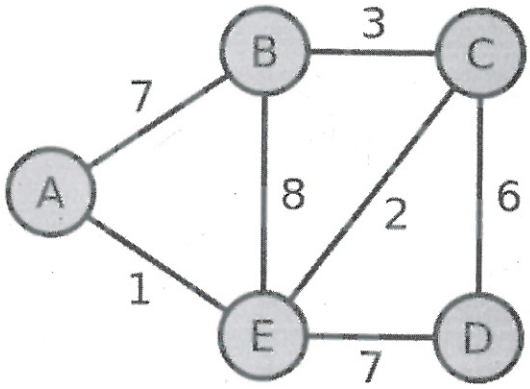
	UNIVERSITY OF TECHNOLOGY AND APPLIED SCIENCES		
	College of Computing and Information Sciences **Mathematics Section**		
	Quiz III **Semester: 2, A. Y.: 2023 / 24**		
	Date: 07/05/2024	**Marks: 7.5**	**Version B**
Student Name			
Student ID			
Course Name	Discrete Structure/Discrete Mathematics		
Course Code	MATH2200/MATH3202		
Section	1		

Question: 1 **[1.5 Marks]**

Use Dijkstra's Algorithm to find the length of the shortest path between the vertices A and D in the graph given:

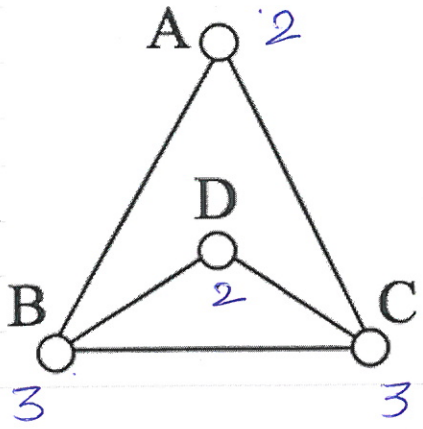


Node	Shortest Distance	Shortest Path
✗ A	0	
✗ B	~~∞~~ ✗ 6	~~AB~~ AECB
✗ C	~~∞~~ 3	AEC
✗ E	~~∞~~ 1	AE
D	~~∞~~ 8	AED

S. Path: AED
S. Dist.: 8

Question: 2 **[1 Mark]**

Construct a Euler path from the graph:



BACDBAC or

CBDCAB or

BCABDC or

CDBACAB

Question: 3 **[1+1=2 Marks]**

(a) A graph has vertices of degrees 4, 2, 2, 2, 2, 2. How many edges does the graph have?

$2e = \sum \deg(v)$

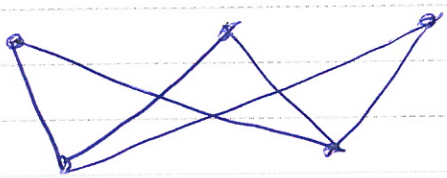
$2e = 4+2+2+2+2+2$

$2e = 14$

$e = 7$

(b) Draw the graphs $K_{3,2}$ and $\overline{K_{3,2}}$

$K_{3,2}$

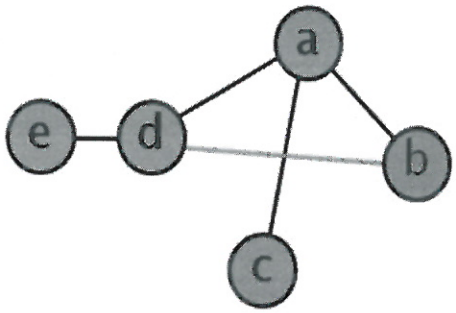


$\overline{K_{3,2}}$

Question: 4 **[1+1=2 Marks]**

(a) Find the adjacency matrix for the graph given:

$$A_G = \begin{array}{c} \\ a \\ b \\ c \\ d \\ e \end{array} \begin{array}{c} \begin{array}{ccccc} a & b & c & d & e \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

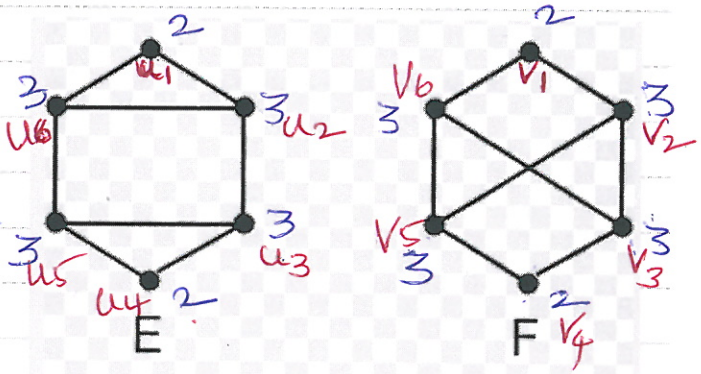


(b) Check whether the graphs are isomorphic or not:

$|V_E| = 6$ $|V_F| = 6$

$|E_E| = 8$ $|E_F| = 8$

Degree seq of E & F $\rightarrow$ 3,3,3,3,2,2



$f(u_1) = V_1$

$f(u_2) = V_2$

$f(u_3) = V_3$

$f(u_4) = V_4$

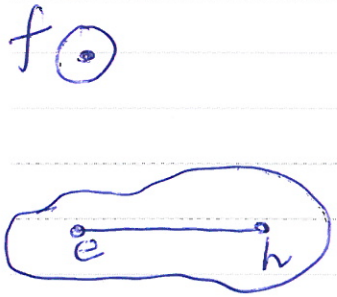
$f(u_5) = V_5$

$f(u_6) = V_6$

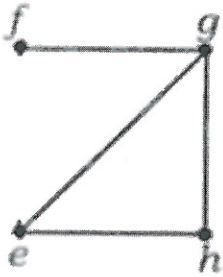
E & F are isomorphic.

Question: 5 **[1 Mark]**

Find the cut vertex/vertices (if any) from the graph:



g is the cut vertex



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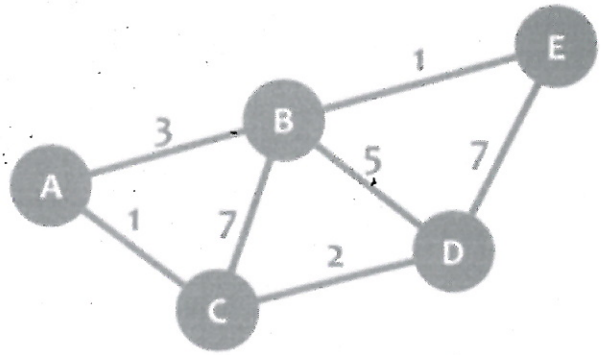
Student Name			
Student ID			
Course Name	Discrete Structure/Discrete Mathematics		
Course Code	MATH2200/MATH3202		
Section	1		

Question: 1 **[1.5 Marks]**

Use Dijkstra's Algorithm to find the length of the shortest path between the vertices A and E in the graph given:

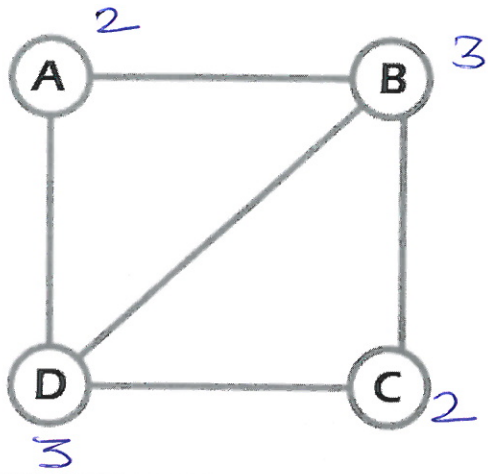


	Nodes	Shortest Distance	Shortest path
X	A	0	
X	B	~~∞~~ 3	AB
X	C	~~∞~~ 1	AC
X	D	~~∞~~ 3	ACD
	E	~~∞~~ 4	ABE

S. path : ABE
S. Dist. 4

Question: 2 **[1 Mark]**

Construct a Euler path from the graph:



B C D B A D

D A B D C B

B A D B C D

D C B D A B

Question: 3 **[1+1=2 Marks]**

(a) A graph has vertices of degrees 4, 3, 2, 2, 2, 1. How many edges does the graph have?

$$2e = \sum deg(v)$$

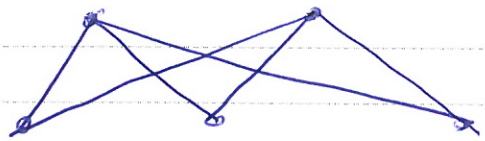
$$2e = 4+3+2+2+2+1$$

$$2e = 14$$

$$e = 7$$

(b) Draw the graphs $K_{2,3}$ and $\overline{K_{2,3}}$

$K_{2,3}$



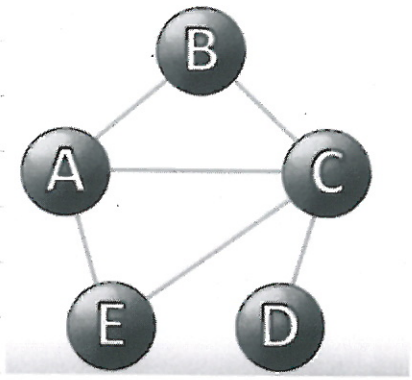
$\overline{K_{2,3}}$

Question: 4 **[1+1=2 Marks]**

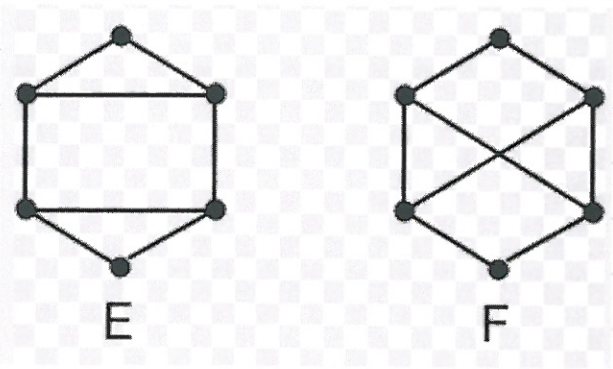
(a) Find the adjacency matrix for the graph given:

$A_G =$

	A	B	C	D	E
A	0	1	1	0	1
B	1	0	1	0	1
C	1	1	0	1	1
D	0	0	1	0	0
E	1	0	1	0	0



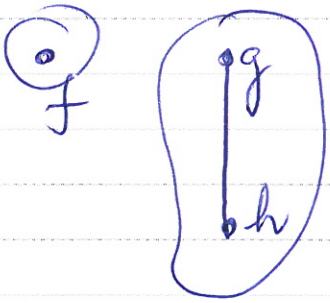
(b) Check whether the graphs are isomorphic or not:



Same as in Version B

Question: 5 **[1 Mark]**

Find the cut vertex/vertices (if any) from the graph:



Cut vertex is 'e'