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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022**

COURSE NAME : ALGORITHMS AND COMPLEXITIES
COURSE CODE : BIE 20303
PROGRAMME CODE : BIP
EXAMINATION DATE : JULY 2022
DURATION : 3 HOURS
INSTRUCTION : 1. ANSWERS ALL QUESTIONS.
2. THIS FINAL EXAMINATION IS AN
**ONLINE ASSESSMENT AND
CONDUCTED VIA OPEN BOOK**

THIS QUESTION PAPER CONSISTS OF TWO (2) PAGES

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Q1 Extend Dijkstra’s algorithm for finding the length of a shortest path between two vertices in a weighted simple connected graph so that a shortest path between these vertices is constructed.

(20 marks)

Q2 Show that Dijkstra’s algorithm may not work if edges can have negative weights.

(20 marks)

Q3 The roads represented by the graph in **Figure Q3** are all unpaved. The lengths of the roads between pairs of towns are represented by edge weights. Use Kruskal’s algorithm to find which roads should be paved so that there is a path of paved roads between each pair of towns so that a minimum road length is paved. (Note: These towns are in Nevada.)

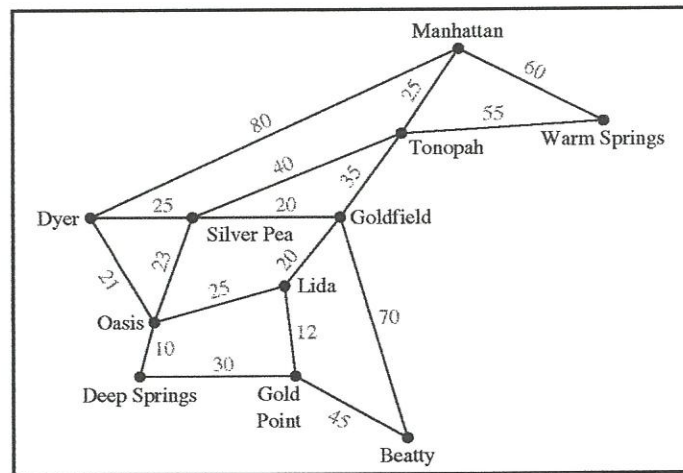


Figure Q3

(20 marks)

Q4 A maximum spanning tree of a connected weighted undirected graph is a spanning tree with the largest possible weight. Devise an algorithm similar to Kruskal’s algorithm for constructing a maximum spanning tree of a connected weighted graph.

(20 marks)

Q5 A minimum spanning forest in a weighted graph is a spanning forest with minimal weight. Explain how Prim’s and Kruskal’s algorithms can be adapted to construct minimum spanning forests.

(20 marks)

-END OF QUESTIONS -

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