2 + y^2 + z^2 - 4x - 2y + 6z + 5 = 0$, then the equation of the straight line which passing through the center of the sphere and the point of tangency is ……….

- $\vec{r} = (2, 1, -3) + t\,(2, -1, 2)$
- $\vec{r} = (2, 1, -3) + t\,(4, 0, -1)$
- $\vec{r} = (4, 0, -1) + t\,(2, 1, -3)$
- $\vec{r} = (2, -1, 2) + t\,(2, 1, 3)$

25

If the plane $bc\,x + ac\,y + ab\,z = abc$ intersects the coordinate axes x, y and z at the points K , N and M respectively and the plane $bc\,x + ac\,y - ab\,z = -abc$ intersects the coordinate axes x, y and z at the points $K^{/}$, $N^{/}$ and M respectively ,then the pyramid $MKNK^{/}N^{/}$ is ....

(where a , b , c are positive real numbers and $a \neq b$)

- **right quadrilateral pyramid.**
- **regular quadrilateral pyramid.**
- **right triangular pyramid.**
- **regular triangular pyramid.**