(vi) Insert four harmonic means between $\frac{7}{3}$ and $\frac{7}{11}$.

(vii) Find values of n and r when ${}^{n-1}C_{r-1} : {}^{n}C_{r} : {}^{n+1}C_{r+1} = 3 : 6 : 10$

(viii) Show that the middle term of $(1+x)^{2n}$ is $\frac{1.3.5....(2n-1)}{n!} 2^n x^n$.

(ix) Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$

(x) Without using table or calculator, prove that $\sin 19^\circ \cos 11^\circ + \sin 71^\circ \sin 11^\circ = \frac{1}{2}$

(xi) Find the period of cosine function.

(xii) The sides of triangle are $x^2 + x + 1$, $2x + 1$ and $x^2 - 1$. Prove that the greatest angle of the triangle is 120^0.

(xiii) Show that $\cos^{-1}(-x) = \pi - \cos^{-1} x$

(xiv) Solve $\sin x + \cos x = 0$

SECTION – C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks. (5×8=40)

Q3. Use matrices to solve the following system:

$$\left.\begin{aligned} x + y &= 2 \\ 2x - z &= 1 \\ 2y - 3z &= -1 \end{aligned}\right\}$$

Q4. Show that the roots of equation $(x-a)(x-b) + (x-b)(x-c) + (x-c)(x-a) = 0$ are real. Also show that the roots will be equal only if $a = b = c$.

Q5. Show that sum of n A.Ms between a and b is equal to n times their A.M.

Q.6 Expand $\frac{(4+2x)^{\frac{1}{2}}}{2-x}$ up to 4 terms.

Q.7 Prove that: $\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{\pi}{3}\sin\frac{4\pi}{9} = \frac{3}{16}$

Q8. Prove that in an equilateral triangle, $r : R : r_1 = 1 : 2 : 3$

Q9. Solve the equation $\operatorname{cosec} x = \sqrt{3} + \cot x$