





## 2. June/2019/Paper\_1/No.13

Line  $l_1$  has Cartesian equation

$$x - 3 = \frac{2y + 2}{3} = 2 - z$$

(a) Write the equation of line  $l_1$  in the form

$$\mathbf{r} = \mathbf{a} + \lambda \mathbf{b}$$

where  $\lambda$  is a parameter and  $\mathbf{a}$  and  $\mathbf{b}$  are vectors to be found.

[2 marks]

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(b) Line  $l_2$  passes through the points  $P(3, 2, 0)$  and  $Q(n, 5, n)$ , where  $n$  is a constant.

(b) (i) Show that the lines  $l_1$  and  $l_2$  are **not** perpendicular.

[3 marks]

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(b) (ii) Explain briefly why lines  $l_1$  and  $l_2$  cannot be parallel.

[2 marks]

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(b) (iii) Given that  $\theta$  is the acute angle between lines  $l_1$  and  $l_2$ , show that

$$\cos \theta = \frac{p}{\sqrt{34n^2 + qn + 306}}$$

where  $p$  and  $q$  are constants to be found.

[3 marks]

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