Y ear 12 Mathematics
ATMAA UNIT 3 APPLICATIONS TEST 3
Graphs and Networks Calculator Free

Name:_____ Date:_____

Mark /27

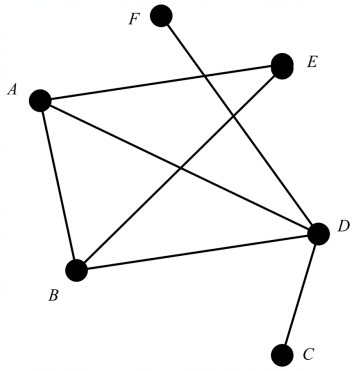
Time Allowed: 25 minutes

Resources Allowed: Formula sheet only.

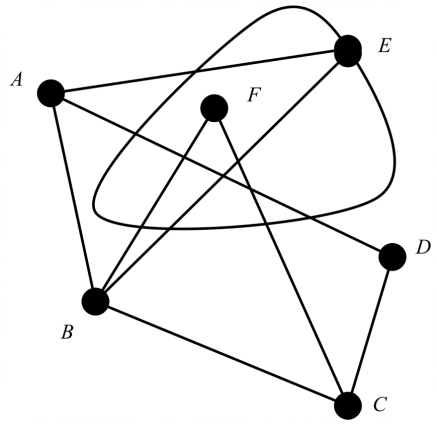
Solutions without working may not be allocated full marks.

Question One [8 marks]

a) Redraw the network below so that it is planar. Write two closed trails each the length of 4 starting at vertex E. (3 marks)



b) Redraw the network M below as a planar graph. Determine the adjacency matrix for the network. (5 marks)



Question Two [11 marks]

An employee has to be qualified with a certificate to operate some of the machines in a factory.

Employees in team 1; Abigail, Barak, Clyde, Dom, Eugene and Fran, have been assigned to work the same shift every day.

Each member has certificates to operate different machinery in the factory. In any shift all 5 machines have to be working at the same time.

TEAM MEMBERS	QUALIFICATIONS
Abigail (A)	M1, M3, M4
Barak (B)	M1, M2, M3, M4, M5
Clyde (C)	M1, M2
Dom (D)	M2, M3
Eugene (E)	M2, M4
Fran (F)	M1

a) Draw a bipartite graph to represent the information about Team 1 and label it S_1. (3 marks)

b) Based on the information about the team, identify the team member who can be chosen to help most of the members of the team during any shift. Justify your decision. (2 marks)

c) The company wants Fran to add another certificate to her qualifications. Which machine would you recommend that Fran qualifies in? Justify your choice using the information from the bipartite graph or the table provided. (3 marks)

d) Draw a subgraph S_2 that shows every member of the team and how every machine can be used during a Team 1 shift. (3 marks)

Question Three **[8 marks]**

a) A complete graph is denoted as K_n. Draw a graph denoted by K_5. (2 marks)

b) Determine the total degree sum of a graph given by K_{12}. (1 mark)

c) What is the total number of edges in a graph denoted by K_9. Is this a Hamilitonian, Semi Hamilitonian, Eulerian, or Semi Eulerian graph? Justify your answer. (5 marks)

END OF SECTION ONE