SECI 1013 - DISCRETE STRUCTURE

SECTION 02

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ASSIGNMENT 3

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Question 1

a. How many students in a class to guarantee that at least two students received the same score on the final exam. If the exam is graded on scale from 0 to 100 points. (5 marks)

b. What is the minimum number of students required in a Structure Discrete class So that at least six students will receive the same letter grade (A,B,C,D or F).

(5 marks)

a. pigeonhole, k = Score grade = 100

Pigeon, n :

at least 2 students = $\dfrac{n}{m}$

Let $1.01 = \dfrac{n}{100}$

$n = 101$

≈ 102

$\therefore$ 102 students in a class

b. pigeonhole, k = grade = $\{A, B, C, D, F\}$

$= 5$

pigeon, n :

at least 6 students = $\dfrac{n}{m}$

Let $5.01 = \dfrac{n}{5}$

$n = 25.05$

≈ 26

$\therefore$ minimum number of students required in a Discrete Structure class is 26 students.

Question 2

The following table gives information on mobile phone sold by a certain store:

	Percentage of customer purchasing	of those who purchase, percentage who purchase extended warranty
Brand 1	70	20
Brand 2	30	40

A purchaser is randomly selected from among all those bought a mobile phone from same store. Determine the probability that:

a. customer purchased Brand 1

$P(A)$ = customer purchased Brand 1.
$P(A) = 0.7$

b. $P(B)$ = customer purchased Brand 2.
$P(B) = 0.3$

c. $P(W)$ = Customer purchased extended warranty.
$P(W|A) = 0.2$

d. $P(A \cap W) = P(A) \cdot P(W|A)$
$$= 0.7 \cdot 0.2$$
$$= 0.14$$

e. $P(B \cap W)$
$P(W|B) = 0.4$
$P(B \cap W) = P(B) \cdot P(W|B)$
$$= 0.3 \cdot 0.4$$
$$= 0.12$$

f. $P(W) = P(W|A) \cdot P(A) + P(W|B) \cdot P(B)$
$$= (0.2)(0.7) + (0.4)(0.3)$$
$$= 0.26$$

g. $P(A|W) = \dfrac{P(A \cap W)}{P(W)}$
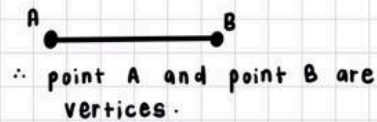$$= \dfrac{0.14}{0.26}$$
$$= 0.5385$$

Question 3

a) Vertices ⟶ a point that can connect edges.

A ●————————● B

∴ point A and point B are vertices.

b) Edges ⟶ lines between two or more points

∴ line a and b are edges.
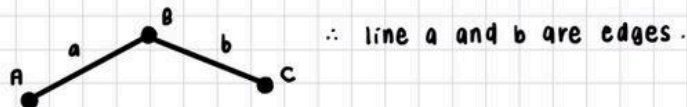
c) adjacent vertices ⟶ two vertices that are connect by an edge

∴ point A and point B are adjacent to each other while point B and point C are adjacent to each other.
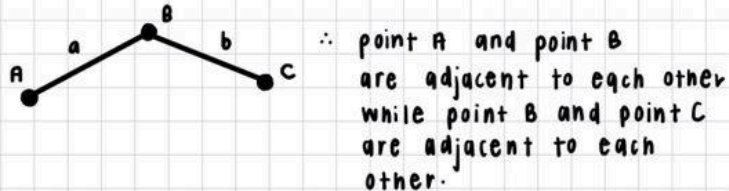
d) Incident edge ⟶ One of two vertices is connect by edges

∴ point A and point B are incident to edge a.
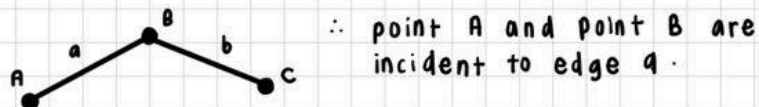
e) Isolated vertex ⟶ vertex that not connected with any edge

∴ D is isolated vertex.

Made with Goodnotes
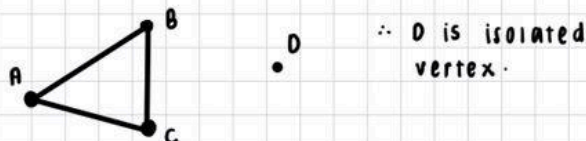
f) loop ⟶ edge with one endpoint
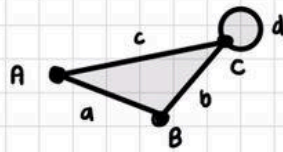
∴ edge d is a loop.

g) parallel edge ⟶ edges that share one vertex
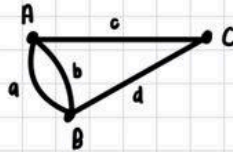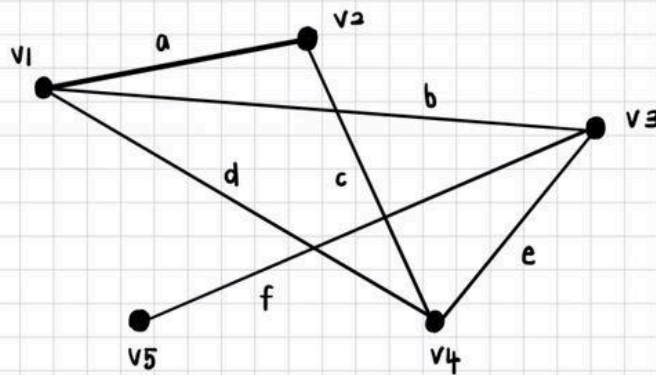

∴ edge a and edge b are parallel edges.

Question 4

Let G = {V, E} be a graph. An undirected graph having V ={v1, v2, v3, v4, v5} and E = {a, b, c, d, e, f}. Where $a = (v1,v2)$, $b = (v1,v3)$, $c = (v2,v4)$, $d = (v1,v4)$, $e = (v3,v4)$ and $f = (v3,v5)$.
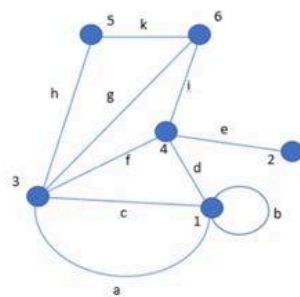
Find the degree of each vertex.

(5 Marks)

$\deg(V1) = 3$, $\deg(V2) = 2$, $\deg(V3) = 3$,

$\deg(V4) = 3$, $\deg(V5) = 1$

Given the graph shown above, Find:

i. Incidence Matrix   (6 Marks)
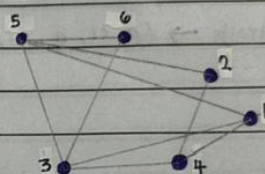ii. Adjacency Matrix   (6 Marks)

i) Incidence Matrix

	a	b	c	d	e	F	g	h	i	k
1	1	2	1	1	0	0	0	0	0	0
2	0	0	0	0	1	0	0	0	0	0
3	1	0	1	0	0	1	1	1	0	0
4	0	0	0	1	1	1	0	0	1	0
5	0	0	0	0	0	0	0	1	0	1
6	0	0	0	0	0	0	1	0	1	1

ii) adjacency matrix

	1	2	3	4	5	6
1	1	0	2	1	0	0
2	0	0	0	1	0	0
3	2	0	0	1	1	1
4	1	1	1	0	0	1
5	0	0	1	0	0	1
6	0	0	1	1	1	0

QUESTION 6

(6) determine whether graph Y and Z ~~below~~ are isomorphic. If it is, find their ~~edjant~~ adjacency matrix.
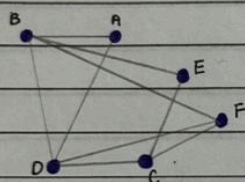
→ f(B) = 5, f(A) = 6, f(D) = 3, f(E) = 2, f(F) = 1, f(c) = 4.

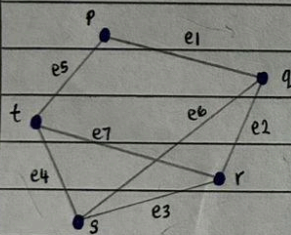∴ graph Y and graph Z are proven to be isomorphic to each other.

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

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	6	5	4	3	2	1
6	0	1	0	1	0	0
5	1	0	0	1	1	1
4	0	0	0	1	1	1
3	1	1	1	0	0	1
2	0	1	1	0	0	0
1	0	1	1	1	0	0

QUESTION 7

⑦ consider an undirected graph with vertices $V = \{p, q, r, s, t\}$ and edges

$E = \{e1, e2, e3, e4, e5, e6, e7\}$.

$e1 = \{p, q\}$, $e2 = \{q, r\}$, $e3 = \{r, s\}$, $e4 = \{s, t\}$, $e5 = \{t, p\}$, $e6 = \{q, s\}$, $e7 = \{r, t\}$

i) find paths from p to t.

→ $(p, e5, t)$, $(p, e1, q, e2, r, e3, s, e4, t)$,

$(p, e1, q, e6, s, e4, t)$, $(p, e1, q, e2, r, e7, t)$, and

$(p, e1, q, e6, s, e3, r, e7, t)$.

ii) find trails from p to t.

→ $(p, e5, t)$, $(p, e1, q, e2, r, e3, s, e4, t)$,

$(p, e1, q, e6, s, e4, t)$ $(p, e1, q, e2, r, e7, t)$,

$(p, e1, q, e6, s, e3, r, e7, t)$, $(p, e5, t, e7, r, e2, q, e6, s, e4, t)$,

$(p, e5, t, e7, r, e3, s, e4, t)$.

iii) shortest → $(p, e5, t)$

longest → $(p, e1, q, e2, r, e3, s, e4, t)$

iv) shortest trails → $(p, e5, t)$

longest trails → $(p, e5, t, e7, r, e2, q, e6, s, e4, t)$