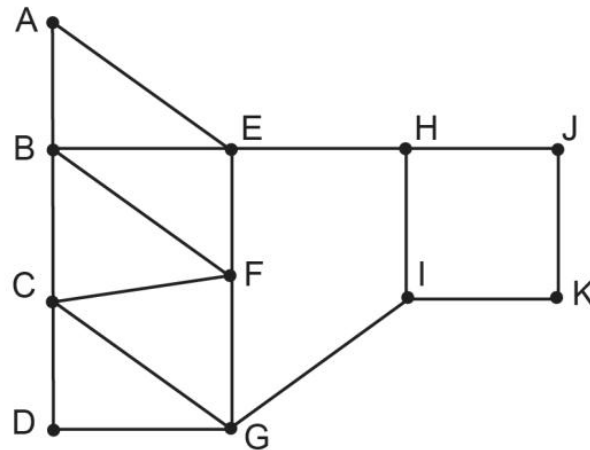**Question 14**   **(7 marks)**

Therese, a mathematics student at Trinity College, Dublin was employed as a guide for a cultural tour of Dublin. She decided to use graph theory to plan the walking tour.

Below is a network she constructed in which the:
- vertices represent the points of interest to be visited, and
- edges represent the most direct route between adjacent vertices.

(a)   Use Euler's formula to verify the network is connected.   (2 marks)

(b)   Therese planned to take the group on a closed walk. Explain the meaning of a closed walk.   (1 mark)

(c)   She also stated that the walk would qualify as a Hamiltonian cycle. State the **two** properties that makes the walk a Hamiltonian cycle.   (2 marks)

(d)   Given that the walk started at G (Trinity College, Dublin), mark the Hamiltonian cycle on the network below.   (2 marks)