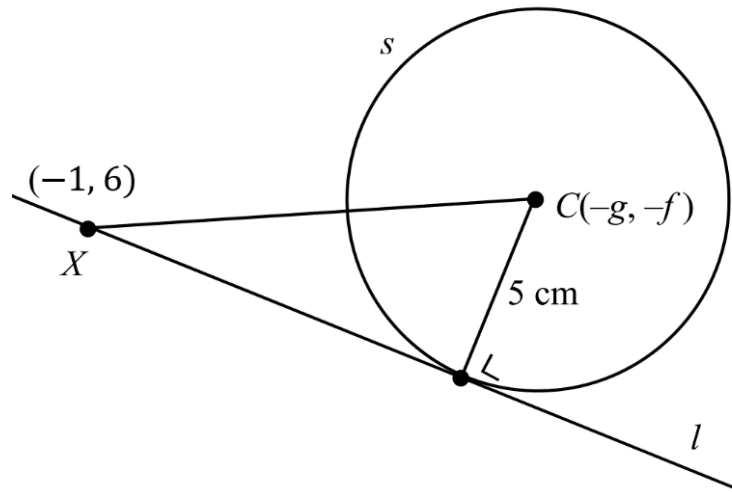**Question 2** (25 marks)

A point X has co-ordinates $(-1, 6)$ and the slope of the line XC is $\frac{1}{7}$.

(a) Find the equation of XC. Give your answer in the form $ax + by + c = 0$, where $a, b, c \in \mathbb{Z}$.

(b) C is the centre of a circle s, of radius 5 cm. The line l: $3x + 4y - 21 = 0$ is a tangent to s and passes through X, as shown. Find the equation of one such circle s.

Q2	Model Solution – 25 Marks	Marking Notes
(a)	$$y - 6 = \frac{1}{7}(x + 1)$$ $$x - 7y + 43 = 0$$	Scale 10C (0, 3, 7, 10) *Low Partial Credit:* • equation of line formula with some relevant substitution *High Partial Credit:* • equation of line not in required form
(b)	$$D = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$ $$D = \frac{|3(-g) + 4(-f) - 21|}{\sqrt{3^2 + 4^2}}$$ $$25 = |-3g - 4f - 21|$$ $$-3g - 4f - 21 = \pm 25$$ $$\Rightarrow 3g + 4f = -46 \ \dots \ (i)$$ $$\text{and } 3g + 4f = 4 \ \dots \ (ii)$$ But $(-g, -f) \in x - 7y + 43 = 0$ $$\Rightarrow -g + 7f + 43 = 0 \ \dots \ (iii)$$ $$\Rightarrow g = 7f + 43$$ Solving : $g = 7f + 43$ and $3g + 4f = -46$ $$f = -7 \text{ and } g = -6$$ Centre (6, 7) $$(x - 6)^2 + (y - 7)^2 = 25$$ **or** Solving: $g = 7f + 43$ and $3g + 4f = 4$ $$f = -5 \text{ and } g = 8$$ Centre (- 8, 5) $$(x + 8)^2 + (y - 5)^2 = 25$$	Scale 15D (0, 4, 7,11,1 5) *Low Partial Credit* • some correct substitution into relevant formula (line, circle, perpendicular distance). *Mid Partial Credit* • one relevant equation in g and f • (either(i) or (ii) or (iii)) *High Partial Credit* • two relevant equations (either (i) and (iii) or (ii) and (iii))