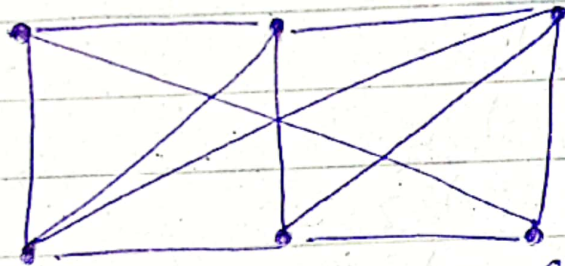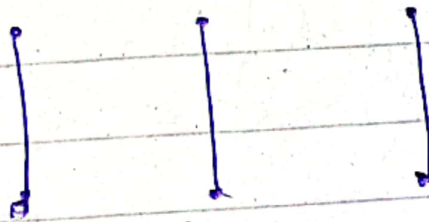Bilal Ahmed Khan ; 20K0183

Sec: B

QUESTION 01

let $n = 3$ $2(n) = 6$ vertices

Consider the graph above
Here
$$\delta(G) = 3 \quad \& \quad n = 3$$
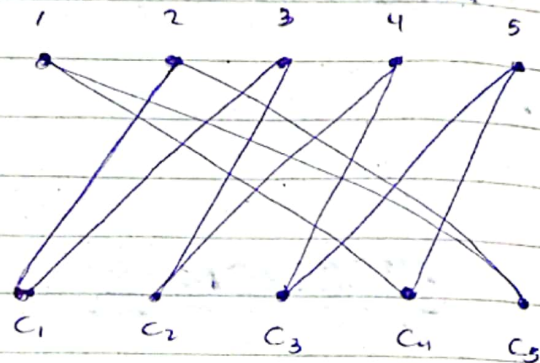There also exists a perfect
matching

Hence proved

QUESTION 02

a)

b)

$\deg(1) = 2$

$\deg(2) = 2$

$\deg(3) = 2$

$\deg(4) = 2$

$\deg(5) = 2$

c)

$\deg(C_1) = 2$

$\deg(C_2) = 2$

$\deg(C_3) = 2$

$\deg(C_4) = 2$

$\deg(C_5) = 2$

d)
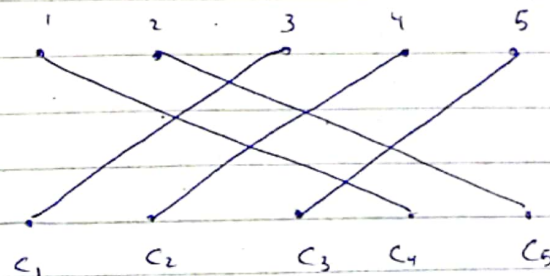
It's 2 regular since all vertices have degree 2

e)

Yes the graph G has perfect matching.

f)

QUESTION 03

a)

NO, it doesn't have perfect matching

b)

The size of maximum matching in G is 5.

QUESTION 04

Men proposing

①
U	a	?
V	a	x
W	c	x
x	c	?
y	c	x
z	d	?

②
U	a	?
V	b	x
W	b	?
x	c	?
y	d	?
z	d	x

③
U	a	?
V	c	✓
W	b	?
x	c	x
y	d	?
z	e	?

④
U	a	x
V	c	✓
W	b	?
x	a	?
y	d	?
z	e	?

⑤
U	b	x
V	c	✓
W	b	?
x	a	?
y	d	?
z	e	?

⑥
U	d	?
V	c	✓
W	b	?
x	c	?
y	d	?
z	e	?

⑦
U	c	x
V	e	✓
W	b	?
x	a	?
y	d	?
z	e	?

⑧
U	f	✓
V	c	✓
W	b	✓
x	a	✓
y	d	✓
z	e	✓

$u \rightarrow f$

$v \rightarrow c$

$w \rightarrow b$

$x \rightarrow a$

$y \rightarrow d$

$z \rightarrow e$

Women proposing
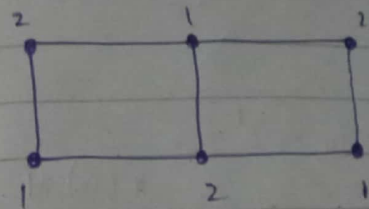
① a   z   ?   ② q   x   ?

b   y   ?   b   y   ?

c   v   ?   c   v   ?

d   w   ?   d   w   ?

e   u   x   e   v   x

f   u   ?   f   u   ?

③ a   z   ⌣   a $\rightarrow$ z

b   y   ⌣   b $\rightarrow$ y

c   v   ⌣   c $\rightarrow$ v

d   w   ⌣   d $\rightarrow$ w

e   x   ⌣   e $\rightarrow$ x

f   u   ✓   f $\rightarrow$ u

QUESTION 05

chromatic number $= 2$
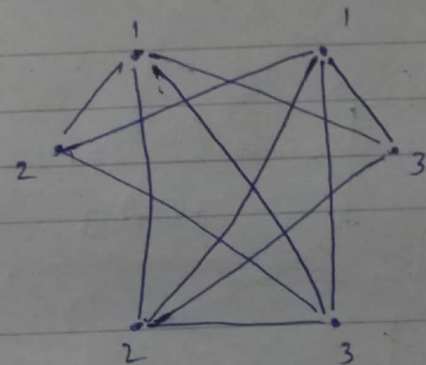
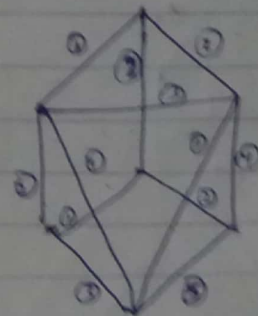chromatic number $= 3$

QUESTION 06

i)

$x(G) = 4$

ii)

→ removed edge.

$x(G) = 3$

Removing
edge

$x(G) = 4$
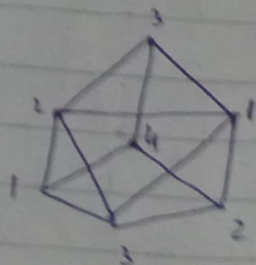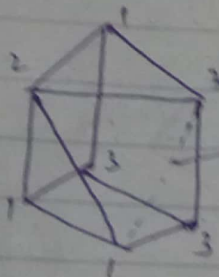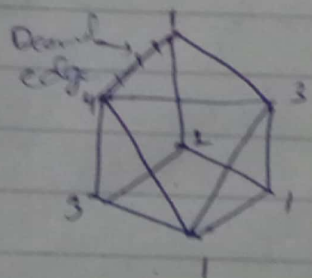
$(x(G-e) = x(G)-1$
is not true for
all edges)

iii)

$x'(G) = 5$

$\Delta G = 4$

Theorem: $\Delta G \leq x'(G) \leq \Delta(G)+1$
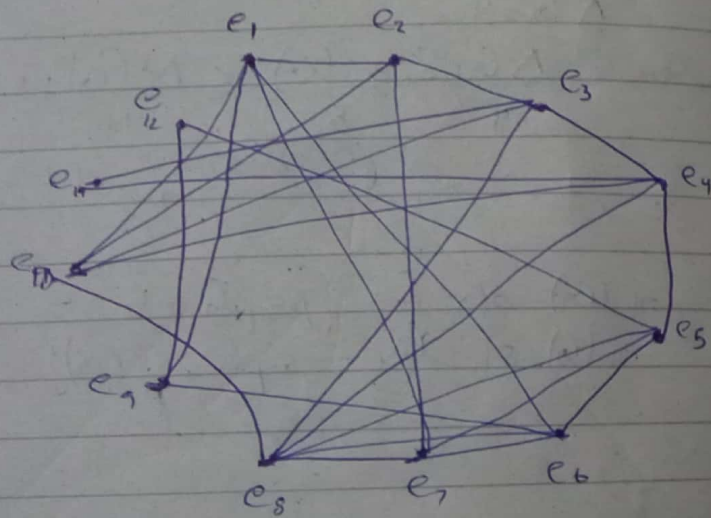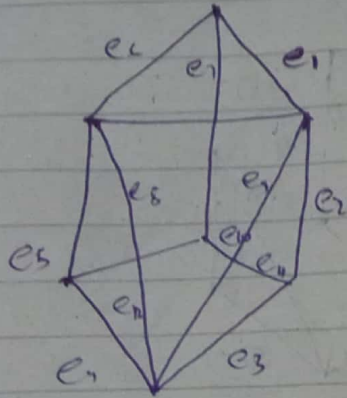
$\quad\quad\quad\quad 4 \quad\quad 5 \quad\quad 4+1$

Hence
proved!

v) $x(G)$ of line graph = 5
    $x(G)$ of line graph = $x'(G)$

iv)

e_6 e_7 e_1

e_8 e_9 e_2

e_5 e_{10} e_{11}

e_{12}

e_4 e_3

e_1 e_2

e_{12} e_3

e_{11} e_4

e_{10}

e_5

e_9 e_6

e_8 e_7

QUESIZON 07

A B (2) C
(1) (4)

E D (3) C₁

(3) (3)

F (2)
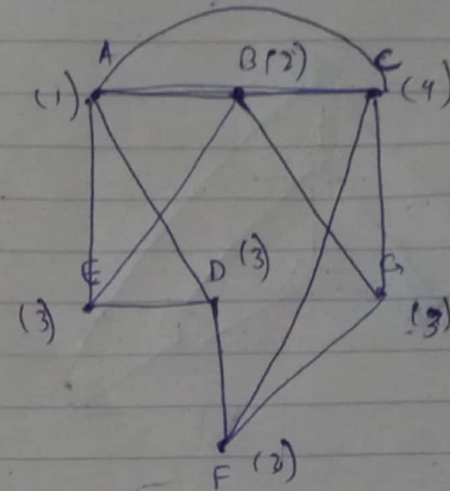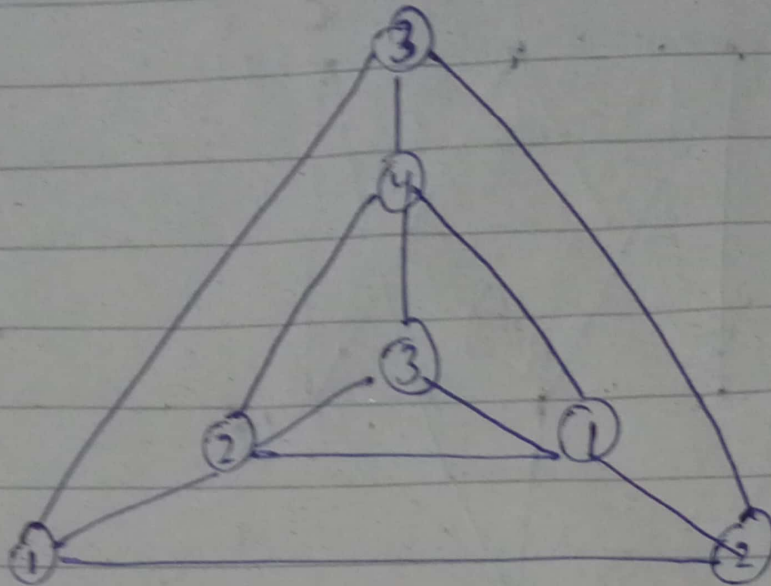
Minimum 4 time slots will be
required since 4 colors

QUESTION 08

a)

b)