This quiz lasts 30 minutes. There are a total of 15 marks.

Answers must be written in pen in the boxes provided. Anything written in pencil or written outside the boxes will not be marked.
1. Complete the following definitions and statements.
   (a) The complement of a graph \( G = (V, E) \) is the graph \( \overline{G} = (V, \overline{E}) \) where \( \overline{E} \) is the complement of \( E \) in the set of 2-element subsets of \( V \).

   (b) A path in a graph \( G \) is a subgraph of \( G \) isomorphic to a path graph \( P_n \).

   (c) If the number of edges in a graph equals the difference between the number of vertices and the number of connected components, then this graph is a forest.

2. This question concerns graphs with 14 vertices.
   (a) The number of isomorphism classes of forests with 12 connected components is 2

   (b) The minimum number of edges in the graphs with 6 connected components is 8

(2 marks)
3. For each of the following sequences, say whether it is graphic or not graphic.

(a) \((0, 1, 2, 3, 4, 5, 5)\) \(\text{not graphic}\)

(b) \((6, 6, 6, 6, 6, 6)\) \(\text{graphic}\)

(2 marks)

4. Consider the following graph \(G\).

\[ a \quad b \]
\[ c \quad d \quad e \]
\[ f \quad g \]

(a) The number of 3-cycles in \(G\) is \(2\)

(b) Does \(G\) have an Eulerian trail? \(\text{yes}\)

(c) Is \(G\) Hamiltonian? \(\text{no}\)

(3 marks)
5. Consider the following weighted graph.

![Graph Image]

(a) The weight of a solution of the Chinese Postman Problem is 40

(b) The weight of a solution of the Travelling Salesman Problem is 20

(c) The weight of a minimal spanning tree is 11

(3 marks)

6. The Prüfer sequence of a tree with the vertices \{1, 2, 3, 4, 5, 6, 7\} is (5, 3, 1, 1, 5). Then the degree sequence of the tree is (1, 1, 1, 1, 2, 3, 3)

(1 mark)

7. Draw the tree with the vertices \{1, 2, 3, 4, 5, 6\} whose Prüfer sequence is (6, 4, 1, 1).

![Tree Image]

(1 mark)

END OF QUIZ.