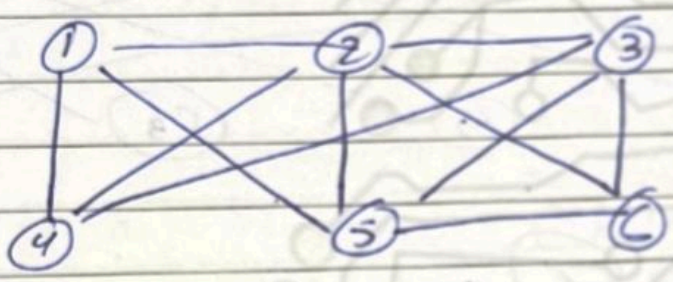
20K-1629 Assignment no. 3

Question no. 1

Statement: G is a graph with 2n vertices and minimum degree $\geq n$ the G does not have a perfect matching

Let $n = 3$ as an example

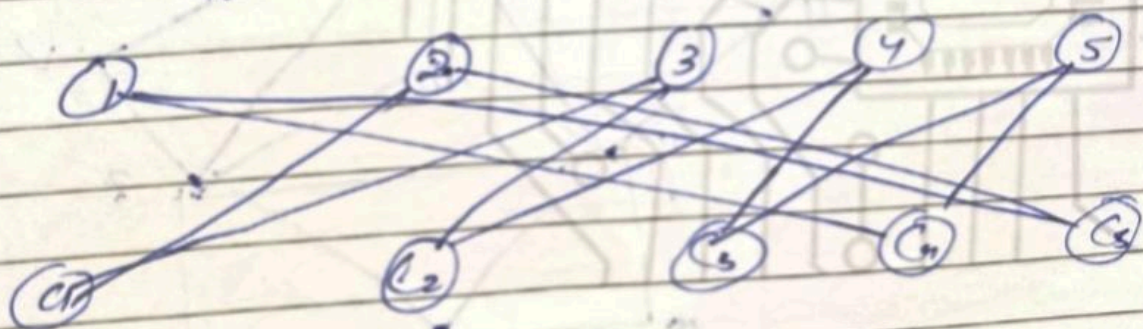
$n = 3 \Rightarrow 2n = 6$



- This example ~~comp~~ consist of all degrees greater than or equal to n.
- There is a perfect matching in the graph which is {(1,5), (2,4), (3,6)}
- Therefore statement disproved. Hence proved

Question no. 2

a)



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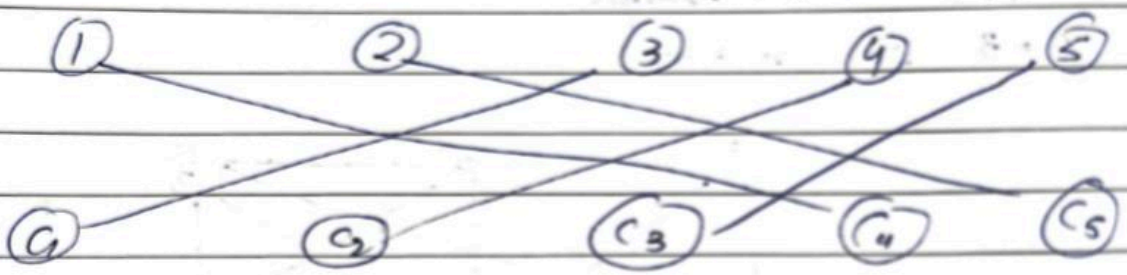
(b) 2

(c) 2

(d) Yes

(e) Yes

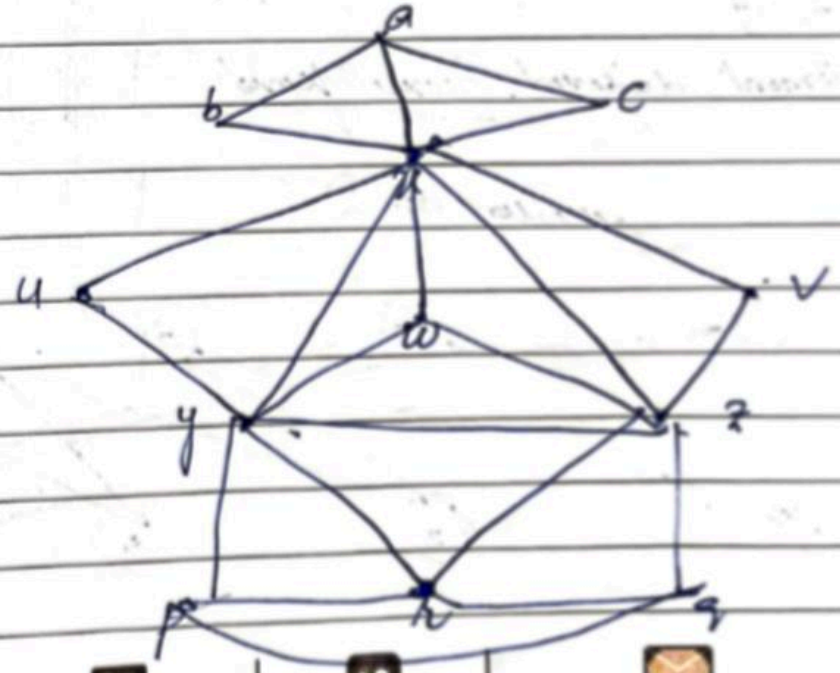
(f)



Question no. 3

(a) No

(b) 5



Question no. 4

Non-pipelining

① w a ?
v a x
w c x
x c ?
y c x
z d ?

② w a ?
v b x
w b ?
x c ?
y d ?
z d x

③ w a ?
v c ✓
w b ?
x c x
y d ?
z e ?

④ w a x
v c ✓
w b ?
x a ?
y d ?
z e ?

⑤ w b x
v c ✓
w b ?
x a ?
y d ?
z e ?

w d ?
v c ✓
w b ?
x c ?
y d ?
z e ?

7) u c x
v c ✓
w b ?
x a ?
y d ?
z e ?

u → f
v → c
w → b
x → a
y → d
z → e

⑧ u f ✓
v c ✓
w b ✓
x a ✓
y d ✓
z e ✓

Woman proposing.

a z ?
b y ?
c v ?
d w ?
e y x
f u ?

② a z ?
b y ?
c v ?
d w ?
e v x
f u

③ a z ✓
b y ✓
c v ✓
d w ✓
e x ✓
f u ✓

a → z
b → y
c → v
d → w
e → x
f → u

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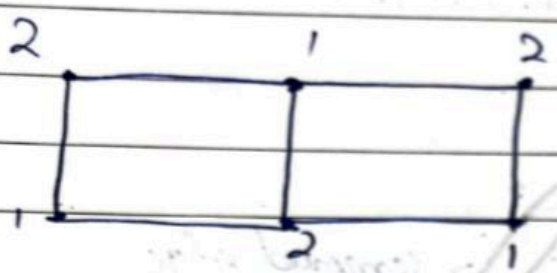
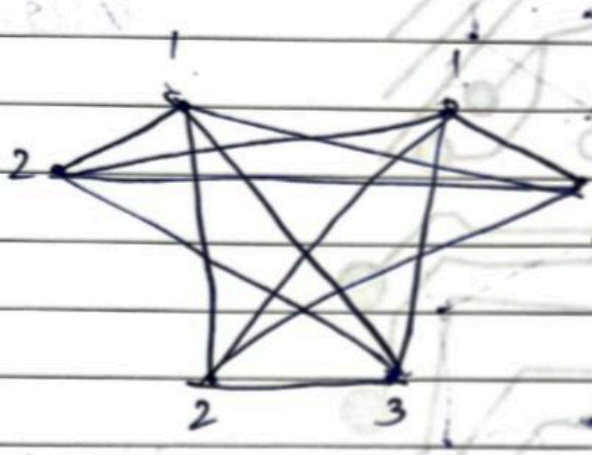
Question no. 5

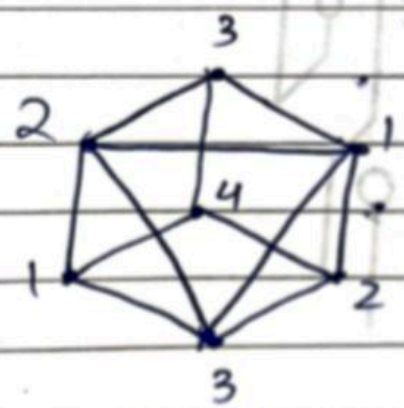


Chromatic number = 2
Equitable coloring shown



Chromatic number = 3
← Equitable coloring sh

Question no. 6(i)



$\chi(G) = 4$

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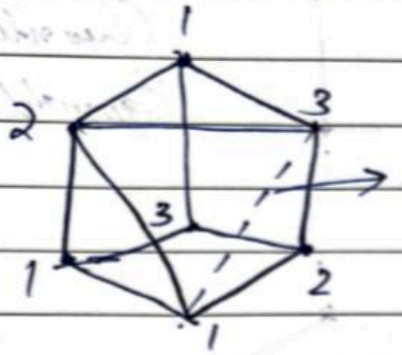
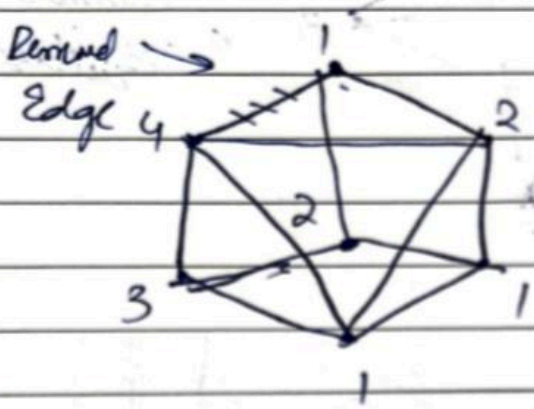
Question no. 6(ii)



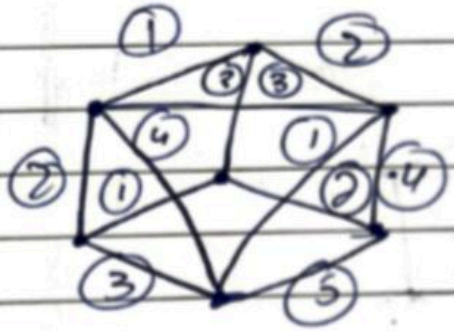
$\chi(G) = 3$



$\chi(G) = 4$

$(\chi(G-e) = \chi(G) - 1 \text{ is}$ not true for all edges)

(iii)



$\chi'(G) = 5$

$\Delta G = 4$

Theorem: $\underset{4}{\Delta G} \leq \underset{5}{\chi'(G)} \leq \underset{4+1}{\Delta(G)+1}$ Proved.

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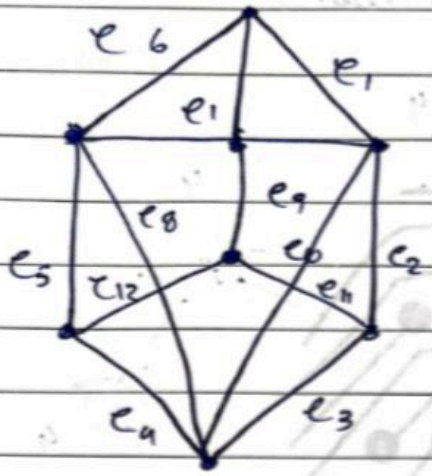
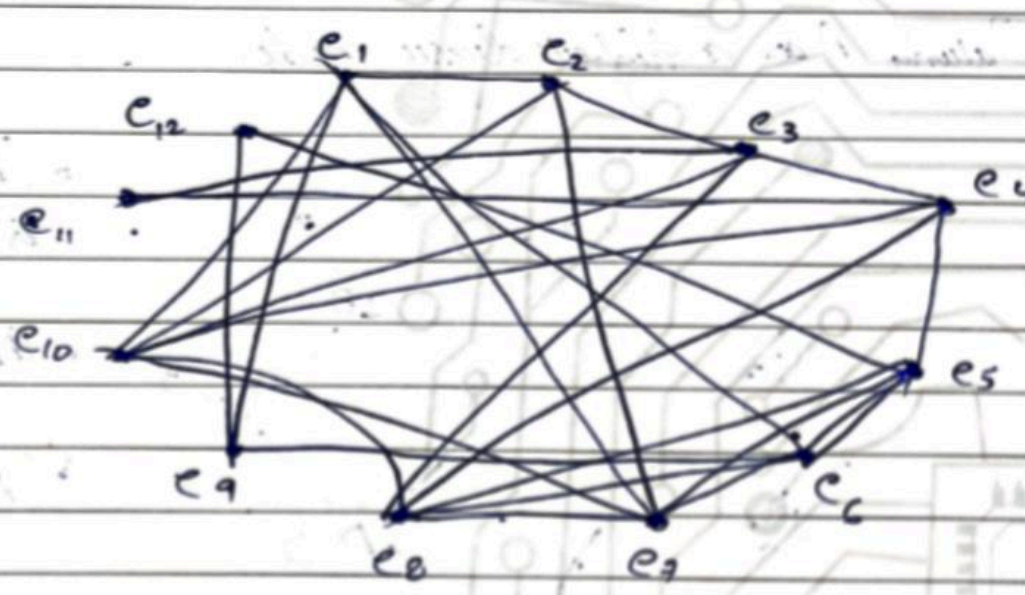
iv)





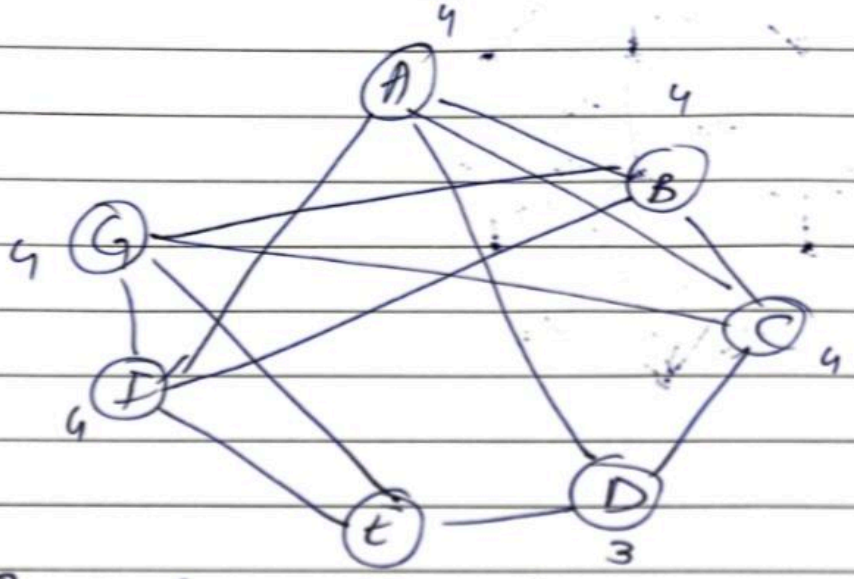
v) $\chi(G)$ of line graph : 5

$\chi(G)$ of line graph : $\chi'(G)$

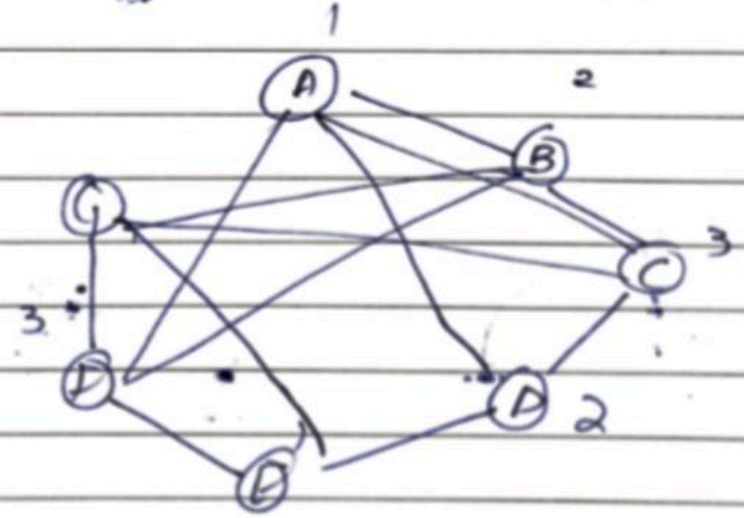
$5 \leq 5$

verified

Question no. 7.



① Taking A as a highest degree node.



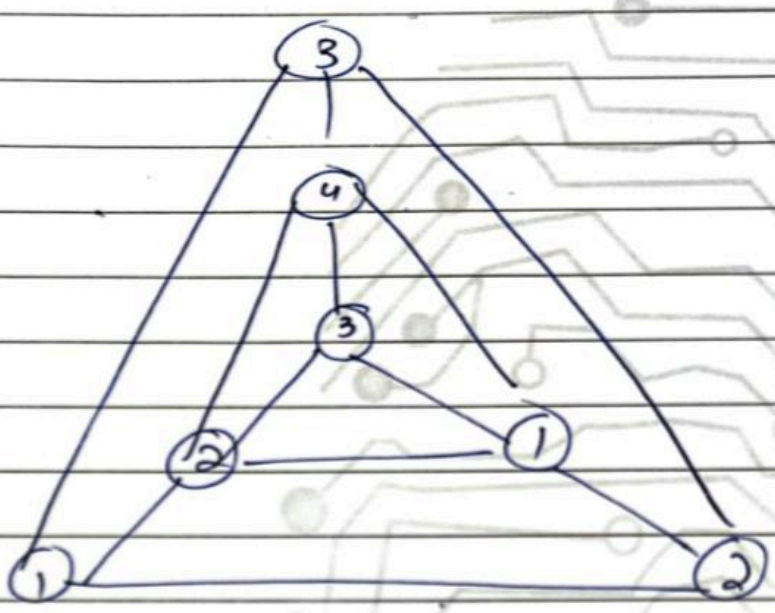
• (ABC) is K_3

• (ABF) is K_3

• (ADC) is K_3

Question no. 8

a)



b)