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20K-0477

Question # 01

(i)

Since tree is connected and every vertex has degree 1.
∴ sum of all degrees of vertices = 2E
In tree n vertices has n-1 edges.
So

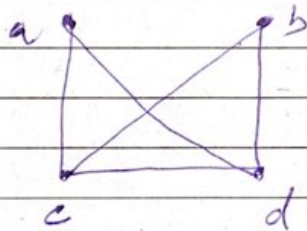$$2E = 2(n-1)$$
$$= 2n-2$$

Proved.

(ii)

let n = 4

a · · b
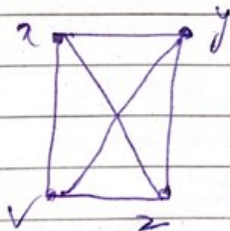c   d

$K(G) \geq 2$ We need minimum exactly two
vertex to disconnect a bicomgraph
so $K(G) = 2$ proved

(iii)

x · · y
v   z

$E(x) = 1$
$d(x,y) = 1$ $d(x,v) = 1$ $d(x,z) = 1$

$E(y) = 1$

$d(y,x) = 1 \quad d(y, v) = 1 \quad d(y,z) = 1$

$\quad E(x) \leq E(y)$

Question # 2

(a)
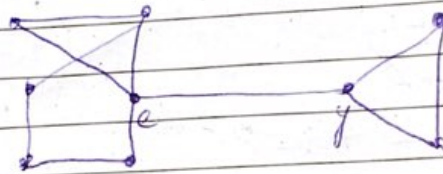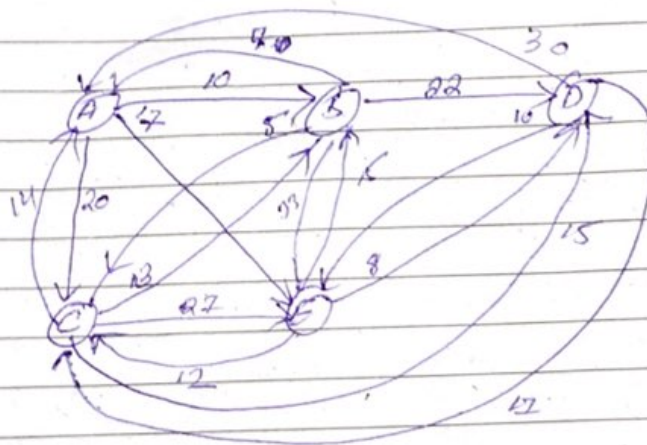

if graph has ey bridge it is possible
that it may have cut vertex the
above figur if we remove bridge y the
graph will be disconnected.

Que Question #04

	A	B	C	D	E
A	0	10	20	28	17
B	7	0	5	22	23
C	14	13	0	15	27
D	30	∞	17	0	16
E	∞	15	12	8	0

1-2 = 10	2-3-4 = 20	4-3 = 17
1-3 = 20	3-1 = 14	4-5 = 10
1-2-4 = 32	3-2 = 13	
1-5 = 17	3-4 = 15	5-2-1 = 22
2-1 = 7	3-4-5 = 25	5-2 = 15
2-3 = 5	4, 4 = 30	5-4 = 8 least
	4-1-2 = 12	5-3 = 12

Q#5

(a)

n = 16

(b)

n = 24
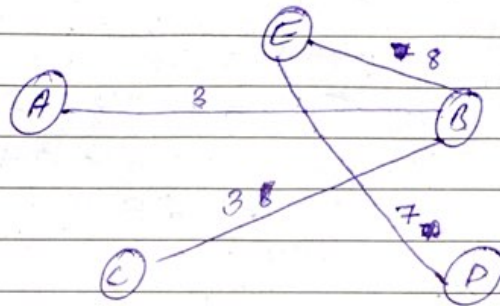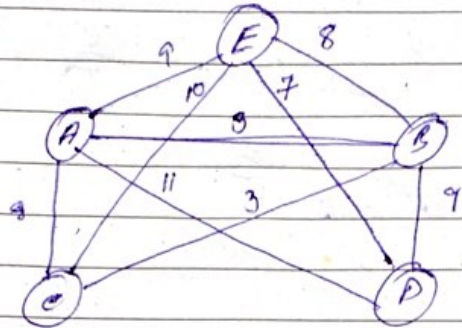
Question # 03

Cost = 3 + 3 + 8 + 7

= $\boxed{21}$

Question # 6

(a)
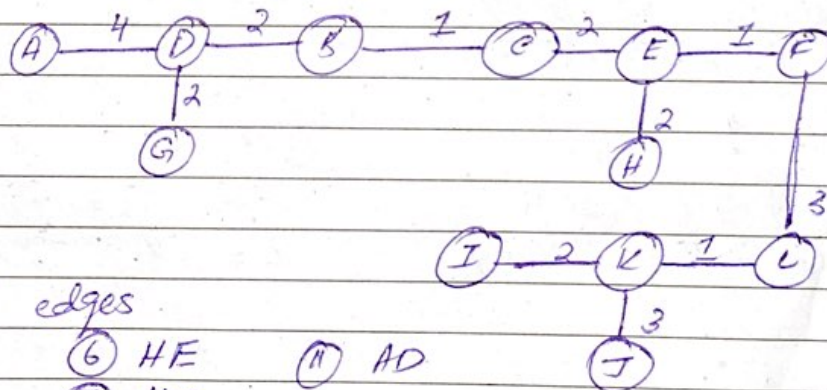
Order of edges

① BC
② EF
③ KL
④ DB
⑤ CE
⑥ HE
⑦ KI
⑧ DG
⑨ JK
⑩ FL
⑪ AD

Cost = 1 + 1 + 1 + 2 + 2 + 2

+ 2 + 2 + 3 + 4

= $\boxed{23}$
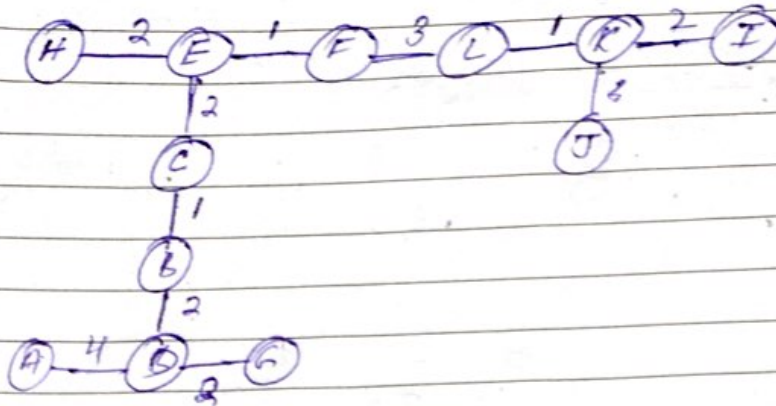
Order of edges:

① HE   ⑦ FL
② EF   ⑧ LK
③ FC   ⑨ KI
④ CB   ⑩ KJ
⑤ BD   ⑪ DA
⑥ DG

$$Cost = 1+1+1+2+2+2+$$
$$2+2+8+3+4$$
$$= 23$$

Question #07 :

① $(\textcircled{3}, 2, 2, 3, 2, 2)$ $n-2=6$
$L = (\textcircled{1}, 2, 3, 4, 5, 6, 7, 8)$ $n = 8$

②⇒
$S = (\textcircled{2}, 2, 3, 2, 2)$
$L = (2, 3, \textcircled{4}, 5, 6, 7, 8)$

③⇒
$S = (\textcircled{2}, 3, 2, 2)$
$L = (2, 3, \textcircled{5}, 6, 7, 8)$

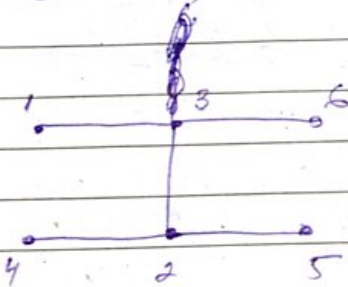**4⟶)**

$S = (\textcircled{3}, \cancel{2}\, 2)$ ^{2}
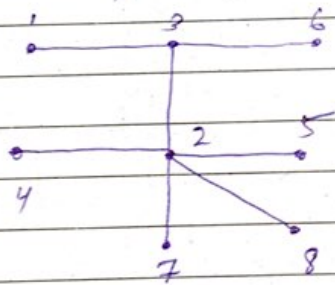
$L = (2, 3, \textcircled{6}, 7, 8)$

5⟶

$S = (\textcircled{3}, 2)$

$L = (2, \textcircled{3}, 7, 8)$

$S = (\textcircled{2})$

$L = (2, \textcircled{7}, 8)$
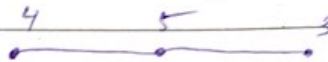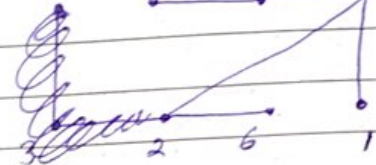
Sandal

① →

$S = (⑤, 3, 2, 3, 3, 1)$ (ii') $n-2 = 6$

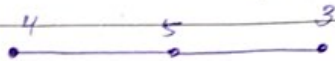$L = (1, 2, 3, ④, 5, 6, 7, 8)$ $n = 8$

② →

4 — 5

$S = (③, 2, 3, 3, 1)$

$L = (1, 2, 3, ⑤, 6, 7, 8)$

③ →

4 — 5 — 3

$S = (②, 3, 3, 1)$

$L = (1, 2, 3, ⑥, 7, 8)$

4 — 5 — 3

2 — 6

④ →

$S = (③, 3, 1)$

$L = (1, ②, 3, 7, 8)$

4 — 5 — 3

2 — 6

⑤ →

$S = (③, 1)$

$L = (1, 3, ④, 8)$

4 — 5 — 3 — 7

2 — 6

⑥ ⇒ $S = (①)$

$L = (1, ③, 8)$

4   5   3   7

3   2   6   1

⑦ ⇒ $S = ()$

$L = (1, 8)$

4   5   3   7

2   6   1   8

Question # 05   (a)

BFS

(b)

DFS

Question # 09

| x | y |

$s\ (-,\ \infty)$

$a\ (s^+,\ 2)$

$b\ (a^+,\ 2)$

$d\ (b^+,\ 2)$

$e\ (d^+,\ 2)$

$c\ (e^+,\ \partial1)$

$g\ (e^-,\ 0)$

$h\ (e^+,\ 2)$

$t\ (h^+,\ 3)$

$a\ \checkmark \qquad f\ X$

$b\ \checkmark \qquad d\ X$

$a\ X2 \qquad d\ \checkmark$

$a\ X \quad e\ \checkmark \quad c\ X$
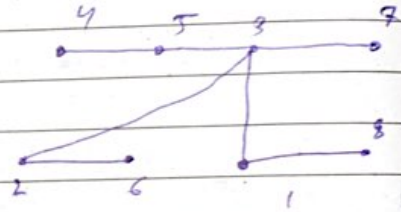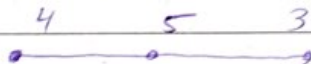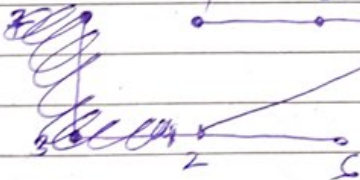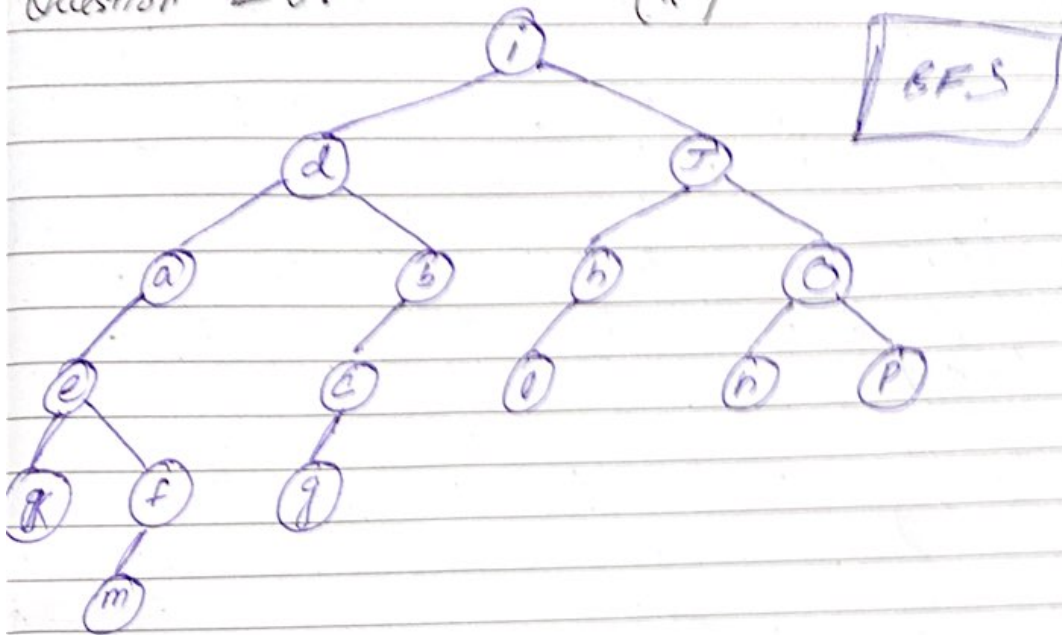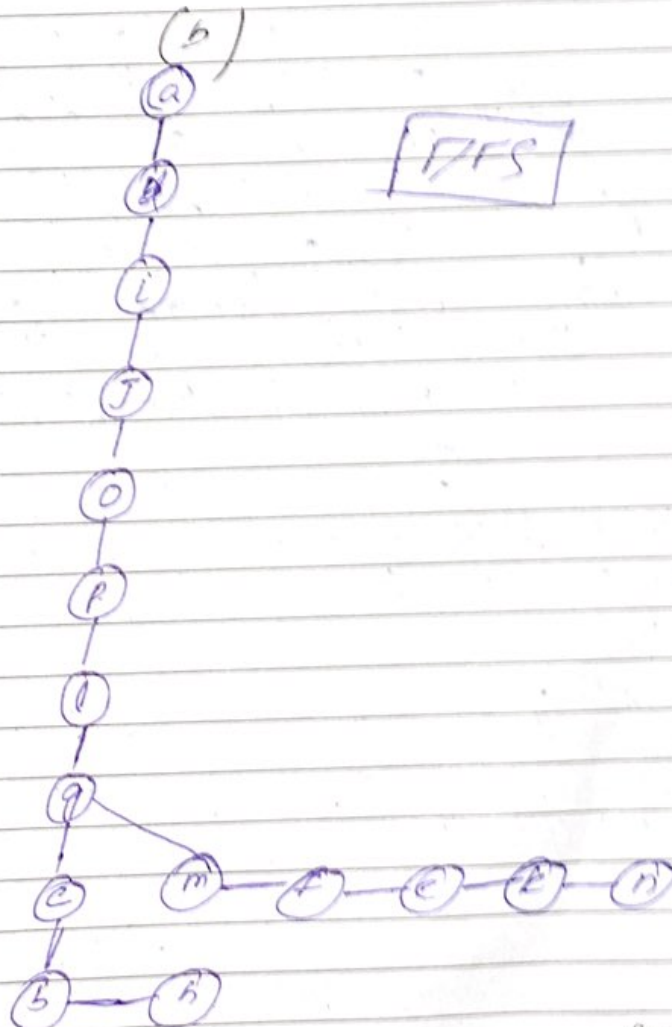
$d \quad e\checkmark \quad g \quad h$

t

Add 2 in edges

$s\ a\ b\ d\ e\ h\ t$

Max Flow $\Rightarrow$ 14

$\{\ s\ \}^{P} \qquad \{a, b, c, d, e, f, g, h, t\}^{\overline{P}}$

$\{sa,\ sf\}$

MIN cut $\Rightarrow\ 10 + 4$

$\Rightarrow\ 14$