6   Logic and Proof (LCP)

(*a*) In the context of resolution theorem proving, describe the steps involved in transforming a formula of first-order logic into clause form, briefly justifying each step.   [4 marks]

(*b*) For each of the following sets of clauses, either derive the empty clause or demonstrate that the set is satisfiable by exhibiting a model. Below, a and b are constants, while x, y and z are variables.

(*i*)

$$\{P(a), P(b)\} \qquad \{\neg P(x), Q(f(x)), \neg P(y)\}$$
$$\{\neg Q(z), R(z)\} \qquad \{\neg Q(x), \neg R(y)\}$$

[8 marks]

(*ii*)

$$\{P(a)\} \qquad \{\neg P(x), Q(f(x)), \neg P(y)\}$$
$$\{\neg Q(z), R(z)\} \qquad \{\neg R(y), \neg P(y)\}$$

[8 marks]