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XI MATHEMATICS

FROM THE DESK OF: FAIZAN AHMED
Skype name: ncrfaizan

Chapter#01

Choose the correct answer for each from the given options.

i) If A and B are any two sets, then $(AUB)' =$

a. A'∪B' b. $A' \cap B'$ c. $A \cap B$ d. none of these

$De\ Morgan's\ Law: i)\ (A \cup B)' = A' \cap B' \quad ii)\ (A \cap B)' = A' \cup B'$

ii) If $A = \{2,3\}$ and $B = \{1,2\}$ then $A - B$ is equal to:

a. $\{1,1\}$ b. $\{0,3\}$ c. $\{3\}$ d. $\{2\}$

$A - B = \{2,3\} - \{1,2\} = \{3\}$
$B - A = \{1,2\} - \{2,3\} = \{1\}$

iii) If $A = \{0,1\}$, $B = \{1,2\}$ and $C = \{2,3\}$ then $A \times (B \cap C) =$:

a. $\emptyset$ b. $\{(1,3),(0,1)\}$ c. $\{(0,2),(1,2)\}$ d. $\{(2,3),(1,1)\}$

$B \cap C = \{1,2\} \cap \{2,3\} = \{2\}$
$A \times (B \cap C) = \{0,1\} \times \{2\} = \{(0,2),(1,2)\}$

Chapter#02

Choose the correct answer for each from the given options.

i) The real part of $(x + iy)^2$ is:

a. $x^2 + y^2$ b. 2xy c. $-2ixy$ d. $x^2 - y^2$

$(x + iy)^2 = x^2 + (iy)^2 + 2(x)(iy) = x^2 - y^2 + 2xyi$

ii) The value of i^3 is:

a. 1 b. $-i$ c. i d. -1

$i^3 = i^2.i = -1.i = -i$

iii) If $i = \sqrt{-1}$ then value of $(-i^3)^2$ is:

a. 1 b. i c. $-i$ d. -1

$(-i^3)^2 = (i^3)^2 = (i^2)^3 = (-1)^3 = -1$

iv) The conjugate of a complex number (a, b) is:

a. $(-a,-b)$ b. $(a,-b)$ c. $(-a,b)$ d. $\left(\frac{a}{b},\frac{b}{a}\right)$

v) If $z = -3i + 4$ the $\bar{z} =$

a. $-3i - 4$ b. $-3i + 4$ c. $3i + 4$ d. $\frac{1}{-3i+4}$

If z is a complex number then $\bar{z}$ is called its Conjugate.
Note: Only sign of imaginary part gets Changed
$Z = -3i + 4, so\ \bar{z} = 3i + 4$

vi) If $z = 3 + 4i$ then $z + \bar{z} =$:.

a. 6 b. $8i$ c. 0 d. -1

$z = 3 + 4i\ and\ \bar{z} = 3 - 4i$
$z + \bar{z} = 3 + 3 = 6$

vii) If a complex number $z = x + iy$ is added to its conjugate, the result is:

a. Purely real　　b. Purely Imaginary　　c. real or imaginary　　d. none of these

Above example clearly shows that is Complex number is added to its conjugate so answer is alwys real

viii) The real part of $(2i-3)i$ is:

a. 2　　b. -2　　c. -3　　d. 3

$i(2i-3) = 2i^2 - 3i = 2(-1) - 3i = -2 - 3i; Real = -2, Imaginary\ part = -3$

Note: You can also solve this question using Casio $\frac{991}{570}$ *bygoing in CMPLX mode, using mode button left to the ON button*

ix) The real and imaginary part of $i(3-2i)$ are respectively:

a. $-2\ and\ 3$　　b. $2\ and -3$　　c. $2\ and\ 3$　　d. $-3\ and -2$

$i(3-2i) = 3i - 2i^2 = 3i - 2(-1) = 2 + 3i; Real = 2, Imaginary\ part = 3$

x) The real and imaginary parts of $i(2-3i)$ are:

a. $-3\ and\ 2$　　b. $3\ and\ 2$　　c. $2\ and\ 3$　　d. $-2\ and -3$

$i(2-3i) = 2i - 3i^2 = 2i - 3(-1) = 3 + 2i; Real = 3, Imaginary\ part = 2$

xi) The real part and imaginary part of $\frac{2-i}{3}$ are respectively:

a. $-\frac{2}{3}\ and \frac{1}{3}$　　b. $\frac{2}{3}\ and -\frac{1}{3}$　　c. $-\frac{1}{3}\ and -\frac{2}{3}$　　d. $-\frac{1}{3}\ and \frac{2}{3}$

$\frac{2-i}{3} = \frac{2}{3} - \frac{1}{3}i$;　$Real = \frac{2}{3}\ and\ Imaginary\ part = -\frac{1}{3}$

xii) $(a,b)(c,d) =$:

a. $(ac-bd, ad+bc)$　　b. (ac, bd)　　c. $(ac+bd, ad-bc)$　　d. (ad, bc)

xiii) The multiplicative inverse of (a,b) is:

a. $\left(\frac{1}{a}, \frac{1}{b}\right)$　　b. $\left(-\frac{1}{a}, -\frac{1}{b}\right)$　　c. $\left(\frac{a}{a^2+b^2}, -\frac{b}{a^2+b^2}\right)$　　d. $\left(\frac{a}{a^2+b^2}, -\frac{b}{a^2+b^2}\right)$

xiv) The multiplicative inverse of (c,d) is equal to:

a. $\left(\frac{1}{c^2}, \frac{1}{c^2}\right)$　　b. $\left(\frac{c}{c^2+d^2}, \frac{-d}{c^2+d^2}\right)$　　c. $\left(\frac{c}{d}, \frac{d}{c}\right)$　　d. $\left(\frac{1}{c}, \frac{1}{d}\right)$

xv) The multiplicative inverse of (1,0) is:

a. (0,1)　　b. $(-1,0)$　　c. (1,0)　　d. (0,0)

$(1,0)^{-1} = \left(\frac{1}{(1)^2+(0)^2}, \frac{-0}{(1)^2+(0)^2}\right) = \left(\frac{1}{1+0}, 0\right) = (1,0)$; *Using above formula of inverse*

xvi) The multiplicative inverse of $(-3,8)$ is:

a. $(3,-8)$　　b. $\left(-\frac{1}{3}, \frac{1}{8}\right)$　　c. $\left(\frac{1}{3}, -\frac{1}{8}\right)$　　d. $\left(-\frac{3}{73}, -\frac{8}{73}\right)$

$(-3,8)^{-1} = \left(\frac{-3}{(-3)^2+(8)^2}, \frac{-8}{(-3)^2+(8)^2}\right) = \left(\frac{-3}{9+64}, \frac{-8}{9+64}\right) = \left(\frac{-3}{73}, \frac{-8}{73}\right)$

xvii) If $z = a + ib$ the $|z| =$:

a. $\sqrt{a-b}$　　b. $\sqrt{a^2-b^2}$　　c. $\sqrt{a^2+b^2}$　　d. $\sqrt{a+b}$

xviii) Magnitude of $3-4i$ is:

a. 25　　b. 1　　c. 9　　d. 5

$magnitude = \sqrt{(3)^2 + (-4)^2} = \sqrt{9+16} = \sqrt{25} = 5$

xix) If $(x+3, 3) = (-5,3)$, then value of x is:

a. -7　　b. -2　　c. -8　　d. -5

$x + 3 = -5, so\ x = -5 - 3 = -8$

Chapter#03

Choose the correct answer for each from the given options.

i) The product of all cube roots of unity is:

a. ∞　　b. 0　　c. 1　　d. -1

Cube roots of unity (1) are : $1, \omega, \omega^2$

$Product = 1 \times \omega \times \omega^2 = \omega^3 = 1$

ii) For the equation $px^2 + qx + r = 0$, the product of roots is:

a. $-\frac{q}{p}$ b. $\boxed{\frac{r}{p}}$ c. $-\frac{r}{p}$ d. $\frac{q}{p}$

iii) The product of the roots of the equation $3x^2 - 5x + 2 = 0$ is:

a. $\frac{3}{5}$ b. $\boxed{\frac{2}{3}}$ c. $\frac{3}{2}$ d. $-\frac{5}{3}$

iv) The sum of the roots of $12x^2 - 15x + 4 = 0$ is:

a. $-\frac{4}{3}$ b. $\boxed{\frac{5}{4}}$ c. $\frac{4}{3}$ d. $-\frac{1}{3}$

v) For the equation $px^2 + qx + r = 0$, then the sum of the roots is:

a. $\boxed{-\frac{q}{p}}$ b. $\frac{q}{p}$ c. $\frac{p}{q}$ d. $-\frac{p}{q}$

vi) For the equation $lx^2 + mx + n = 0$, the sum of the roots =

a. $l + m$ b. $\frac{m}{l}$ c. $\frac{n}{l}$ d. $\boxed{-\frac{m}{l}}$

vii) If roots of a quadratic equation are 2 and -2 then the equation is:

a. $\boxed{x^2 - 4 = 0}$ b. $x^2 + 4 = 0$ c. $x^2 + 2 = 0$ d. $x^2 - 2 = 0$

$x^2 - 4 = 0, so\ x^2 = 4, now\ \boxed{x = \pm 2}$

viii) $(i)^{-8} + \omega^8 =$:

a. 2 b. $1 + \omega$ c. $\boxed{1 + \omega^2}$ d. none of these

$(i)^{-8} + \omega^8 = \frac{1}{(i)^8} + \omega^6.\omega^2 = \frac{1}{(i^2)^4} + (1)\omega^2 = \frac{1}{(-1)^4} + \omega^2 = 1 + \omega^2$

$Note: \omega^3 = 1\ and\ any\ multiple\ of\ 3\ in\ power\ of\ \omega\ is\ 1. E.g\ \omega^{243} = 1, \omega^{15} = 1$

ix) $\omega + \omega^2 =$:

a. ω b. 1 c. $\boxed{-1}$ d. 0

$= 1 + \omega^2$

x) If ω is a complex cube root of unity then $\omega^{16} =$:

a. 0 b. ω^2 c. $\boxed{\omega}$ d. 1

$\omega^{16} = \omega^{15}.\omega = 1.\omega = 1$

xi) If ω is a cube root of unity, then $\omega^{32} =$:

a. 0 b. $\boxed{\omega^2}$ c. ω d. 1

$\omega^{32} = \omega^{30}.\omega^2 = 1.\omega^2 = \omega^2$

xii) If ω is the cube root of unity, then $\omega^4 =$:

a. $\boxed{\omega}$ b. 0 c. ω^2 d. 1

$\omega^4 = \omega^3.\omega = 1.\omega = 1$

xiii) If ω is a complex cube root of unity then $\omega^3 + \omega^4 + \omega^5 =$:

a. 1 b. ω c. ω^3 d. $\boxed{0}$

$\omega^3 + \omega^4 + \omega^5 = \omega^3 + \omega^3.\omega + \omega^3\omega^2 = 1 + 1.\omega + 1.\omega^2 = 1 + \omega + \omega^2 = 0$

xiv) The roots of a quadratic equation are equal if:

a. $b^2 - 4ac > 0$ b. $b^2 - 4ac < 0$ c. $\boxed{b^2 - 4ac = 0}$ d. $b^2 - 4ac$ is a perfect square

xv) The roots of the equation $ax^2 + bx + c = 0$ are real and distinct, if $b^2 - 4ac$ is:

a. 0 b. $\boxed{positive}$ c. negative d. non zero

xvi) The roots of the equation $ax^2 + bx + c = 0$ are real and unequal then $b^2 - 4ac$ is:

a. Less than zero b. equal to zero c. $\boxed{greater\ than\ zero}$ d. equal to zero

xvii) The roots of the equation $ax^2 + bx + c = 0$ are complex if $b^2 - 4ac$ is:

a. $\boxed{negative}$ b. positive c. 0 d. perfect square

xviii) If ω is a complex cube root of unity then $(1 + \omega + \omega^2)^2$ will be equal to:

a. $\boxed{0}$ b. 1 c. ω^2 d. 4

xix) If the roots of the equation $ax^2 + bx + c = 0$ are equal then $b^2 - 4ac$ is:

a. Positive b. negative c. Perfect squarte d. $\boxed{zero}$

xx) If an equation, has the roots $\frac{1}{2}$ and $-\frac{1}{6}$, the the equation is:

a. $\boxed{12x^2 - 4x - 1 = 0}$ b. $x^2 - 6x + 2 = 0$ c. $x^2 + 6x - 2 = 0$ d. $12x^2 + 4x - 1 = 0$

Solve these Equation using Quadratic Eq in MODE option in Casio 991 or 570 it will verify the roots so that will the correct answer

xxi) If -4 *and* 8 are the roots of quadratic equation then the equation is:

a. $\boxed{x^2 - 4x - 32 = 0}$ b. $x^2 + 4x - 32 = 0$ c. $x^2 - 4x + 32 = 0$ d. $x^2 + 4x + 32 = 0$

xxii) If $2^{2x+3} = 32$ the $x =$:

a. 2 b. 3 c. $\boxed{1}$ d. 4

$2^{2x+3} = 32 = 2^5, so\ 2x + 3 = 5; 2x = 2\ and\ hence\ \boxed{x = 1}$

Chapter#04

Choose the correct answer for each from the given options.

i) A square matrix is said to be a singular if:

a. $\boxed{|A| = 0}$ b. $A = 0$ c. $|A| = 1$ d. none of these

ii) If $\begin{vmatrix} 4 & x \\ 2 & -3 \end{vmatrix} = 0$, then value of x is:

a. -12 b. $\boxed{-6}$ c. 0 d. 6

$\begin{vmatrix} 4 & x \\ 2 & -3 \end{vmatrix} = 0, \Longrightarrow (4)(-3) - 2x = 0 \Longrightarrow -12 - 2x = 0 \Longrightarrow 2x = -12 \Longrightarrow \boxed{x = -6}$

iii) If $\begin{bmatrix} 4 & 2 \\ 3 & \lambda \end{bmatrix}$ is a singular matrix, then $\lambda =$:

a. 6 b. ± 5 c. $\boxed{\frac{3}{2}}$ d. $\frac{2}{3}$

$\begin{vmatrix} 4 & 2 \\ 3 & \lambda \end{vmatrix} = 0 \Longrightarrow 4\lambda - 6 = 0 \Longrightarrow 4\lambda = 6 \Longrightarrow \lambda = \frac{6}{4} \Longrightarrow \boxed{\lambda = \frac{3}{2}}$

iv) $\begin{vmatrix} 2 & 1 \\ 1 & 3 \end{vmatrix} \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} =$:

a. $\begin{vmatrix} 5 & 10 \\ 0 & 10 \end{vmatrix}$ b. $\begin{vmatrix} 5 & 10 \\ 0 & 10 \end{vmatrix}$ c. $\boxed{\begin{vmatrix} 15 & 20 \\ -5 & 10 \end{vmatrix}}$ d. none of these

$\begin{vmatrix} 2 & 1 \\ 1 & 3 \end{vmatrix} \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} = \{(2)(3) - (1)(1)\} \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} = \{6 - 1\} \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} = 5 \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} 15 & 20 \\ -5 & 10 \end{bmatrix}$

v) The matrix $\begin{bmatrix} 2 & 0 \\ 0 & -2 \end{bmatrix}$ is:

a. $\boxed{\text{Diagonal}}$ b. Scalar c. Unit d. Null

Diagonal Matrix: A matrix having all elements zero except in diagonal

vi) The matrix $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ is:

a. diagonal b. $\boxed{\text{scalar}}$ c. unit d. null

Scalar Matrix: A diagonal matrix having all elements same in diagonal

vii) The matrix $\begin{bmatrix} \sqrt{3} & 0 & 0 \\ 0 & \sqrt{3} & 0 \\ 0 & 0 & \sqrt{3} \end{bmatrix}$ is a:

a. Diagonal matrix b. $\boxed{\textit{Scalar matrix}}$ c. Unit matrix d. Null matrix

viii) If $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 5 & k \\ -1 & 1 & 2 \end{bmatrix}$ is a singular matrix, then the value of k is:

a. $\boxed{10}$ b. 5 c. 2 d. 1

$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 5 & k \\ -1 & 1 & 2 \end{vmatrix} = 1 \begin{vmatrix} 5 & k \\ 1 & 2 \end{vmatrix} - 0 + 0 \Longrightarrow 5 \times 2 - 2k = 0 \Longrightarrow 2k = 10 \Longrightarrow \boxed{k = 5}$

ix) If order of matrices *A* and *B* respectively are *2 x 3* and 3 *x* 4 than order of *AB*:

a. 2×2 b. 3×3 c. $\boxed{2 \times 4}$ d. 4×2

x) If the order of two matrices A and B are $m \times n$ and $n \times p$ respectively, then order of AB is:

a. $m \times p$ b. $p \times n$ c. $n \times p$ d. $p \times m$

xi) A matrix, in which the number of rows is equal to the number of columns, is called:

a. Identity matrix b. Diagonal matrix c. *Square matrix* d. Scalar matrix

xii) A matrix, in which the number of rows is equal to the number of columns, is called:

a. Identity matrix b. Diagonal matrix c. *Rectangular matrix* d. Scalar matrix

xiii) $|I_3|$ equal to:

a. -1 b. 0 c. 1 d. 3

$$I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, so\ determinant\ is\ 1$$

xiv) If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \omega & 0 \\ 0 & 0 & \omega^2 \end{bmatrix}$ then $|A| =$:

a. 1 b. ω c. ω^2 d. -1

$$Determinant\ of\ a\ diagonal\ matrix\ is\ calculated\ by\ multiplying\ all\ elements\ of\ diagonal$$
$$Here, 1 \times \omega \times \omega^2 = \omega^3 = 1$$

xv) If A is a non-singular matrix the $A^{-1} =$:

a. $\frac{Adj\ A}{A}$ b. $\frac{Adj\ A}{|A|}$ c. $\frac{|Adj\ A|}{A}$ d. $|A|AdjA$

xvi) The matrix $[1 \quad 2 \quad 3]^t$ is a:

a. Row matrix b. *columns matrix* c. singular Non-singluar

$$[1 \quad 2 \quad 3]^t = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}; hence, it\ is\ column\ matrix$$

Chapter#05

Choose the correct answer for each from the given options.

i) A binary operation $*$ on a set is said to be associative if:

a. $a * b = b * a$ b. $a * b = b * a = e$ c. $(a * b) * c = a * (b * c)$ d. $a * e = e * a = a$

ii) A binary operation $*$ on a set S, and e be the identity in S so $a * e =$:

a. a b. e c. ae d. none of these

Chapter#06

- **Arithmetic Mean: $A = \frac{a+b}{2}$**
- **Geometric Mean: $G = \pm\sqrt{ab}$**
- **Harmonic Mean: $H = \frac{2ab}{a+b}$**
- **$A > G > H$ and $G^2 = AH$**

Choose the correct answer for each from the given options.

i) The arithmetic mean between 5 and 10 is:

a. 5.5 b. 6.5 c. 7.5 d. 8.5

$$A = \frac{a+b}{2} = \frac{5+10}{2} = 7.5$$

ii) The geometric means between $\sqrt{2}$ and $\frac{1}{\sqrt{2}}$ is:

a. ± 2 b. $\pm\sqrt{2}$ c. ± 1 d. $\pm\frac{1}{\sqrt{2}}$

$$G = \pm\sqrt{ab} = \pm\sqrt{(\sqrt{2})\left(\frac{1}{\sqrt{2}}\right)} = \pm\sqrt{1} = \pm 1$$

iii) The geometric means between 2 and 8 is:

a. 5 b. 16 c. ± 8 d. ± 4

$$G = \pm\sqrt{ab} = \pm\sqrt{(8)(2)} = \pm\sqrt{16} = \pm 4$$

iv) The harmonic means between $\frac{1}{3}$ and $\frac{2}{5}$ is:

a. $\frac{11}{4}$ b. 7 c. $\boxed{\frac{4}{11}}$ d. $\frac{7}{11}$

$$H = \frac{2ab}{a+b} = \frac{2\left(\frac{1}{3}\right)\left(\frac{2}{5}\right)}{\left(\frac{1}{3}\right)+\left(\frac{2}{5}\right)} = \frac{4}{11}$$

v) The H.M. of 2 and 5 is:

a. $\frac{7}{2}$ b. $\pm\sqrt{10}$ c. 0 d. $\boxed{\frac{20}{7}}$

vi) If H is the Harmonic mean between a and b, then $H =$:

a. $\frac{a+b}{2}$ b. $\sqrt{ab}$ c. $\boxed{\frac{2ab}{a+b}}$ d. None

vii) The H.M. between p and q is:

a. $\frac{p+q}{2}$ b. $\frac{p+q}{pq}$ c. $\boxed{\frac{2pq}{p+q}}$ d. $\frac{q}{p+q}$

viii) If 4, a, 16 are in G.P., then the value of 'a' is:

a. 64 b. $\boxed{\pm 8}$ c. $\sqrt{8}$ d. $\pm\sqrt{8}$

$$a = \pm\sqrt{4 \times 16} = \pm 2 \times 4 = \pm 8$$

ix) The nth term of the sequence 2,4,6,8, . . . ,n is:

a. n b. $\frac{n}{n+1}$ c. 2n + 1 d. $\boxed{2n}$

x) If A,G,H are respectively the A.M., G.M., and H.M. between a and b, then:

a. $A^2 = GH$ b. $G = \frac{A}{H}$ c. $G = \frac{A+H}{2}$ d. $\boxed{G^2 = AH}$

Chapter#07

Choose the correct answer for each from the given options.

i) The value of 0! is:

a. 0 b. $\boxed{1}$ c. ∞ d. none of them

ii) Number of ways in which 7 girls can be seated around a round table is:

a. 7! b. 7 c. $\boxed{6!}$ d. 6

$$*\ To\ arrange\ is\ a\ row; n!$$
$$*\ to\ arrange\ in\ a\ circle\ or\ around\ a\ round\ table: (n-1)!\ ;\ \ here, (7-1)! = 6!$$
$$To\ form\ a necklace\ or\ garland: \frac{(n-1)!}{2}$$

iii) $\frac{(n-1)!}{(n+1)!} =$:

a. $\frac{1}{n+1}$ b. $\frac{n-1}{n+1}$ c. $\boxed{\frac{1}{n(n+1)}}$ d. none of these

$$\frac{(n-1)!}{(n+1)!} = \frac{(n-1)!}{(n+1)n(n-1)!} = \frac{1}{n(n+1)}$$

iv) $\frac{(n+1)!}{(n-1)!} =$

a. n b. $n-1$ c. $n+1$ d. $\boxed{n(n+1)}$

$$\frac{(n+1)!}{(n-1)!} = \frac{(n+1)n(n-1)!}{(n-1)!} = n(n+1)$$

v) $\frac{(n+1)!}{n!} =$

a. $\frac{n+1}{n}$ b. $\boxed{n+1}$ c. $n(n+1)$ d. $(n+1)!$

$$\frac{(n+1)!}{n!} = \frac{(n+1)n!}{n!} = n+1$$

vi) $\frac{n!}{(n+1)!} =$:

a. n b. n+1 c. $\frac{1}{n}$ d. $\boxed{\frac{1}{n+1}}$

$$\frac{n!}{(n+1)!} = \frac{n!}{(n+1)n!} = \frac{1}{n+1}$$

vii) The value of $\binom{5}{2,\ 2}$ is:

a. $\boxed{30}$ b. 50 c. 40 d. 30

$\binom{5}{2,2} = \frac{5!}{2!.2!} = \frac{120}{2\times2} = 30$

viii) $\binom{5}{3,2}$ =:

a. 8 b. 9 c. $\boxed{10}$ d. 20

$\binom{5}{3,2} = \frac{5!}{3!.2!} = \frac{120}{6\times2} = 10$

ix) ^nP_r is equal to:

a. $\frac{n!}{r!(n-r)!}$ b. $\frac{n!}{r!}$ c. $\frac{n!}{n!-r!}$ d. $\boxed{\frac{n!}{(n-r)!}}$

$Note: n_{P_r} = \frac{n!}{(n-r)!}$ and $n_{C_r} = \frac{n!}{r!(n-r)!}$

x) The value of n_{P_0} is:

a. 0 b. $\boxed{1}$ c. $n!$ d. $\frac{1}{n}$

$n_{P_0} = \frac{n!}{(n-0)!} = \frac{n!}{(n)!} = 1$

xi) The value of $^8P_2$ =

a. 66 b. 76 c. $\boxed{56}$ d. 86

$8_{P_2} = \frac{8!}{(8-2)!} = \frac{8!}{(6)!} = \frac{8.7.6!}{6!} = 56$; cal also be calculated using calculator

xii) The value of $^5P_3$ is:

a. 120 b. $\boxed{60}$ c. 20 d. 80

$5_{P_3} = \frac{5!}{(5-3)!} = \frac{120!}{(2)!} = 60$; cal also be calculated using calculator

xiii) ^nC_r =:

$Note: n_{P_r} = \frac{n!}{(n-r)!}$ and $n_{C_r} = \frac{n!}{r!(n-r)!}$

a. $\boxed{\frac{n!}{r!(n-r)!}}$ b. $\frac{n!}{(n-r)!}$ c. $\frac{n!}{r!}$ d. $\frac{(n-r)!r!}{n!}$

xiv) The value of $^{13}C_{11}$ is:

a. 77 b. 1! c. 13! d. $\boxed{78}$

$13_{C_{11}} = \frac{13!}{11!\,(13-11)!} = \frac{13.12.11!}{11!(2)!} = \frac{13.12}{2} = 78$; cal also be calculated using calculator

xv) If a balanced die is rolled, then the probability of getting 3 is:

a. $\frac{2}{3}$ b. $\frac{3}{2}$ c. $\frac{1}{3}$ d. $\boxed{\frac{1}{6}}$

$S = \{1,2,3,4,5,6\}, O(S) = 6, A = \{3\}, O(A) = 1; P(A) = \frac{O(A)}{O(S)} = \frac{1}{6}$

xvi) A die is rolled once, the probability of getting a number 4 is:

a. $\boxed{\frac{1}{6}}$ b. $\frac{1}{3}$ c. $\frac{1}{2}$ d. $\frac{2}{3}$

$S = \{1,2,3,4,5,6\}, O(S) = 6, A = \{4\}, O(A) = 1; P(A) = \frac{O(A)}{O(S)} = \frac{1}{6}$

xvii) The chance of winning 5 or 4 in a throw of a die whose faces are numbered from 1 to 6 is:

a. $\frac{1}{6}$ b. $\boxed{\frac{1}{3}}$ c. $\frac{1}{2}$ d. $\frac{1}{4}$

$S = \{1,2,3,4,5,6\}, O(S) = 6, A = \{5,4\}, O(A) = 2; P(A) = \frac{O(A)}{O(S)} = \frac{2}{6} = \frac{1}{3}$

xviii) If a balanced die is rolled then the probability of getting 2 or 5 is:

a. $\frac{1}{2}$ b. $\boxed{\frac{1}{3}}$ c. $\frac{1}{6}$ d. $\frac{2}{5}$

$S = \{1,2,3,4,5,6\}, O(S) = 6, A = \{2,5\}, O(A) = 2; P(A) = \frac{O(A)}{O(S)} = \frac{2}{6} = \frac{1}{3}$

xix) The probability of getting a head in single toss of a coin is:

a. 0 b. 1 c. $\boxed{\frac{1}{2}}$ d. $-\frac{1}{2}$

$S = \{H,T\}, O(S) = 2, A = \{1\}, O(A) = 1; P(A) = \frac{O(A)}{O(S)} = \frac{1}{2}$

Chapter#08

Points to remember:

- $2n$ is an even number
- $(2n+4)$ is an even number
- $(2n+1)$ is odd number
- $(2n+3)$ is odd number
- If n=even, Middle Term= $\left(\frac{n+2}{2}\right)$ $th\ term$
- If n=odd, Middle Terms= $\left(\frac{n+1}{2}\right)$ and $\left(\frac{n+3}{2}\right)$ $th\ term$

Choose the correct answer for each from the given options.

i) The number of terms in the binomial expansion $(a+b)^n$ is:
a. n b. $\boxed{n+1}$ c. 2n d. n-1

ii) The number of terms in the binomial expansion $(a+b)^n$ is:.
a. $n\ terms$ b. $(n-1)terms$ c. $\boxed{n+1}$ terms d. $(n+2)$ terms

iii) The total number of terms in the binomial expansion of $\left(y^2+\frac{b^2}{y^2}\right)^n$ are:
a. n b. n-1 c. $\boxed{n+1}$ d. 2n

iv) The number of terms in the binomial expansion of $(3x+2y)^9$ is:
a. 9 b. $\boxed{10}$ c. 11 d. 8

v) The coefficient of 1st term in the Binomial expansion of $(x+a)^8$ is:
a. $\boxed{8_{C_0}}$ b. 1_{C_8} c. 8_{C_8} d. 1_{C_1}

$T_{r+1} = n_{C_r} a^{n-r} b^r$; $Coeff. of\ (r+1)th\ term\ is\ n_{C_r}$ (one less)
So, coeff. of First term is 8_{C_0}

vi) If $(a+b)^{2n+4}\ \forall\ n \in \mathbb{N}$, its middle term is:
a. $(2n+1)^{th}$ term b. $\boxed{(n+3)^{th}\text{ term}}$ c. $(n+1)^{th}$ term d. $(n+2)^{th}$ term

$(2n+4) is\ an\ even\ number; Middle\ Term = \frac{(2n+4)+2}{2} = n+3$

vii) The middle term in the expansion of $\left(x-\frac{1}{x}\right)^{20}$ is:
a. 9^{th} b. 10^{th} c. $\boxed{11^{th}}$ d. 12^{th}

$20\ is\ an\ even\ number; Middle\ Term = \frac{20+2}{2} = 11$

viii) The middle term in the expansion of $\left(x-\frac{1}{x}\right)^{2n}$ is:
a. $(2n+1)^{th}$ term b. $\boxed{(n+1)^{th}\ term}$ c. $(2n+2)^{th}$ term d. $(n+2)^{th}$

$(2n) is\ an\ even\ number; Middle\ Term = \frac{(2n)+2}{2} = n+1$ term

ix) If n is a natural number, the middle term in the expansion of $(a+b)^{2n}$ is:
a. $\left(\frac{n}{2}\right)^{th}$ term b. $\left(\frac{n+2}{2}\right)^{th}$ term c. $\boxed{(n+1)^{th}\ term}$ d. $\left(\frac{2n-1}{2}\right)^{th}$ term

x) If $|x|<1$, then $1+2x+3x^2+4x^3+...$ is equal to:
a. $\boxed{(1-x)^{-2}}$ b. $(1+x)^{-2}$ c. $(1-x)^{-1}$ d. $(1+x)^{-1}$

xi) $\sum_3^{20} n^0 =$:
a. 17 b. $\boxed{18}$ c. 19 d. 20

$$\sum_3^{20} n^0 = \sum_3^{20} 1 = (1+1+1+...+1)(18\ times) = 18;$$
$Here, 3\ to\ 20\ means\ add\ 1\ till\ 18\ times$

xii) $\sum n^3 =$
a. $\boxed{\frac{n^2(n+1)^2}{4}}$ b. $\frac{n^3(n+1)^3}{8}$ c. $\frac{n(n+1)}{2}$ d. none of these

xiii) $\sum n =$

a. $\boxed{\frac{n(n+1)}{2}}$ b. $\frac{n+1}{2}$ c. $\frac{n^2(n+1)^2}{2}$ d. $\frac{n(n+1)}{2}$

Chapter#09

Points to remember:

- $\pi\ radians = 180^0$
- $1\ radian = \frac{180}{\pi}$ degree
- $1^0 = \frac{\pi}{180}$ radian
- $In\ First\ Quadrant: All\ Positive$
- $In\ Second\ Quadrant: Only \sin and\ cosec\ \ Positive$
- $In\ Third\ Quadrant: Only \tan and\ cot\ \ Positive$
- $In\ Fourth\ Quadrant: Only \cos and\ sec\ \ Positive$

Choose the correct answer for each from the given options.

i) $\frac{2}{3}\pi$ radians in degree equal to:

a. 60^0 b. 90^0 c. $\boxed{120^0}$ d. 150^0

$\frac{2}{3}\pi = \frac{2}{3}(180) = 120^0$

ii) The angle of $\frac{\pi}{3}$ radian is equal to:

a. 120^0 b. 150^0 c. $\boxed{60^0}$ d. 30^0

$\frac{\pi}{3} = \frac{180}{3} = 60^0$

iii) $\frac{2\pi}{3}$ radians in degree is equal to:

a. 90^0 b. $\boxed{120^0}$ c. 60^0 d. 150^0

$\frac{2\pi}{3} = \frac{2(180)}{3} = 120^0$

iv) The angle of $\frac{\pi}{90}$ radians is equal to:

a. 90^0 b. $\boxed{2^0}$ c. 1^0 d. 180^0

$\frac{\pi}{90} = \frac{180}{90} = 2^0$

v) The angle 330^0 in radians is:

a. $\frac{5\pi}{6}$ b. $\frac{7\pi}{6}$ c. $\boxed{\frac{11\pi}{6}}$ d. $\frac{13\pi}{6}$

$330^0 = 330\left(\frac{\pi}{180}\right) = \frac{11\pi}{6}$

vi) The angle 135^0 in radians is:

a. $\frac{5\pi}{4}$ b. $\boxed{\frac{3\pi}{4}}$ c. $\frac{2\pi}{4}$ d. 135π

$135^0 = 135\left(\frac{\pi}{180}\right) = \frac{3\pi}{4}$

vii) The value of $\tan\theta$ is positive in ________ quadrant:

a. 1^{st} & 4^{th} b. $\boxed{1^{st}\text{ and }3^{rd}}$ c. 2^{nd} and 3^{rd} d. 3^{rd} and 4^{th}

viii) If $sin\theta > 0$ and $sec\theta < 0$, then $\rho(\theta)$ lies in this quadrant:

a. First b. $\boxed{Second}$ c. Third d. Fourth

ix) If $sin\theta < 0$ and $cos\theta > 0$, then $\rho(\theta)$ lies in this quadrant:

a. First b. second c. Third d. $\boxed{Fourth}$

x) If $cos\theta > 0$ and $sin\theta < 0$, then $\rho(\theta)$ lies in:

a. Ist quadrant b. $2nd\ quadrant$ c. $3rd\ quadrant$ d. $\boxed{4th\ quadrant}$

xi) If $tan\theta = -\frac{3}{4}$ and $sin\theta$ is negative then $\rho(\theta)$ lies in:

a. 1^{st} quadrant b. 2^{nd} quadrant c. 3^{rd} quadrant d. $\boxed{4th\ quadrant}$

xii) If $tan\theta = -\frac{1}{3}$ and $sin\theta$ is negative, $\rho(\theta)$ lies in this quadrant.
a. 3rd quadrant b. 1st quadrant c. $\boxed{4th\ quadrant}$ d. 2nd quadrant

xiii) The area of a circle of radius r is:
a. $2\pi r$ b. $\frac{1}{2}\pi r^2$ c. $\boxed{\pi r^2}$ d. $2\pi r^2$

Chapter#10

Choose the correct answer for each from the given options.

i) $1 - cos\theta =$:
a. $2\cos^2\frac{\theta}{2}$ b. $\sin^2\frac{\theta}{2}$ c. $\cos^2\frac{\theta}{2}$ d. $\boxed{2\sin^2\frac{\theta}{2}}$

ii) $1 + \cos\theta =$:
a. $2\sin^2\frac{\theta}{2}$ b. $2\cos^2\theta$ c. $2\sin^2\theta$ d. $\boxed{2\cos^2\frac{\theta}{2}}$

iii) $sin(180^0 + \theta) =$:
a. $-\cos\theta$ b. $\boxed{-\sin\theta}$ c. $\cos\theta$ d. $\sin\theta$

$\boxed{\sin(180^0 + \theta) = \sin 180^0 \cos\theta + \cos 180^0 \sin\theta = 0 + (-1)\sin\theta = -\sin\theta}$

iv) $\cos(90^0 - \alpha) =$:
a. $\boxed{sin\alpha}$ b. $cos\alpha$ c. $-cos\alpha$ d. $-sin\alpha$

$\boxed{\cos(90^0 - \theta) = \cos 90^0 \cos\theta + \sin 90^0 \sin\theta = 0 + (1)\sin\theta = \sin\theta}$

v) $tan(180^0 - \theta) =$:
a. $tan\theta$ b. $\boxed{-tan\theta}$ c. $cot\theta$ d. $-cot\theta$

$$\boxed{\tan(180^0 - \theta) = \frac{\tan 180^0 - \tan\theta}{1 + \tan 180^0 \tan\theta} = \frac{0 - \tan\theta}{1 + (0)\tan\theta} = \frac{-\tan\theta}{1 + 0} = -\tan\theta}$$

vi) $\frac{1}{1+\tan^2\theta} =$:
a. $\sec^2\theta$ b. $\boxed{\cos^2\theta}$ c. $\sin^2\theta$ d. $\cot^2\theta$

$$\boxed{\frac{1}{1+\tan^2\theta} = \frac{1}{\sec^2\theta} = \cos^2\theta}$$

vii) $tan\theta cos\theta =$
a. $\cos\theta$ b. $\boxed{sin\theta}$ c. $\sec\theta$ d. $\mathrm{cosec}\theta$

$$\boxed{\tan\theta\sin\theta = \frac{\sin\theta}{\cos\theta}\cos\theta = \sin\theta}$$

viii) $cosU - cosV =$
a. $2\sin\frac{U+V}{2}cos\frac{U-V}{2}$ b. $2\cos\frac{U+V}{2}sin\frac{U-V}{2}$ c. $2\cos\frac{U+V}{2}cos\frac{U-V}{2}$ d. $\boxed{-2\sin\frac{U+V}{2}sin\frac{U-V}{2}}$

ix) $cosU + cosV =$:
a. $cos\frac{U+V}{2}cos\frac{U-V}{2}$ b. $2cos\frac{U+V}{2}sin\frac{U-V}{2}$ c. $\boxed{2cos\frac{U+V}{2}cos\frac{U-V}{2}}$ d. $2sin\frac{U+V}{2}cos\frac{U-V}{2}$

x) $Cot(-\theta) =$:
a. $\boxed{-Cot\theta}$ b. $-tan\theta$ c. $\frac{1}{Cot\theta}$ d. $\frac{1}{tan\,\theta}$

xi) $\tan(-\theta) =$:
a. $\frac{1}{tan\theta}$ b. $\boxed{-tan\theta}$ c. $-cot\theta$ d. $\frac{1}{cot\,\theta}$

xii) The distance between $(a, 0)$ and $(0, b)$ is:
a. a+b b. $a^2 + b^2$ c. $\sqrt{a+b}$ d. $\boxed{\sqrt{a^2+b^2}}$

$\boxed{d = \sqrt{(a-0)^2 + (0-b)^2} = \sqrt{a^2+b^2}}$

xiii) The distance between (1,1) and (4,5) is:
a. 4 b. 3 c. $\boxed{5}$ d. 2

$\boxed{d = \sqrt{(4-1)^2 + (5-1)^2} = \sqrt{9+16} = \sqrt{25} = 5}$

Chapter#11

Points to remember:

- $Period\ of\ sinx\ is\ 2\pi$
- $Period\ of\ sin2x\ is \frac{2\pi}{2} = \pi$
- $Period\ of\ sin3x\ is \frac{2\pi}{3}$
- $Period\ of\ cosx\ is\ 2\pi$
- $Period\ of\ cos2x\ is \frac{2\pi}{2} = \pi$
- $Period\ of\ sin3x\ is \frac{2\pi}{3}$
- $Period\ of\ tanx\ is\ \pi$
- $Period\ of\ tan2x\ is \frac{\pi}{2}$
- $Period\ of\ \tan\frac{x}{2}\ is \frac{\pi}{\frac{1}{2}} = 2\pi$

Choose the correct answer for each from the given options.

i) The period of $sin2x$ is:
a. 2π b. $\boxed{\pi}$ c. $\frac{\pi}{2}$ d. $\frac{2}{3}\pi$

ii) The period of $tanx$ is:
a. $\boxed{\pi}$ b. $\frac{\pi}{2}$ c. 2π d. none of these

iii) The period of $cos\theta$ is:
a. π b. $\boxed{2\pi}$ c. 4π d. $\frac{\pi}{2}$

Chapter#12

Choose the correct answer for each from the given options.

i) The sides of a triangle are 3,4 and 5 units, then 'S'=:
a. $\boxed{6}$ b. 12 c.15 d. 30

$$s = \frac{a+b+c}{2} = \frac{3+4+5}{2} = 6$$

ii) If the sides of a triangle are 2, 3 and 5, then s =:
a. 30 b. 25 c. $\boxed{5}$ d. 10

iii) If the sides of a triangle are 5,6 and 7 units, the 2s is:
a. 6 b. 9 c. $\boxed{18}$ d. 27

$$s = \frac{a+b+c}{2}, \text{So}, 2s = a+b+c = 5+6+7 = 18$$

iv) If a, b, c are the sides of ΔABC, then $\frac{a-b+C}{2}$ =:
a. s b. s-a c. $\boxed{s-b}$ d.2s

$$s = \frac{a+b+c}{2}, \text{So}, 2s = a+b+c$$

$$2s - 2b = a+b+c-2b \Longrightarrow 2(s-b) = a-b+c \Longrightarrow s-b = \frac{a-b+c}{2}$$

v) If a, b, c are the sides of ΔABC, then r =:
a. $\boxed{\frac{\Delta}{s}}$ b. $\frac{4\Delta}{abc}$ c. $\frac{abc}{4}$ d. $\frac{abc}{4\Delta}$

vi) In a $\Delta ABC, a = b = c = x$, the Δ=:
a. $\boxed{\frac{\sqrt{3}}{4}x^2}$ b. $\frac{\sqrt{3}}{3}x^2$ c. $\frac{\sqrt{3}}{2}x^2$ d. $\frac{\sqrt{3}}{6}x^2$

$$Tirangle\ is\ Equilateral, so\ \alpha = \beta = \gamma = 60^0, \Delta = \frac{absin\gamma}{2} = \frac{x.x}{2}sin60^0 = \frac{x^2}{2}\left(\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}}{4}x^2$$

vii) The area of ΔABC is:
a. $\boxed{\frac{1}{2}bcsin\alpha}$ b. $\frac{1}{2}bc\ cos\alpha$ c. $\frac{1}{2}abc\ sin\alpha$ d. $\frac{1}{2}abc\ cos\alpha$

viii) Area of triangle ABC is:

a. $absin\alpha$ b. $\frac{1}{2}absin\beta$ c. $\boxed{\frac{1}{2}absin\gamma}$ d. $2absin\gamma$

ix) The circum-radius of ΔABC is:

a. $\frac{4\Delta}{abc}$ b. $\frac{\Delta}{2s}$ c. $\boxed{\frac{abc}{4\Delta}}$ d. $s(s-a)(s-b)(s-c)$

$\boxed{Circum - Radius = R = \frac{abc}{4\Delta}}$

x) If a, b, c are the sides of ΔABC, then $r =$:

a. $\frac{abc}{4}$ b. $\frac{abc}{4\Delta}$ c. $\boxed{\frac{\Delta}{s}}$ d. $\frac{s}{\Delta}$

xi) The law of cosine, when $\angle B$ is in the standard position is:

a. $a^2 = b^2 + c^2 - 2bccos\alpha$ b. $\boxed{b^2 = c^2 + a^2 - 2accos\beta}$ c. $c^2 = a^2 + b^2 - 2accos\gamma$ d. $cos\beta = a^2 + c^2 - b + 2ac$

Chapter#13

Choose the correct answer for each from the given options.

i) If $sin\theta = 0$, then θ is equal to:

a. $\boxed{2n\pi, n \in \mathbb{Z}}$ b. $(2n+1)\pi, n \in \mathbb{Z}$ c. $n\pi, n \in \mathbb{Z}$ d. $n\frac{\pi}{2}, n \in \mathbb{Z}$

$\sin\theta = 0 \Longrightarrow \theta = \sin^{-1} 0 = 0$
$G.S = \{0 + 2n\pi\} = \{2n\pi\}$