10 Logic and Proof (MJ)

(a) Describe the DPLL method, explaining briefly each of its four steps. [4 marks]

(b) Use the DPLL method to find a model satisfying the following set of clauses, or to prove that no such model exists.

\[
\{ P, Q \} \{ R \} \{ Q, \neg S, \neg Q \} \{ \neg Q, \neg R, S \} \{ P, \neg Q \} \{ P, Q, \neg S \} \{ P, \neg R, S \} \{ \neg P, \neg S \}
\]

[6 marks]

(c) Describe briefly the procedure for constructing a BDD. Illustrate your answer by constructing the BDD (using the variable order \( P < Q < R < S \)) for:

\[
(\neg P \lor (Q \land S)) \lor (S \lor (\neg R \lor S))
\]

[10 marks]