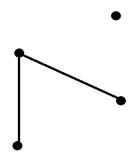
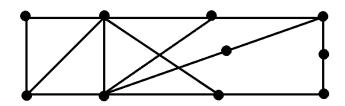
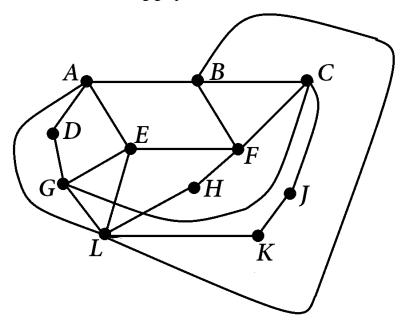
1. Write done the adjacency matrix of the following graph and calculate the eigenvalues of the graph.



- 2. What are the eigenvalues of $K_{3,3}$?
- 3. Let G be the following graph. Determine whether or not G is Hamiltonian.



4. Let G be the following graph.



- (i) Partition the edge set into cycles and hence construct an Eulerian trail in G
- (ii) Show that G is Hamiltonian

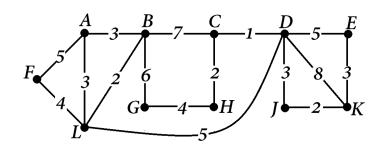
5. Let G be the incidence graph for the following sets.

$$S_1 = \{a, c\}, S_2 = \{a, f\}, S_3 = \{a, b\}, S_4 = \{a, c, e, f\}, S_5 = \{b, d\}, S_6 = \{d, e\}$$

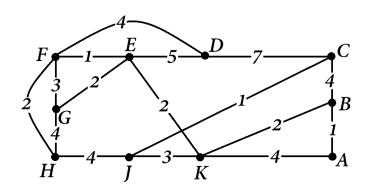
- (i) Draw G.
- (ii) Is G Eulerian? If so, find an Eulerian trail in G.
- (iii) Is G Hamiltonian? If so write down the edges which do NOT appear in the Hamiltonian cycle.
- 6. State Prim's algorithm.

Demonstrate the use of Prim's algorithm in finding a minimal spanning tree for each of the following graphs. [Start at vertex A and list the edges as they appear in your tree.] State the weight of the minimal spanning tree.

(i)



(ii)



7. Nine students take the following combinations of 7 modules A, B, C, D, E, F, G

Demonstrate the use of a graph-colouring technique to find the least number of time slots required for the final exam.

8. Find and draw a graph for which the largest clique is K_3 which has chromatic number strictly greater than 3.