# IMPORTANT QUESTIONS XI MATHEMATICS

**Chap#03** i. Find the value of k by Synthetic division so that (x-i) is a factor of $2kx^4+7x^3+kx^2+7x-1$. ii. Find all cube roots of 1 and 27 also show that their sum is zero OR show that all the cube roots of -27 are -3, -3w, $-3w^2$. iii. Show that $w^{99}+w^{101}+w^{150}=0$ and $w^{155}+w^{247}+i^{360}=0$. iv. Solve $x^6-26x^3-27=0$ OR $(2x^2-4x+4)^2-12(x^2-2x)-40=0$ OR $(x-\frac{1}{x})^2+3(x+\frac{1}{x})=0$ OR $\sqrt{\frac{1-x}{x}}+\sqrt{\frac{x}{1-x}}=\frac{13}{6}$ v. what value of k will make the roots equal of $k^3x^2+2(2k^2-1)x+4k=0$ and of $x^2+(7+k)x+(7x+1)=0$. Vi. For what value of p and q both roots of $x^2+(2p-4)x=3q+15$ may vanish. Vii. Find the condition that one root of $px^2+qx+r=0$ is the square of the other. Viii. Find the equation whose roots are $-1\pm i$ and $w, w^2$. Ix. If $\alpha,\beta$ are the roots of $px^2+qx+r=0$, form an equation whose roots are $(\alpha^2,\beta^2)$, $(\frac{1}{\alpha^2},\frac{1}{\beta^2})$, $(\frac{-1}{\alpha^3},\frac{-1}{\beta^3})$. x. If $\alpha,\beta$ are the roots of $px^2+qx+r=0$, form an equation whose roots are $x^2-3x+2=0$, form an equation whose roots are $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$, $(1+\alpha+\alpha^2)$ and $(1+\beta+\beta^2)$, $\frac{1}{\alpha}$ and $\frac{1}{\beta}$, $(\alpha+2)$ and $(\beta+2)$

i. Solve x-y=5 and $x^2+2xy+y^2=9$, $x^2+y^2=169$ and x-y=13, ii. The sum of the circumferences of two circles is $42\pi$ metres and the sum of their areas is $261\pi$ sq metres. What are the radii of the circles?

**Chap#04** Define: transpose of a matrix, diagonal matrix, scalar matrix, unit matrix, null matrix, singular matrix
i. Evaluate the following matrices using properties.

$$\begin{vmatrix} a+b+2c & b & a \\ c & b & b+c+2a \\ c & c+a+2b & a \end{vmatrix}, \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}, \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}, \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}, \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}, \begin{vmatrix} 1+a & 1 & 1 \\ 2 & 2+a & 2 \\ 3 & 3 & 3+a \end{vmatrix}$$

ii. Find the Inverse by adjoint method $A=\begin{bmatrix} 2 & 2 & 3 \\ 1 & -1 & 0 \\ -1 & 2 & 1 \end{bmatrix}$. iii. Solve using Cramer's Rule: (a) x+y=5, y+z=7, z+x=6 (b) x+2y+z=8, 2x-y+z=3, x+y-z=0 iv. Solve by Adjoint method: (a) x+y+z=2, 2x-y-z=1, x-2y-3z=3 (b) 2x-y+2z=4, x+10y-3z=10, -x+y+z=-6

**Chap#05** i. Define a binary operation $\star$ in by: $a\star b=4a.b$, $\forall$ a,b $\epsilon\,\mathbb{Q}$ . Where "." Represents ordinary multiplication. Show that: a.$\star$ is commutative. b.$\star$ is associative. c. $\frac{1}{4}$ is the identity element w.r.t. $\star$. d. $\frac{1}{12}$ is the inverse of $\frac{3}{4}$ under. ii. Let S={1,w,$w^2$}, w being a complex cube root of unity. Construct a composition table w.r.t. multiplication on ¢ and show that: (a) Associative law holds (b) 1 is the identity element is S (c) Each element of S has an inverse in S. iii. Is (R, $\star$) a commutative group is $\star$ is defined in R by $a\star b=7ab$, $\forall$ a,b $\epsilon$ **R** ?

**Chap#06** i. Find the sum of all the natural numbers between 1 and 100 which are not exactly divisible by 2 or 3. ii. Find the sum of an A.P. of 17th terms whose middle term is -42. iii. Find the first 6 terms of a series of which the sum of n terms is $\frac{1}{2}$n(7n-1). iv. The sum of 4 numbers in A.P. The ratio of the product of the first and the last numbers and the product of 2nd and 3rd numbers is 2:3. Find the numbers. v. Find the sum to n terms of the series: 0.6+0.66+0.666+. . . vi. The first three terms of a G.P. are x+10, x-2, x-10 respectively. Find x and hence find the sum to infinity of this series. vii. The 3rd term of a G.P. is 27 and 6th term is 8. Find the sum to infinite terms. viii. Find three numbers in G.P. whose sum is 19 and whose product is 216. ix. In an H.P. the 3rd term, 6th term and last terms are respectively $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{3}{203}$; find the number of terms. x. Find the 12th term of an H.P. whose 2nd term is 3 and 4th term is 2. xi. If $\frac{x-y}{y-z}=\frac{x}{z}$ then prove that x,y,z are in H.P. xii. Find the sum of the series: $1+\frac{3}{2}+\frac{5}{4}+\frac{7}{8}+\ldots$

**Chap#08** i. Prove by mathematical Induction that: $2+5+8+\ldots+(3n-1)=\frac{n}{2}(3n+1)$. ii. Prove that $3^{3n}-26n-1$ is divisible by 676, $\forall$ n $\epsilon$ N. iii. Prove that $2^n>(2n+1)$ for all integral values of $n\geq3$. iii. Without using calculator, find the sum of (a) $16^2+17^2+18^2+\ldots 40^2$ (b) $11^2+12^2+13^2+\ldots+30^2$.

i. Find the middle terms in the following: $\left(x^2-\frac{1}{x}\right)^7$, $\left(x+\frac{1}{x}\right)^8$, $\left(x-\frac{1}{x}\right)^9$, $\left(\frac{2x}{3y}-\frac{3y}{2x}\right)^7$. ii. Find the term independent of x in the following: $\left(x-\frac{1}{2x}\right)^8$, $\left(x-\frac{2}{x}\right)^{10}$, $\left(\frac{4x^2}{3}-\frac{3}{2x}\right)^9$, $\left(\frac{3x^2}{2}-\frac{1}{3x}\right)^6$. iii. Expand to 5 terms $(3-2x)^{-3}$. iv. Find first negative term in the expansion of $(1+2x)^{\frac{7}{2}}$. v. If 'x' be so small so that its square and higher powers may be neglected, find the approximate value of $\frac{\left(1+\frac{2x}{3}\right)^5+\sqrt{4+2x}}{\sqrt{(4+x)^3}}$. vi. If 'a' be a quantity so small that 'a' may be comparison with $b^3$. Prove that $\sqrt{\frac{b}{b+a}}+\sqrt{\frac{b}{b-a}}=2+\frac{3a^2}{4b^2}$. vii. Find the sum of series: $1-\frac{3}{2}.\frac{1}{2}+\frac{2.5}{3.6}.\frac{1}{2^2}-\frac{2.5.8}{3.6.9}.\frac{1}{2^3}+\ldots$

**Chap#09** i. Convert $24^0 32'30''$ into Radian measure and $\frac{3}{\pi}$ into Degree measure. ii. Find the arc-length of a circle whose diameter is 28cm and central angle is of measure $41^0$. iii. Find the remaining trigonometric functions of the following: (a) $\sin\theta = \frac{4}{5}$ and $\rho(\theta)$ is not in the first quadrant (b) $\cos\theta = \frac{2}{\sqrt{5}}$ and $\sin\theta < 0$ (c) $\tan\theta = \frac{-4}{3}$ and $\rho(\theta)$ is not in the second quadrant.

**Chap#10** i. Prove that: i. $\frac{cosec\theta}{cosec\theta-1} + \frac{cosec\theta}{cosec\theta+1} = 2\sec^2\theta$ ii. $\frac{\tan\theta+\sin\theta}{\sin\theta-\tan\theta} = \frac{\sec\theta(1+\cos\theta)}{1-\sec\theta}$ iii. $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$ iv. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = cosec\theta - \cot\theta$ v. $\tan\frac{\theta}{2} = \frac{\sin\theta}{1+\cos\theta} = \frac{1-\cos\theta}{\sin\theta}$ vi. $\cos\alpha\cos(\alpha-\beta)+\sin\alpha\sin(\alpha-\beta)=\cos\beta$ vii. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \cot\frac{\theta}{2}$ viii. $\tan 3\theta = \frac{\sin\theta+\sin 3\theta+\sin 5\theta}{\cos\theta+\cos 3\theta+\cos 5\theta}$ ix. $\sin u + \sin v = 2\sin\frac{u+v}{2}\cos\frac{u-v}{2}$ x. $\cos u + \cos v = 2\cos\frac{u+v}{2}\cos\frac{u-v}{2}$ xi. $\sin 6\theta - \sin 4\theta + \sin 2\theta = 4\sin\theta\cos 2\theta\cos 3\theta$ xii. $\frac{\sin\alpha-\sin\beta}{\sin\alpha+\sin\beta} = \frac{\tan\left(\frac{\alpha-\beta}{2}\right)}{\tan\left(\frac{\alpha+\beta}{2}\right)}$ xiii. $\sin x + \cos x = \sqrt{2}\sin(x+\frac{\pi}{4})$

**Chap#11** i. Find the period of $\frac{1}{2}\sin x$. ii. Draw the graph of (a) $\sin 2\theta$ where $\frac{-\pi}{2} \le \theta \ge \frac{\pi}{2}$ (b) $\cos 2\theta$ where $\frac{-\pi}{2} \le \theta \ge \frac{\pi}{2}$ (c) $\sin\frac{\theta}{2}$ where $-2\pi \le \theta \ge 2\pi$ (d) $\cos\frac{\theta}{2}$ where $-2\pi \le \theta \ge 2\pi$ (e) $\tan\theta$ where $\frac{-\pi}{2} \le \theta \ge \frac{\pi}{2}$ (f) $\arcsin\theta$ where $-1 \le \theta \ge 1$ (g) $\arccos\theta$ where $-1 \le \theta \ge 1$

**Chap#12** i. Prove the following laws: $\cos\alpha = \frac{b^2+c^2-a^2}{2bc}$, $\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$, $\frac{a-b}{a+b} = \frac{\tan\left(\frac{\alpha-\beta}{2}\right)}{\tan\left(\frac{\alpha+\beta}{2}\right)}$ ii. Solve the following triangles also find their areas: (a) $\alpha=54^0\ 58'$, b=70cm, c=58cm (b) $\alpha=49^0$, $\beta=60^0$, c=39cm (c) a=40.1cm, b=20cm, $\gamma=50^0$ (d) a=15.2cm, b=20.9cm, c=34.7 iii. Prove that: (a) $\sin\frac{\alpha}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$ (b) $\cos\frac{\alpha}{2} = \sqrt{\frac{s(s-a)}{bc}}$ (c) $\tan\frac{\alpha}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$ (d) $\Delta = \frac{1}{2}a^2\frac{\sin\beta.\sin\gamma}{\sin\alpha}$ (e) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$ (f) $R = \frac{abc}{4\Delta}$ (g) $r = \frac{\Delta}{s}$ (h) $r_1 = \frac{\Delta}{s-a}$ (i) $\Delta = 4Rr\cos\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$ (j) $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3} = \frac{1}{r}$ (k) $(r_1 - r)(r_2 - r)(r_3 - r) = 4Rr^2$ (l) $\frac{\cos\alpha}{a}+\frac{\cos\beta}{b}+\frac{\cos\gamma}{c} = \frac{a^2+b^2+c^2}{2abc}$

**Chap#13** i. Without using calculator, Prove that: i. $\sin(\text{acr}\sin\frac{\sqrt{3}}{2} + \arccos\frac{1}{2}) = \frac{\sqrt{3}}{2}$ ii. $\arcsin\theta + \text{acr}\cos\theta = \frac{\pi}{2}$ iii. $\tan^{-1}\frac{1}{13} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{2}{7}$ iv. $\cot^{-1}\theta = \cos^{-1}\frac{\theta}{\sqrt{1+\theta^2}}$ v. $\arcsin\frac{3}{5} + \arccos\frac{4}{5} = \frac{\pi}{2}$ vi. Solve: (a) $2\sin^2\theta + 2\sqrt{2}\sin\theta - 3=0$ (b) $\sqrt{3}\cos\theta + \sin\theta = 2$ (c) $\sqrt{3}\sin\theta - \cos\theta = 1$ (d) $\sqrt{3}\sin\theta\cos\theta = 2$ (e) $\sin^2\theta - 2\cos\theta + 2 = 0$ (f) $2\cos^2\theta - 5\cos\theta + 2=0$ (g) $\sin\theta + \cos\theta=1$ (h) $\tan^2\theta - 1 = \sec\theta$ (i) $\sin 2\theta - \cos\theta = 0$

## IMPORTANT QUESTIONS FROM TEXT BOOK

**Chap#01** Ex:1.1 Q.7,9,10,14,15,16
**Chap#02** Ex:2.2 Q.1,3,5,7,8,9,11 Ex:2.3 Q.3,4
**Chap#03** EX:3.1 Q.2,5 EX:3.3 Q.1, 2(i,ii), 3 (iv) EX:3.4 Q.3,5,11,15,17,20,23,24 EX: 3.5 Q.2(i,iii),3(i), Q.4(ii),8
EX: 3.6 Q.2,3,5(i,ii),6,7,9,10,11 Ex:3.8 Q.3,6,10,12,14,15
**Chap#04** EX:4.1 Q.4(ii,ix), 6,8(i),10(i,ii),11,12,13,14(iii),18, Ex:4.2 Q.7,8,9,10,12,13,15,20
Ex: 4.3 (Adjoint of a Matrix) Ex:4.4 Q.1(ii, viii), 5(iii,v,vii)
**Chap#05** EX:5.1 Q.1,3,4,5,6,8,9,10,11,12 Ex:5.3 Q.2,3,6,8
**Chap#06** EX:6.1 Q.5,6,7,9,10,11 Ex:6.2 Q.5,6,8(i), 9,10,11,14,16,18,19 Ex:6.3 Q.3,4,8,9,14,15
EX:6.4 Q.4(i),5,6,7,9 EX:6.5 Q.3,5,6(ii),7,9 Ex:6.6 Q.2(iv), 3(v,vi), 5,6,7,9,10 Ex:6.7 Q.2(ii), 3,4,5,7
Ex:6.8 Q.1,3,4,5(ii),6,7,8,9 Ex:6.9 Q.1,2,3,4,5,6,7
**Chap#07** EX:7.1 Q.5,6,12,13,15,19 Ex:7.2 Q.5,7,8,9,10,11,12 Ex:7.3 Q.6,7,8,13,17,18
Ex:7.4 Q.1,2,3,6,10,11,12 Ex:7.5 Q.1,3,4,5,9,10
**Chap#08** EX:8.1 Q.4,5(ii),6,8,9,11,12,13,14,15(i),16(ii,iv,v) Ex:8.2 Q.1,2,3,6,11 Ex:8.3 Q.1,2,5,6,7,8,10
Ex:8.4 Q.2,7,8,12,13,14 Ex:8.5 Q.1,2,3,7,8,11,13,14
**Chap#09** EX: 9.1 Q.1(iv), 8,9,10 Ex:9.2 Q.4,6,8,9,10,11
**Chap#10** EX: 10.1 Q.5,6,7,8,9,11,16,18,21(iv) Ex:10.2 Q.14,15,16 Ex:10.3 Q.1,4,5,7,8,9,11,14,16,17,18,19,20
**Chap#11** EX: 11.1 Q.1,2(ii) Ex:11.2 Q.1,2,3,4,5,6
**Chap#12** EX: 12.1 Q.4,5,6,7 Ex:12.2 Q.1,2,3,4,5,6,7,8 Ex:12.3 Q.7,8 Ex:12.4 Q.3,4,7,8,9,10,12,13,14
Ex:12.5 Q.2,6,7,9,10,11,12,13
**Chap#13** EX: 13.1 Q.5,6,7,8,9,10,11,12,13,14 Ex:13.2 Q.1,2,3,5,7,11,14,15,16