2. (*a*) Obtain x and y when

$$\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 4 \\ 1 \end{bmatrix}.$$ 2

(*b*) If $A+B+C=\pi$, then prove that $\sin 2A+\sin 2B+\sin 2C=4\sin A\cdot\sin B\cdot\sin C$. 5

(*c*) Show that :

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}=abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right).$$ 7

3. (*a*) Find the value of $\tan^{-1}\left(2\cos\frac{\pi}{3}\right)$. 2

(*b*) In any triangle, prove that,

$$b\cos B+c\cos C=a\cos(B-C).$$ 5

(*c*) Find the value of 'a' so that the points (1, 4) (2, 7) (3, a) are collinear. 7

4. (*a*) Find the value of 'p' for which the vectors $\vec{a}=3\hat{i}+2\hat{j}+9\hat{k}$ and $\vec{b}=\hat{i}+p\hat{j}+3\hat{k}$ are parallel. 2

(*b*) Find the equation of the line passing through the point (–2, 3) and perpendicular to the line $3x+4y-11=0$. 5

(*c*) Prove that, $\sin^{-1}\frac{4}{5}+2\tan^{-1}\frac{1}{3}=\frac{\pi}{2}$. 7

5. (*a*) Find the centre and radius of the circle $x^2+y^2-2x+4y+1=0$. 2

(*b*) Resolve into partial fraction :

$$\frac{x-4}{x^2-5x+6}.$$ 5

(*c*) Find the area of a parallelogram whose diagonals are determined by the vectors $\vec{a}=3\hat{i}+\hat{j}-2\hat{k}$ and $\vec{b}=\hat{i}-3\hat{j}+4\hat{k}$. 7

6. (*a*) Find the distance between the lines, $2y-3=0$ and $3y-2=0$. 2

(*b*) Prove that :

$$\tan 37\frac{1}{2}^{\circ}=\sqrt{6}+\sqrt{3}-\sqrt{2}-2.$$ 5