VERY IMPORTANT QUESTIONS

[MATH IA]

VSAQs

Ch.01: FUNCTIONS

① If $A = \{1,2,3,4\}$ and $f: A \to R$ is a function defined by $f(x) = \frac{x^2-x+1}{x+1}$, then find the range of f.

2) If $A = \{-2,-1,0,1,2\}$ & $f: A \to B$ is a surjection defined by $f(x) = x^2+x+1$, then find B.

3) Find the domains of the following real valued function

$f(x) = \frac{2x^2-5x+7}{(x-1)(x-2)(x-3)}$

4) If $A = \{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}\}$ and $f: A \to B$ is a surjection defined by $f(x) = \cos x$ then find B.

5) Find the domain of Real valued function

$f(x) = \sqrt{4x - x^2}$

6) $f(x) = \frac{1}{6x - x^2 - 5}$

7) If $f: R/\{0\} \to R$ by $f(x) = x^3 - \frac{1}{x^3}$ then S.T $f(x) + f(\frac{1}{x})$

8) If $f: R \to R$ defined by $f(x) = \frac{1-x^2}{1+x^2}$, then S.T

$f(\tan 2\theta) = \cos 2\theta$.

9) If $f(x) = 2x - 1$, $g(x) = \frac{x+1}{2}$ $\forall x \in R$ find

(i) $(g \circ f)(x)$ (ii) $(f \circ g)(x)$

10) Find domain of Real valued function

$f(x) = \frac{1}{(x^2-1)(x+3)}$

11) $f(x) = \frac{1}{(x^2-1)(x+3)}$

12) $f(x) = \log(x^2 - 4x + 3)$

Ch:03: Matrices :

13) If ω complex (non-real) cube root of 1, then show that $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix} = 0$

14) $\begin{bmatrix} x-1 & 2 & 5-y \\ 0 & z-1 & 7 \\ 1 & 0 & a-5 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 7 \\ 1 & 0 & 0 \end{bmatrix}$ then find the values of x, y, z and 'a'.

15) If $A = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$ find A^2

16) If $\begin{bmatrix} x-3 & 2y-8 \\ z+2 & 6 \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ -2 & a-4 \end{bmatrix}$

17) Find the trace of $\begin{bmatrix} 1 & 3 & -5 \\ 2 & -1 & 5 \\ 2 & 0 & 1 \end{bmatrix}$

18) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$ find $3B - 2A$.

19) If $A = \begin{bmatrix} 2 & 4 \\ -1 & k \end{bmatrix}$ & $A^2 = 0$, find 'k'

20) Find the rank of matrix $\begin{bmatrix} 1 & 4 & -1 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$

21) If $A = \begin{bmatrix} 2 & 0 & 1 \\ -1 & 1 & 5 \end{bmatrix}$ & $B = \begin{bmatrix} -1 & 1 & 0 \\ -0 & 1 & -2 \end{bmatrix}$ then find $(AB')'$

22) Define symmetric matrix.

If $A = \begin{bmatrix} -1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & x & 7 \end{bmatrix}$ is a symmetric matrix, Then find 'x'.

23) If $A = \begin{bmatrix} 0 & 2 & 1 \\ -2 & 0 & -2 \\ -1 & x & 0 \end{bmatrix}$ is a skew symmetric matrix, then find 'x'.

24) If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ 5 & -6 & x \end{bmatrix}$ & det $A = 45$ find x,

25) Define rank of a matrix.

26) Find the rank of matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

27) If $A = \begin{bmatrix} 3 & 2 & -1 \\ 2 & -2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -3 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & -1 & 2 \end{bmatrix}$ and $X = A+B$ then find 'x'.

28) Find trace of A, if $A = \begin{bmatrix} 1 & 2 & -1/2 \\ 0 & -1 & 2 \\ -1/2 & 2 & 1 \end{bmatrix}$

29) Find A^2, where $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$

Ch:04: ADDITION OF VECTORS

30) If the vectors $-3i+4j+\lambda k$ and $\mu i+8j+6k$ are collinear vectors, then find λ and μ.

31) Find the unit vector in the direction of vector $a = 2i+3j+k$

32) Let $a = i+2j+3k$ & $b = 3i+j$, find the unit vector in the direction of $a+b$.

33) If $OA = i+j+k$, $AB = 3i-2j+k$, $BC = i+2j-2k$ and $CD = 2i+j+3k$, then find the vector OD.

34) If $a = 2i+4j-5k$, $b = i+j+k$ & $c = j+2k$ find the unit vector in the opposite direction of $a+b+c$.

35) Find the vector equation of the line joining the point $2i+j+3k$ & $-4i+3j-k$

36) Find the V.E of line passing through the point $2i+3j+k$ and parallel to the vector $4i-2j+3k$

37) ABCDE is a pentagon. If the sum of vectors AB, BC, AE, DC, ED and AC is $\lambda \cdot AC$, then find the value of λ.

38) Find the V.E of the plane passing through the points $i-2j+5k$, $-5j-k$, $-3i+5j$

Ch:05: PRODUCT OF VECTORS

39) Find the angle between the vectors $i+2j+3k$ and $3i-j+2k$.

40) For what values of λ, the vectors $i-\lambda j+2k$ and $8i+6j-k$ are at right angles?

41) If $\bar{a} = i+2j+3k$ & $\bar{b} = 3i-j+2k$ then show that $\bar{a}+\bar{b}$ & $\bar{a}-\bar{b}$ are perpendicular to each other.

42) Find the angle between planes $r.(2i-j+2k)$ and $r.(3i+6j+k)=4$

43) If $a = 2i-3j+5k$, $b=-i+4j+2k$, then find $\bar{a}\times\bar{b}$

44) If the vectors $2i+\lambda j-k$ and $4i-2j+2k$ are perpendicular to each other, find λ.

45) Find the area of Parallelogram having $a = 2j - k$ and $b = -i + k$ as adjacent sides.

46) Find the eqn of the plane through the point $(3, -2, 1)$ and ⊥r to vector $(4, 7, -4)$

Ch-06 : Trigonometric Ratios upto Transformations

47) Eliminate θ from the following
$x = a\cos^3\theta$, $y = b\sin^3\theta$.

48) P.T $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$.

49) Express $\dfrac{1 - \cos\theta + \sin\theta}{1 + \cos\theta + \sin\theta}$ in terms of $\tan\dfrac{\theta}{2}$

50) Evaluate $\sin^2 82\frac{1}{2}^\circ - \sin^2 22\frac{1}{2}^\circ$

51) Prove that $\sin 78^\circ + \cos 132^\circ = \dfrac{\sqrt{5} - 1}{4}$

52) P.T $\dfrac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \cot 36^\circ$

53) Find the value of $\sin^2\dfrac{\pi}{10} + \sin^2\dfrac{4\pi}{10} + \sin^2\dfrac{6\pi}{10} + \sin^2\dfrac{9\pi}{10}$

54) Find the period of fn $f(x) = \cos(3x + 5) + 7$

55) If $\sin\theta = \dfrac{-1}{3}$ & $\theta \notin$ III Quadrant then find $\cos\theta$

56) If $a\cos\theta - b\sin\theta = c$ Then S.T $a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$

57) Find the period of the function defined by $f(x) = \tan(x + 4x + 9x + \dots + n^2 x)$ (n is any positive integer)

58) Find a cosine function whose period is 7

59) Find the minimum and maximum values of $3\cos x + 4\sin x$.

60) Express $\left(\frac{\sqrt{3}\cos 25^\circ + \sin 25^\circ}{2}\right)$ as sine of an angle.

61) what is value of $\tan 20^\circ + \tan 40^\circ + \sqrt{3}\tan 20^\circ \tan 40^\circ$

62) Simplify $\tan\left(\frac{\pi}{4}+\theta\right)\tan\left(\frac{\pi}{4}-\theta\right)$

63) find a sine function whose period is $\frac{2}{3}$

64) P.T $\cos 48^\circ \cos 12^\circ = \frac{3+\sqrt{5}}{8}$

65) Find the value of $\sin\frac{5\pi}{3}$

66) find the period of the function $\cos\left(\frac{4x+9}{5}\right)$

67) find the period of the fn $\tan 5x$.

Ch-09: HYPERBOLIC FUNCTIONS

68) P.T $(\cosh x + \sinh x)^n = \cosh(nx) + \sinh(nx)$, $x \in R$

69) S.T $\tanh^{-1}\left(\frac{1}{2}\right) = \frac{1}{2}\log_e 3$.

70) If $\cosh x = \frac{5}{2}$ find (i) $\cosh 2x$ (ii) $\sinh 2x$.

71) If $\sinh x = 3$, S.T $x = \log_e(3+\sqrt{10})$

72) for any $x \in R$, P.T $\cosh^4 x - \sinh^4 x = \cosh(2x)$

73) If $\operatorname{cosech} x = \sec\theta$, then P.T $\tanh^2\frac{x}{2} = \tan^2\frac{\theta}{2}$

74) If $\sinh x = \frac{3}{4}$, find $\cosh(2x)$ & $\sinh(2x)$

75) P.T for any $x \in R$, $\sinh(3x) = 3\sinh x + 4\sinh^3 x$.

SAQs

Ch: 03: MATRICES

1) If $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \\ 4 & 5 & -6 \end{bmatrix}$ & $B = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ find BA & $4A-5B$.

2) If $A = \begin{bmatrix} 7 & -2 \\ 1 & 2 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & -1 \\ 4 & 2 \\ -1 & 0 \end{bmatrix}$ then find AB' and BA'

3) If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, S.T $AA' = A'A = I$

4) S.T $\begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ is non-singular and find A^{-1}

5) If $A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ find A^4

6) If $A = \begin{bmatrix} 1 & 5 & 3 \\ 2 & 4 & 0 \\ 3 & -1 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 0 \\ 0 & -2 & 5 \\ 1 & 2 & 0 \end{bmatrix}$ then find $3A - 4B'$

7) If $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $E = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ then S.T $(aI + BE)^3 = a^3I + 3a^2bE$

8) If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ & $\begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix} \neq 0$

then S.T $abc = -1$

9) Find adj & inverse of $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$

10) If $A = \begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix}$ find AA'

ch:04: ADDITION OF VECTORS

11) If a, b, c are non-coplanar find the point of intersection of the line passing through the points $2a+3b-c$, $3a+4b-2c$ with the line joining the points $a-2b+3c$, $a-6b+6c$.

12) Let A, B, C and D be four points with position vectors $a+2b$, $2a-b$ and $3a+b$ respectively. Express vectors $\overline{AC}$, $\overline{DA}$, $\overline{BA}$, $\overline{BC}$.

13) S.T the pts $A(2i-j+k)$ $B(i-3j-5k)$, $C(3i-4j-4k)$ are the vertices of right angled triangle.

14) Let ABCDEF be a regular hexagon with centre 'O'. S.T $\overline{AB}+\overline{AC}+\overline{AD}+\overline{AE}+\overline{AF} = \overline{6AO}$.

15) If the position vectors of the points A, B and C are $-2i+j-k$, $-4i+2j+2k$ and $6i-3j-13k$ respectively and $AB = \lambda AC$ then find the value of λ.

16) If the pts whose position vectors are $3i-2j-k$, $2i+3j-4k$, $-i+j+2k$ and $4i+5j+\lambda k$ are coplanar then S.T $\lambda = \frac{-146}{7}$.

17) Is the triangle formed by the vectors $3i+5j+2k$, $2i-3j-5k$ and $-5i-2j+3k$ equilateral.

18) a, b, c are non-coplanar vectors. P.T the following four pts are coplanar. $-a+4b-3c$, $3a+2b-5c$, $-3a+8b-5c$, $-3a+2b+c$.

Ch:05: Product of Vectors

19) For any two vectors a & b, show that $(1+|a|^2)(1+|b|^2) = |1-a\cdot b|^2 + |a+b+a\times b|^2$

20) P.T for any three vectors $\bar{a}, \bar{b}, \bar{c}$: $[\bar{b}+\bar{c},\ \bar{c}+\bar{a},\ \bar{a}+\bar{b}] = 2[\bar{a}\ \bar{b}\ \bar{c}]$.

21) If $\bar{a} = \bar{i}+2\bar{j}+3\bar{k}$ & $\bar{b} = 3i+5j-k$ are two sides of a triangle, then find its area.

22) If $|a| = 13$, $|b| = 5$ and $a\cdot b = 60$ then find $|a\times b|$

23) Let $\bar{a} = 2i+j+k$ & $\bar{b} = 3i+4j-k$, If θ is the angle b/w $\bar{a}$ & $\bar{b}$ find $\sin\theta$.

24) If $a = 2i+3j+4k$, $b = i+j+k$ & $c = i-j+k$ then compute $a\times(b\times c)$ and verify that it is $\perp r$ to 'a'

25) Find unit vector perpendicular to the plane passing through the points (1, 2, 3) (2, −1, 1) and (1, 2, −4)

26) P.T angle between any two diagonals of a cube is $\cos\theta = \frac{1}{3}$

27) If $a = 2i+j-k$, $b = -i+2j-4k$ & $c = i+j+k$ then find $(a\times b)\cdot(b\times c)$

28) Find the volume of tetrahedron whose vertices are $(1,2,1)$, $(3,2,5)$, $(2,-1,0)$ and $(-1,0,1)$

Ch:06: Trigonometric Ratios upto Transformations

29) P.T $\frac{1}{\sin 10^\circ} - \frac{\sqrt{3}}{\cos 10^\circ} = 4$

30) Find the range of $7\cos x - 24\sin x + 5$

31) If $\tan 20^\circ = p$ then P.T $\frac{\tan 610^\circ + \tan 700^\circ}{\tan 560^\circ - \tan 470^\circ} = \frac{1-p^2}{1+p^2}$

32) P.T $\cos^2\left(\frac{\pi}{8}\right) + \cos^2\left(\frac{3\pi}{8}\right) + \cos^2\left(\frac{5\pi}{8}\right) + \cos^2\left(\frac{7\pi}{8}\right) = 2$

33) S.T $\cos^2\left(\frac{\pi}{10}\right) + \cos^2\left(\frac{2\pi}{5}\right) + \cos^2\left(\frac{3\pi}{5}\right) + \cos^2\left(\frac{9\pi}{10}\right) = 2$

34) S.T $\cos^4\left(\frac{\pi}{8}\right) + \cos^4\left(\frac{3\pi}{8}\right) + \cos^4\left(\frac{5\pi}{8}\right) + \cos^4\left(\frac{7\pi}{8}\right) = \frac{3}{2}$

35) S.T $\left(1+\cos\frac{\pi}{10}\right)\left(1+\cos\frac{3\pi}{10}\right)\left(1+\cos\frac{7\pi}{10}\right)\left(1+\cos\frac{9\pi}{10}\right) = \frac{1}{16}$.

36) P.T $\cos\frac{2\pi}{7} \cdot \cos\frac{4\pi}{7} \cos\frac{8\pi}{7} = \frac{1}{8}$.

37) $\cot\left(\frac{\pi}{20}\right)\cot\left(\frac{3\pi}{20}\right)\cot\left(\frac{5\pi}{20}\right)\cot\left(\frac{7\pi}{20}\right)\cot\left(\frac{9\pi}{20}\right) = 1$.

38) P.T $\frac{(\cos^3\theta - \cos 3\theta)}{\cos\theta} + \frac{(\sin^3\theta + \sin 3\theta)}{\sin\theta} = 3$

39) If $\sin\alpha + \operatorname{cosec}\alpha = 2$, find the value of $\sin^n\alpha + \operatorname{cosec}^n\alpha$, $n \in \mathbb{Z}$.

40) If 'A' is not an integral multiple of π P.T $\cos A \cdot \cos 2A \cdot \cos 4A \cdot \cos 8A = \frac{\sin 16A}{16\sin A}$ & hence deduce that $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15} \cdot \cos\frac{16\pi}{15} = \frac{1}{16}$

Ch:07: TRIGONOMETRIC EQUATIONS

41) Solve $7\sin^2\theta + 3\cos^2\theta = 4$

42) Solve $\sqrt{3}\sin\theta - \cos\theta = \sqrt{2}$

43) $\sin x + \sqrt{3}\cos x = \sqrt{2}$

44) If θ_1, θ_2 are the solutions of the eqn $a\cos 2\theta + b\sin 2\theta = c$, where $a, b, c \in R$ and if $a^2+b^2 > 0$, $\cos\alpha \neq \cos\beta$ & $\sin\alpha \neq \sin\beta$ then S.T $\sin\alpha + \sin\beta = \dfrac{2bc}{a^2+b^2}$.

45) Solve the equation $2\cos^2\theta + 11\sin\theta = 7$ & write the General solutions.

Ch:08: Inverse Trigonometric functions

46) Find the Values of $\sin\left[\cos^{-1}\left(\frac{3}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right)\right]$

47) P.T $\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13} = \cos^{-1}\frac{33}{65}$

48) P.T $\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{8}{17} = \cos^{-1}\frac{36}{85}$

49) P.T $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8} = \frac{\pi}{8}$.

50) P.T $\cos^{-1}\frac{4}{5} + \sin^{-1}\frac{3}{\sqrt{34}} = \tan^{-1}\frac{27}{11}$

Ch:10: Properties of Triangles

51) In a ΔABC S.T $\dfrac{\cos A}{a} + \dfrac{\cos B}{b} + \dfrac{\cos C}{c} = \dfrac{a^2+b^2+c^2}{2abc}$

52) If a ΔABC if $a:b:c = 7:8:9$ then find $\cos A : \cos B : \cos C$.

53) P.T $b^2\cos^2\frac{C}{2} + c\cdot\cos^2\frac{B}{2} = S$

54) P.T $\cot A + \cot B + \cot C = \frac{a^2+b^2+c^2}{4\Delta}$.

55) P.T $\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2} = \frac{S^2}{\Delta}$.

56) P.T $\tan\frac{A}{2} + \tan\frac{B}{2} + \tan\frac{C}{2} = \frac{bc+ca+ab-s^2}{\Delta}$

57) If $a = 2cm$, $b = 3cms$, $c = 4cm$ then find $\cos A$

58) P.T $r(r_1+r_2+r_3) = ab+bc+ca-s^2$

59) P.T $r_1^2+r_2^2+r_3^2+r^2 = 16R^2-(a^2+b^2+c^2)$

60) If $a = (b+c)\cos\theta$, then P.T $\sin\theta = \frac{2\sqrt{bc}}{b+c}\cos\frac{A}{2}$

61) In a ΔABC, P.T $\frac{1}{r_1^2}+\frac{1}{r_2^2}+\frac{1}{r_3^2} = \frac{1}{r}$.

MIA || LAQs ||

Ch: 01: FUNCTIONS

1) Let $f: A \to B$, I_A and I_B be identity functions of A and B respectively. Then P.T $f \circ I_A = f = I_B \circ f$.

2) If $f: R \to R$, $g: R \to R$ are defined by $f(x) = 4x-1$ & $g(x) = x^2+2$ then find
(i) $(g \circ f)(x)$ (ii) $(g \circ f)\left(\frac{a+1}{4}\right)$
(iii) $f \circ f(x)$ (iv) $g \circ (f \circ f)(0)$

3) If $A = \{1, 2, 3\}$ $B = \{\alpha, \beta, \gamma\}$ $C = \{p, q, r\}$ and $f: A \to B$, $g: B \to C$ are defined by $f = \{(1,\alpha), (2,\alpha), (3,\beta)\}$, $g = \{(\alpha, q), (\beta, \gamma), (\gamma, p)\}$ then S.T f & g are bijective functions and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.

4) If $f: A \to B$ is a bijection & $g: B \to C$ is a bijection then P.T $g \circ f: A \to C$ is also bijection.

5) If $f: A \to B$ is a bijection, I_A and I_B are identity fns on A & B respectively, then S.T $f \circ f^{-1} = I_B$ & $f^{-1} \circ f = I_A$.

6) If $f: A \to B$, $g: B \to C$ are bijections then P.T $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.

7) If $f = \{(4,5),(5,6),(6,-4)\}$ and $g = \{(4,-4),(6,5),(8,5)\}$ then find

(i) $f+g$ (ii) $2f+4g$ (iii) $f+4$ (iv) f/g

(v) $\sqrt{f}$ (vi) f^2 (vii) $|f|$ (viii) $f-g$

(ix) fg

ch:02: MATHEMATICAL INDUCTION

(8) Using Mathematical induction prove the following statement for all $n \in N$

$$1^2+2^2+3^2+\cdots+n^2 = \frac{n(n+1)(2n+1)}{6}$$

(9) S.T $\forall n \in N$, $\frac{1}{1\cdot4}+\frac{1}{4\cdot7}+\frac{1}{7\cdot10}+\cdots+$ upto n'term $= \frac{n}{3n+1}$

(10) S.T $49^n+16n-1$ is divisible by 64 for all positive integers 'n'

(11) P.T $\left(1+\frac{3}{1}\right)\left(1+\frac{5}{4}\right)\left(1+\frac{7}{9}\right)\cdots\left(1+\frac{2n+1}{n^2}\right) = (n+1)^2 \; \forall n \in N$

(12) $1\cdot2\cdot3+2\cdot3\cdot4+3\cdot4\cdot5+\cdots+$ upto 'n' terms $= \frac{n(n+1)(n+2)(n+3)}{4}$

(13) $\frac{1}{1\cdot3}+\frac{1}{3\cdot5}+\frac{1}{5\cdot7}+\cdots+\frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$

14) S.T $\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(ab+bc+ca)$

15) Solve the eqns by using Gauss Jordan method
$x-y+3z=5,\ 4x+2y-z=0,\ -x+3y+z=5$

16) Solve by using Matric Inversion method
$3x+4y+5z=18,\ 2x-y+8z=13$ and $5x-2y+7z=20$

17) Solve the following simultaneous linear eqns by using cramer's & matrix Inverson methods (i) $x-y+3z=5,\ 4x+2y-z=0,\ -x+3y+z=5$
(ii) $x+y+z=1,\ 2x+2y+3z=6,\ x+4y+9z=3$

18) Solve by using Cramer's rule
(i) $2x-y+3z=8,\ -x+2y+z=4,\ 3x+y-4z=0$

19) S.T $\begin{vmatrix} b+c & c+a & a+b \\ a+b & b+c & c+a \\ a & b & c \end{vmatrix} = a^3+b^3+c^3-3abc$

20) S.T $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$

21) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then S.T $A^2-4A-5I=0$

Ch:05 : PRODUCT OF VECTORS

22) S.T the points $(5,-1,1)$ $(7,-4,7)$, $(1,-6,10)$ and $(-1,-3,4)$ are the vertices of a rhombus by vectors.

23) If $a = i-2j+k$, $b = 2i+j+k$, $c = i+2j-k$, find $a\times(b\times c)$ and $|(a\times b)\times c|$

24) If $\bar{a} = i-2j+3k$, $\bar{b} = 2i+j-k$ and $\bar{c} = i+3j-2k$, Verify that $a\times(b\times c) \neq (\bar{a}\times\bar{b})\times\bar{c}$

25) If $\bar{a} = i-2j+3k$, $b = 2i+j+k$, $c = i+2j+2k$, then find $(a\times b)\times c$ and $|a\times(b\times c)|$

26) If $a = 2i+j-3k$, $b = i-2j+k$, $c = -i+j-4k$, $d = i+j+k$ then compute $|(a\times b)\times(c\times d)|$

27) If $a = 7i-2j+3k$, $b = 2i+8k$ and $c = i+j+k$ then compute $a\times b$, $a\times c$, $a\times(b+c)$. Verify whether the cross product is distributive over vector addition.

Ch:06 : Trigonometric Ratios upto Transformations

28) If A, B, C are angles in a triangle, then P.T $\cos 2A - \cos 2B + \cos 2C = 1 - 4\sin A \cos B \sin C$

29) If A, B, C are the angles of a triangle,
P.T $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$.

30) If A, B, C are angles in a triangle then
P.T $\cos A + \cos B + \cos C = 1 + 4 \sin\frac{A}{2} \sin\frac{B}{2} \sin\frac{C}{2}$

31) P.T $\sin 2A - \sin 2B + \sin 2C = 4 \cos A \sin B \cos C$

32) $\cos A + \cos B - \cos C = -1 + 4 \cos\frac{A}{2} \cos\frac{B}{2} \sin\frac{C}{2}$

33) $\sin A + \sin B + \sin C = 4 \cos\frac{A}{2} \cos\frac{B}{2} \cos\frac{C}{2}$

34) $\sin A + \sin B - \sin C = 4 \sin\frac{A}{2} \sin\frac{B}{2} \cos\frac{C}{2}$

35) If $A+B+C = 2S$, then P.T

$$\sin(S-A) + \sin(S-B) + \sin C = 4 \cos\frac{S-A}{2} \cos\frac{S-B}{2} \sin\frac{C}{2}$$

36) If $A+B+C = 2S$, then P.T

$$\cos(S-A) + \cos(S-B) + \cos(S-C) + \cos S = 4 \cos\frac{A}{2} \cos\frac{B}{2} \cos\frac{C}{2}$$

Ch:10 : PROPERTIES OF TRIANGLES

37) In ΔABC, if AD, BE, CF are the Perpendicular drawn from the vertices A, B, C to the opposite sides, S.T

(i) $\frac{1}{AD} + \frac{1}{BE} + \frac{1}{CF} = \frac{1}{r}$

(ii) $AD \cdot BE \cdot CF = \frac{(abc)^2}{8R^3}$

38) If $\sin\theta = \frac{a}{b+c}$, then S.T $\cos\theta = \frac{2\sqrt{bc}}{b+c}\cos\frac{A}{2}$

39) If P_1, P_2, P_3 are altitudes drawn from vertices A, B, C to the opposite sides of Δle respectively S.T

(i) $\frac{1}{P_1} + \frac{1}{P_2} + \frac{1}{P_3} = \frac{1}{a_1}$

(ii) $\frac{1}{P_1} + \frac{1}{P_2} - \frac{1}{P_3} = \frac{1}{a_3}$.

(iii) $P_1 P_2 P_3 = \frac{(abc)^2}{8R^3} = \frac{8\Delta^3}{abc}$.

39) If $a=13$, $b=14$, $c=15$. S.T $R = \frac{65}{8}$, $r=4$, $r_1 = \frac{21}{2}$ & $r_3 = 14$, $r_2 = 12$

40) If $r : R : r_1 = 2:5:12$, then P.T the triangle is right angled at A.

41) P.T $4(r_1 r_2 + r_2 r_3 + r_3 r_1) = (a+b+c)^2$

42) If $r_1 = 2$, $r_2 = 3$, $r_3 = 6$ & $r = 1$, P.T $a=3$, $b=4$, $c=5$

43) P.T $\frac{\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2}}{\cot A + \cot B + \cot C} = \frac{(a+b+c)^2}{a^2+b^2+c^2}$

44) In ΔABC, if $r_1 = 8$, $r_2 = 12$, $r_3 = 24$. find a, b, c.