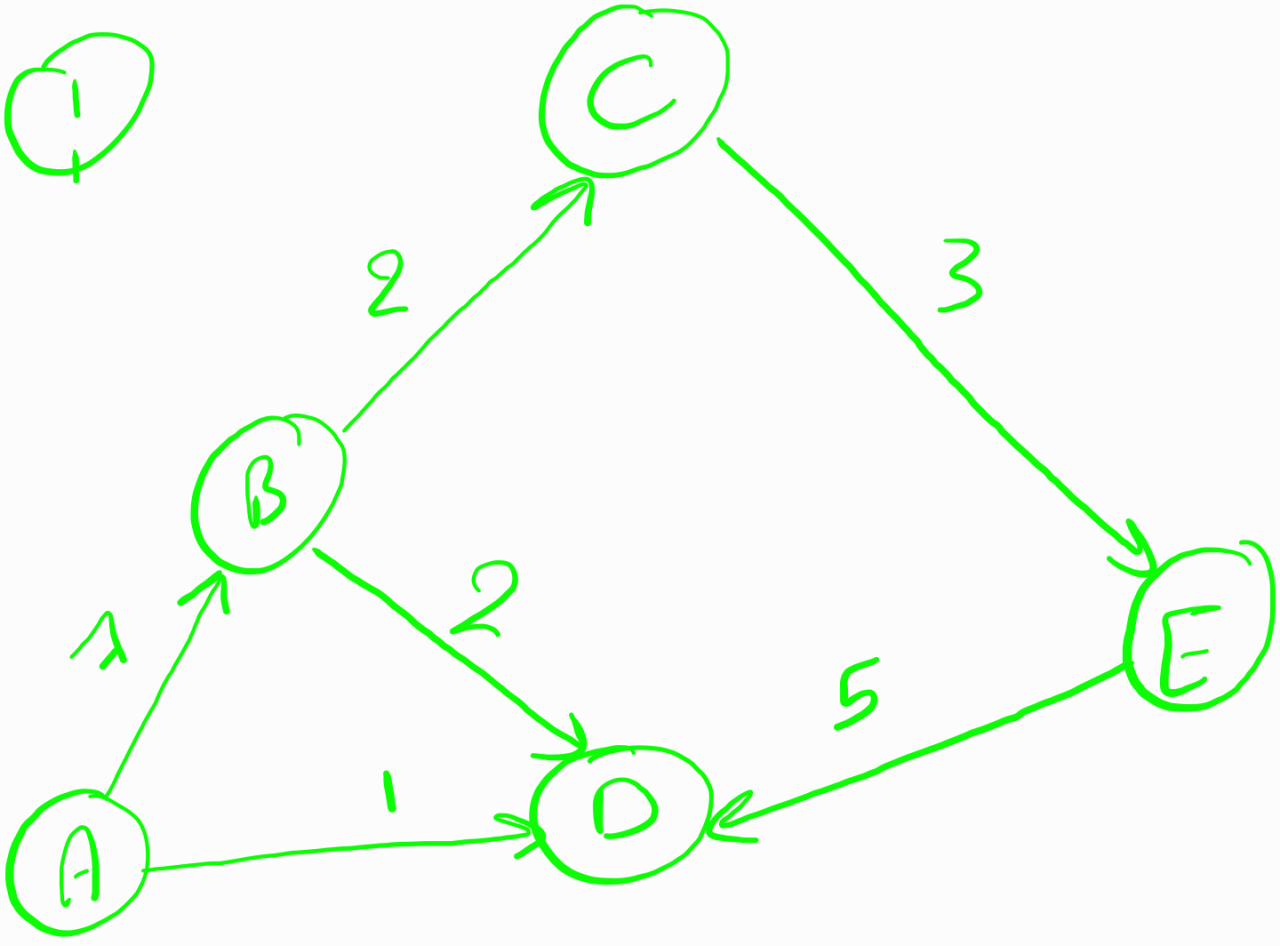


1. list 2 valid topological sort ordering or one:-

Ans:-

V	Indegree	Known
A	0	F T
B	~~1~~ 0	F T
C	~~1~~ 0	F T
D	~~3~~ ~~2~~ ~~1~~ 0	F T
E	~~1~~ 0	F T

A → B → C → E → D

2. worst case big-O for topological sort as an adjacency list (with queue):-

Ans:- O(E + V)

3. is the graph:-

directed

weakly connected

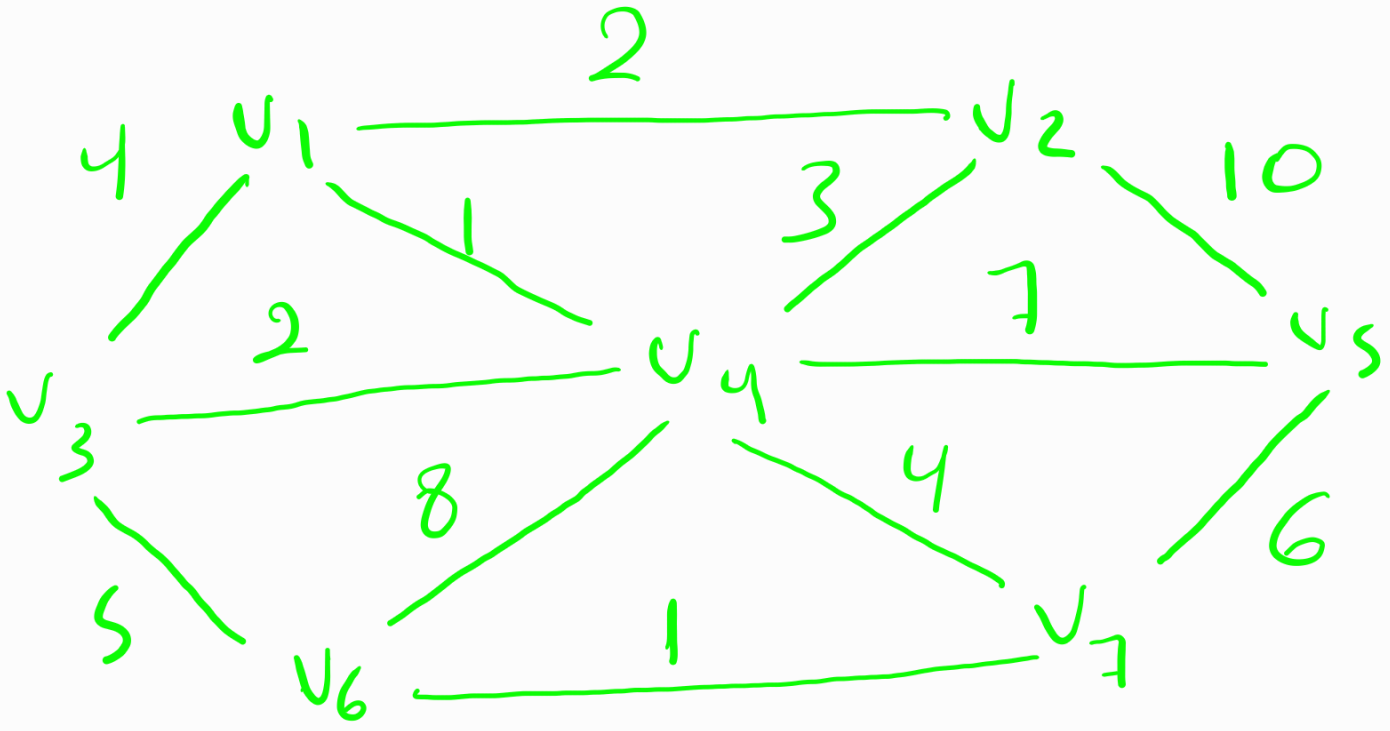
undirected

complete

asyclic

strongly connected

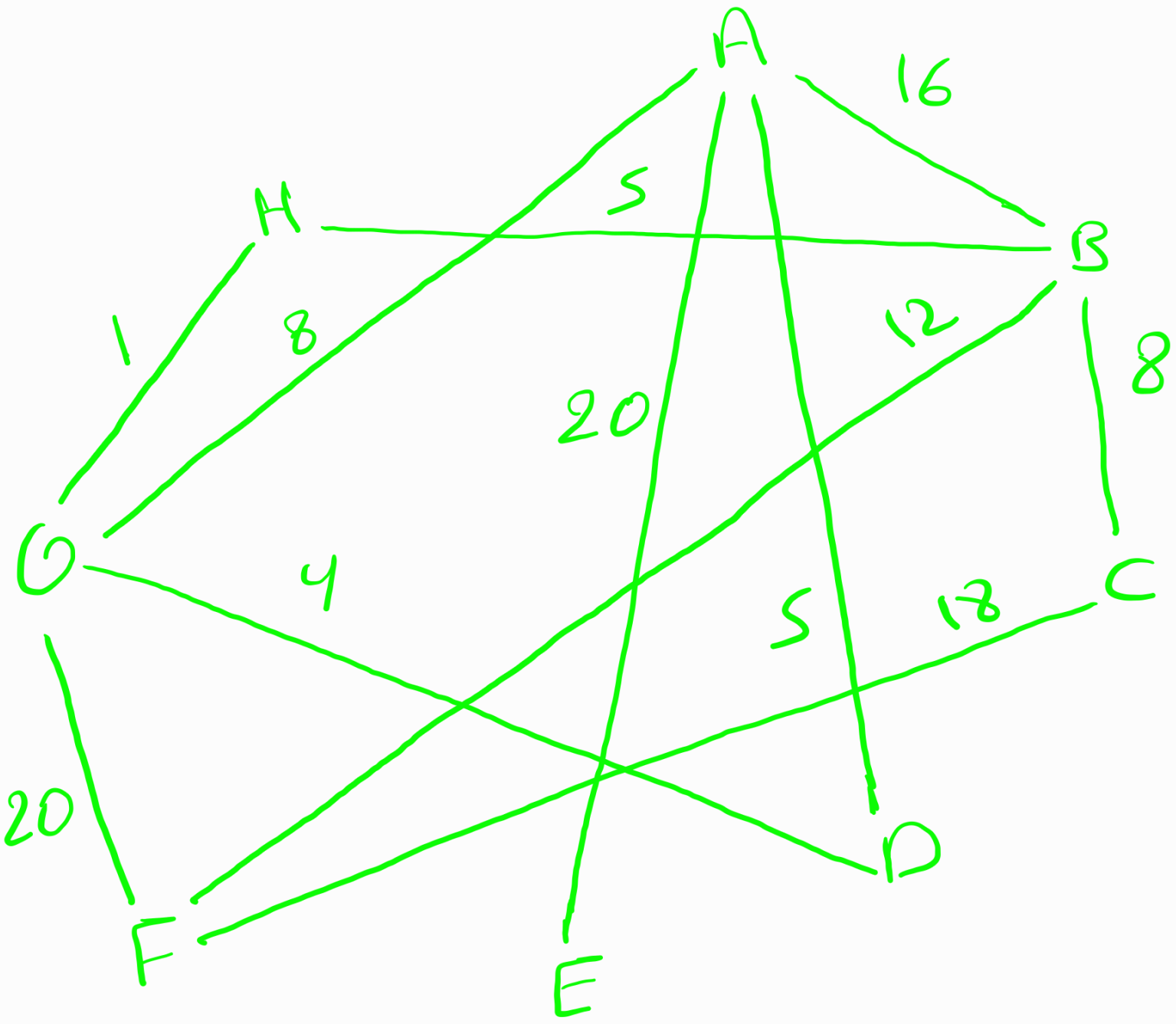
(2) Minimum spanning tree:-



- Prim's algo:-

V	Known	dv	Pv
V_1	~~0~~ 1	0	0
V_2	~~0~~ 1	~~∞~~ 2	~~0~~ V_1
V_3	~~0~~ 1	~~∞~~ x 2	~~0~~ ~~x~~ V_4
V_4	~~0~~ 1	~~∞~~ 1	~~0~~ V_1
V_5	~~0~~ 1	~~∞~~ ~~6~~	~~6~~ ~~V_4~~ V_7
V_6	~~0~~ 1	~~∞~~ ~~3~~ ~~5~~ 1	~~∞~~ ~~V_4~~ ~~V_5~~ V_7
V_7	~~0~~ 1	~~∞~~ 4	~~0~~ V_4

(3) Prim's algo & Kruskal :-



Ans :-

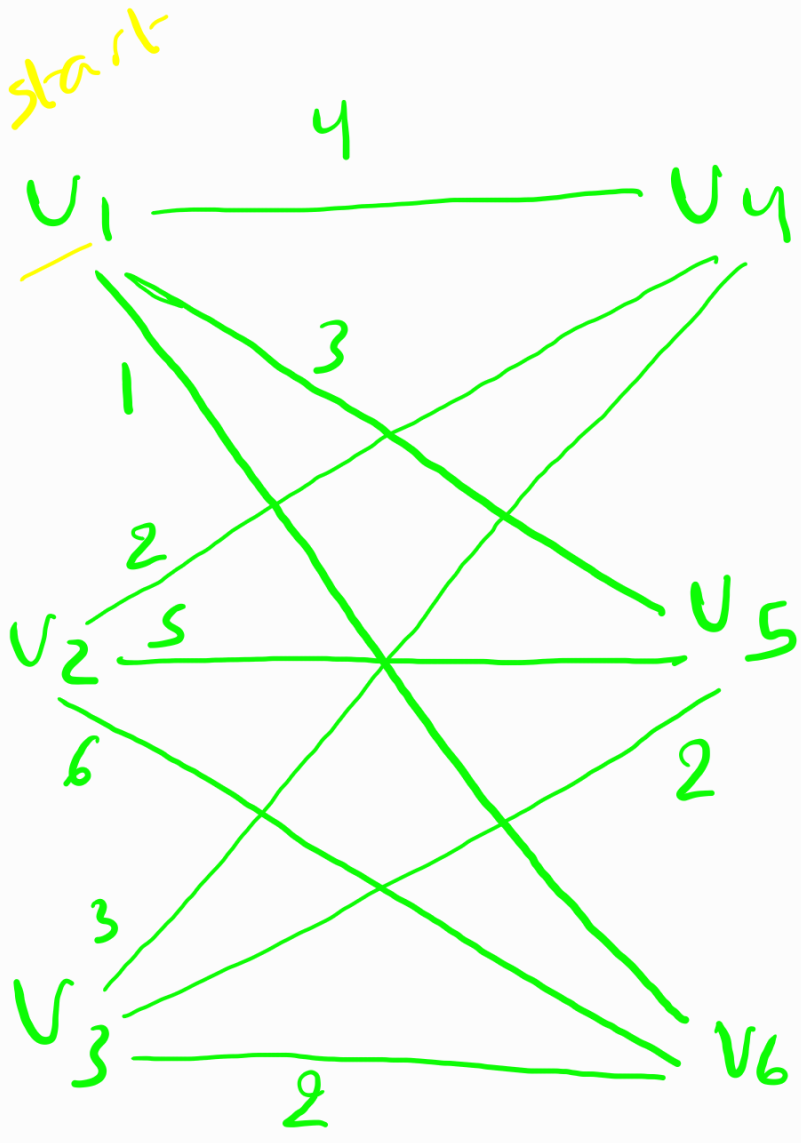
Prim's :-

V	Known	dv	Pv
A	ϕ_1	$\phi_{16}\ \phi_5$	$\phi\ \phi\ \phi\ D$
B	$\phi 1$	0	0
C	ϕ_1	ϕ_8	ϕB
D	ϕ_1	ϕ_4	ϕG
E	ϕ_1	ϕ_{15}	ϕH
F	ϕ_1	ϕ_{12}	ϕB
G	ϕ_1	ϕ_1	ϕH
H	ϕ_1	$\phi_{8,1}$	$\phi\ \phi\ G$

Kruskal :-

edges	cost	accepted
(G, H)	1	✓
(G, D)	4	✓
(D, A)	5	✓
(B, H)	5	✓
(B, C)	8	✓
(G, A)	8	X → B, F 12 ✓
(H, E)	15	✓
(A, B)	16	X
(C, F)	18	X
(A, E)	20	X
(B, F)	20	X

(4) minimum spanning tree:-



Ans:-

Prim's:-

V	Known	dV	PV
V_1	ϕ_1	0	0
V_2	ϕ_1	ϕ_2	ϕ
V_3	ϕ_1	ϕ_2	ϕ
V_4	ϕ_1	ϕ_3	ϕ
V_5	ϕ_1	ϕ_2	ϕ
V_6	ϕ_1	ϕ_1	ϕ

Kruskal :-

edge	cost	accepted
(v_1, v_6)	1	✓
(v_2, v_4)	2	✓
(v_3, v_5)	2	✓
(v_3, v_6)	2	✓
(v_1, v_5)	3	X
(v_3, v_4)	3	✓
(v_1, v_4)	4	X
(v_2, v_5)	5	X
(v_2, v_6)	6	X