14-AMALIY MASHG’ULOT. Qo’shnilik va insidentlik matrisalariga ko’ra graf uchlarining darajalari va kirralari sonini topish

Reja:

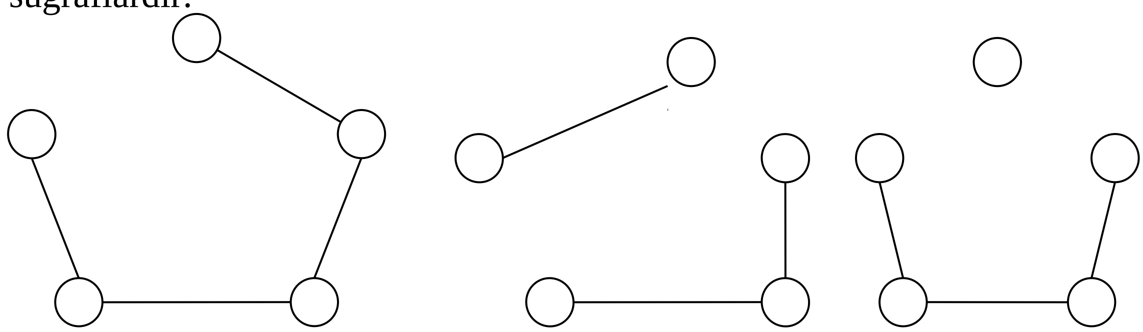
1. Graflar nazariyasiga oid asosiy tushunchalar.
2. Mustaqil bajarish uchun masala va topshiriqlar

2.1. Graflar ustida amallar

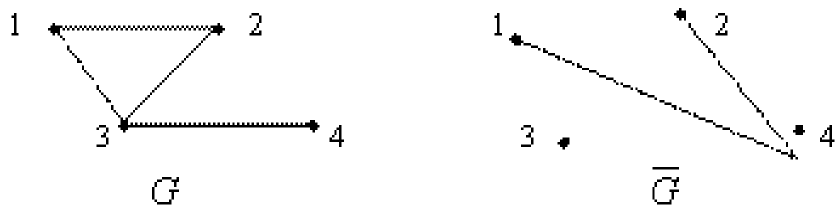
1. Graflar nazariyasiga oid asosiy tushunchalar

14.1- Ta’rif. Agar G=(X,U) grafning bo‘lagi $G^{|}$=($X^{|}$,$U^{|}$) uchun $X^{|} = X$ bo‘lsa, u holda graf **sugraf** deb ataladi.

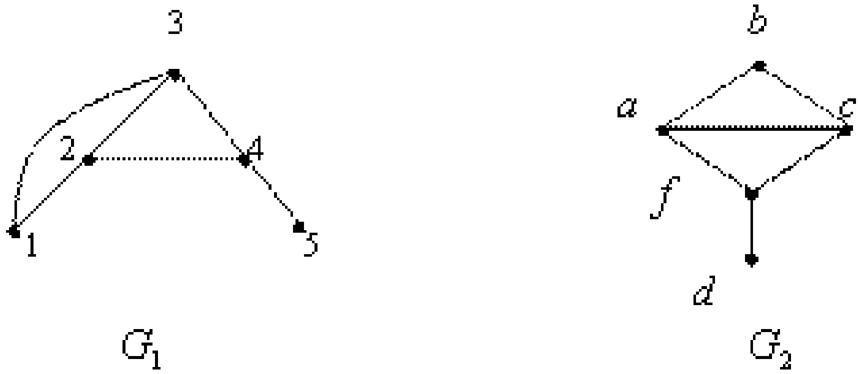
Sugraflarni hosil qilish uchun faqat qirralarga murojaat qilamiz. Quyidagi graflar sugraflardir.



14.1-Misol.



14.2-Ta’rif. Agar graflarning uchlari to`plami orasida qo`shnilik munosabatini saqlovchi biyeksiya mavjud bo`lsa, bu ikkita **graf izomorf** deyiladi. $G$ graf $H$ grafga izomorf bo`lsa, $G \cong H$ kabi belgilanadi.



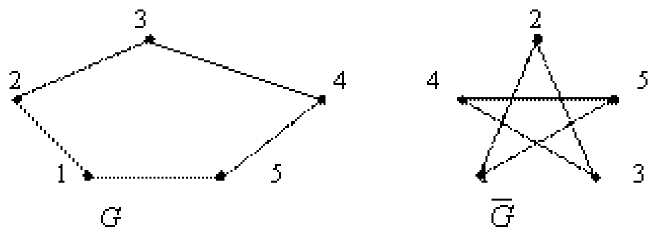
14.3-Misol.

$\varphi: V(G_1) \rightarrow V(G_2)$ $\varphi(1) = b$, $\varphi(2) = a$, $\varphi(3) = c$, $\varphi(4) = f$, $\varphi(5) = d$.

qo`shnilik munosabatini saqlovchi biyeksiya mavjud bo`lgani uchun $G_1 \cong G_2$ bo`ladi .

14.3-Ta'rif. Agar graf o`zining to`ldiruvchisiga izomorf bo`lsa, graf o`zini o`zi **to`ldiruvchi** deyiladi.

14.4-Misol.



14.4-Ta'rif. Qo`shni yoylar ketma-ketligi *yo`l*, qo`shni qirralar ketma-ketligi **zanjir** deyiladi. Yopiq yo`l **kontur** deyiladi, yopiq zanjir esa **sikl** deyiladi.

14.5-Ta'rif. Grafning har bir uchidan bir martadan o`tgan **yo`l elementar** deyiladi. Graf yoylari orqali bir martadan o`tgan yo`l **oddiy yo`l** deyiladi. Aks holda **murakkab yo`l** deyiladi.

14.6-Ta'rif. Agar zanjir grafning barcha uchlaridan bir martadan o`tsa, bunday zanjirga **gamilton zanjiri** deyiladi.

14.7-Ta'rif. Grafning barcha qirralaridan bir martadan o`tgan zanjir **eyler zanjiri** deyiladi.

14.8- Ta'rif. Ixtiyoriy ikkita uchini marshrut bilan birlashtirish mumkin bo`lgan graf **bog`liq graf** deyiladi.

14.9-Ta'rif. Grafning barcha uchlaridan o`tuvchi karrali qirralar va ilmoqlarga ega bo`lmagan graf **eyler grafi** deyiladi.

14.10-Ta'rif. Agar bog`liqli grafda har bir uchdan faqat bir martadan o`tuvchi tsikl (yoki marshrut) mavjud bo`lsa, bunday graf **gamilton grafi** deyiladi.

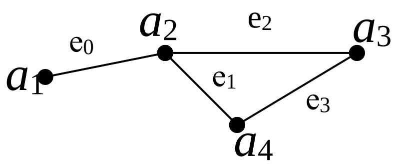
14.1-Teorema. Agar grafda karrali qirralari hamda ilmoq mavjud bo`lmasa, *n* ta uchga ega bo`lgan va bog`liq komponentasi *K* ga teng bo`lgan grafning qirralari soni eng ko`pi bilan aniqlanadi.

$$M = \frac{1}{2}(n-k)(n-k+1)$$

Mashrutning uzunligi deb, shu marshrutda mavjud qo`shni (e_{i-1}, e_i) qirralar soniga aytiladi.

Grafning ixtiyoriy *a* va ixtiyoriy *v* uchlari orasidagi **masofa** deb, shu uchlarni bog`lovchi eng kichik uzunlikka ega bo`lgan zanjirga aytiladi.

14.5-Misol.



$d(a_1,a_4)=(e_0, e_1)=2;$

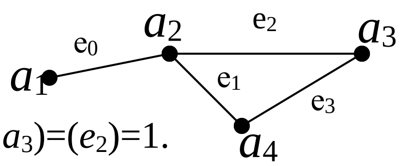
$d(a_1,a_4)=(e_0, e_2, e_3)=3$

bu erda masofa $d(a_1,a_4)=(e_0, e_1)=2$*; teng. Chunki eng kichik uzunlik.*

Grafning diametri deb, uchlari orasidagi eng katta uzunlikka ega bo`lgan masofaga aytiladi.

$$d(\Gamma) = \max_{a,в\in V} d(a,в)$$

14.6-Misol



$d(a_1,a_2)=(e_0)=1.$ $d(a_2,a_3)=(e_2)=1.$

$d(a_1,a_3)=(e_0, e_2)=2$ $d(a_2,a_4)=(e_1)=1.$

$d(a_1,a_4)=(e_0, e_1,)=2$ $d(a_3,a_4)=(e_3)=1.$

Bu misolda grafning diametri D=2 ga teng . Chunki masofalar orasida eng kattasi

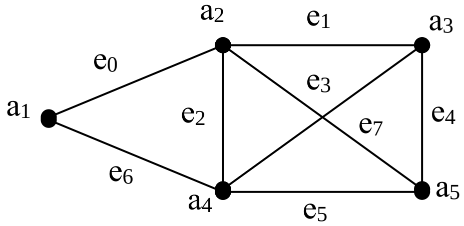
14.11-Ta'rif. *S* uch *G* grafning fiksirlangan uchi bo`lsin. *X* esa grafning ixtiyoriy uchi bo`lsin. *S* uch uchun maksimal masofani hisoblaymiz. Qandaydir S_0 uch uchun bu maksimal masofa boshqa uchlarga nisbatan minimal bo`lsa, u holda S_0 *G* **grafning markazi** deyiladi va S_0 uchun aniqlangan masofa *G* **grafning radiusi** deyiladi.

Gamilton grafi. Agar grafda oddiy sikl mavjud bo'lib, bu siklda grafning barcha tugunlari qatnashsa, bunday sikl Gamilton sikli deyiladi.

Oddiy zanjir Gamilton zanjiri deyiladi, agar bunday grafda tugunlarning xammasi ishtirok etsa. Tugun va qirralar takrorlanmasligi kerak.

Grafda Gamilton sikli mavjud bo'lsa, bu graf Gamilton grafi deyiladi.

14.7- Misol.



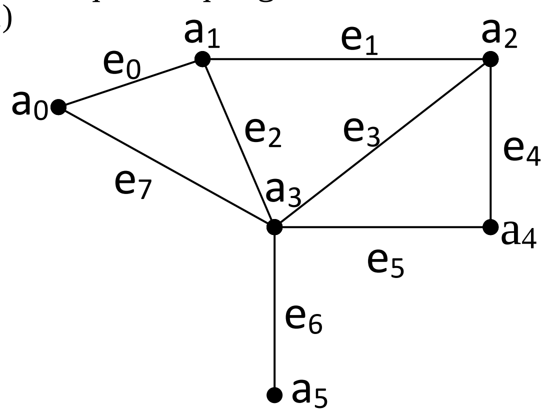
Bu grafda oddiy sikl S_1=(ye_0, ye_1, ye_4 ye_5, ye_6) – Gamilton sikli, S_2=(ye_0, ye_1, ye_7, ye_6) - Gamilton sikli emas, chunki a_5 tugun qatnashmayapti.

2.Mustaqil bajarish uchun masala va topshiriqlar

2.1.Graflar ustida amallar

1) Grafni markazini toping.
2) Grafni diametrini toping.
3) Grafni radiusini toping.
4) Grafda Eyler sikli mavjudligini tekshiring.
5) Grafda Gamilton sikli mavjudligini tekshiring.
6) Grafni siklomatik sonini toping.
7) Grafni qirralar sonini tugunlarning lokal darajalari va qo’shnilik matritsasi orqali aniqlang.

1)



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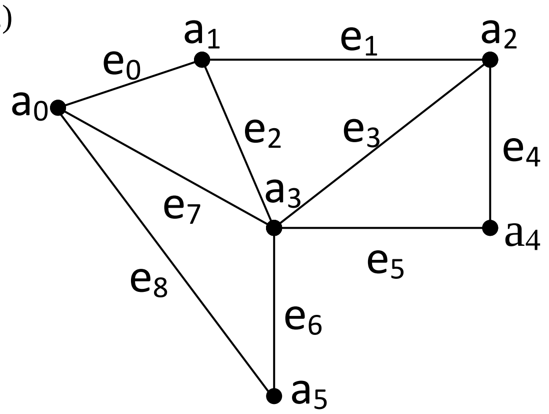

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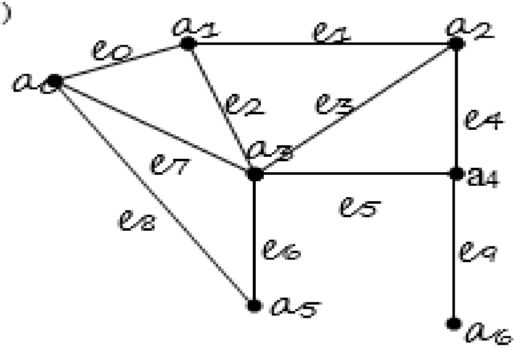

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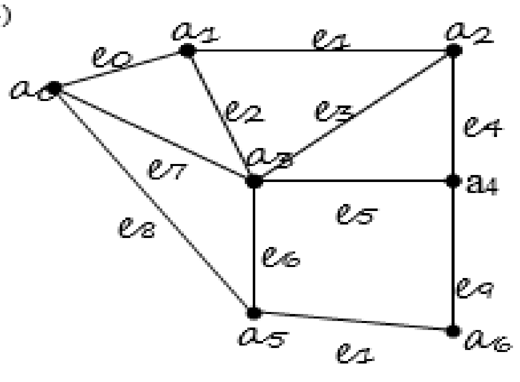

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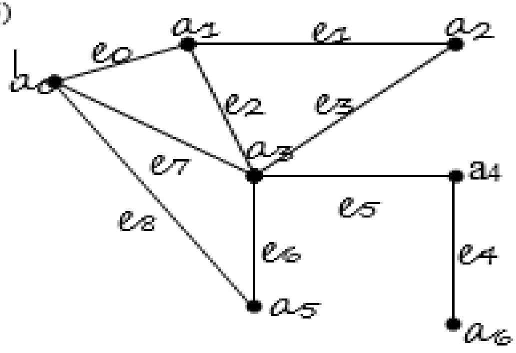

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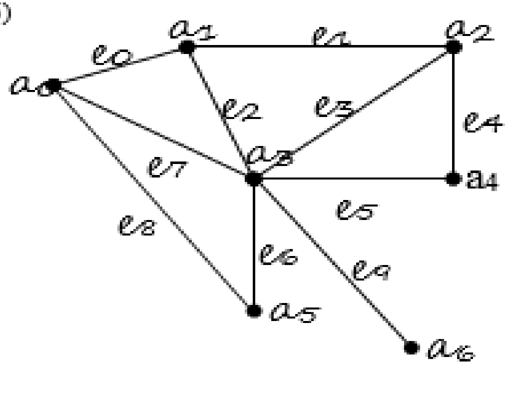

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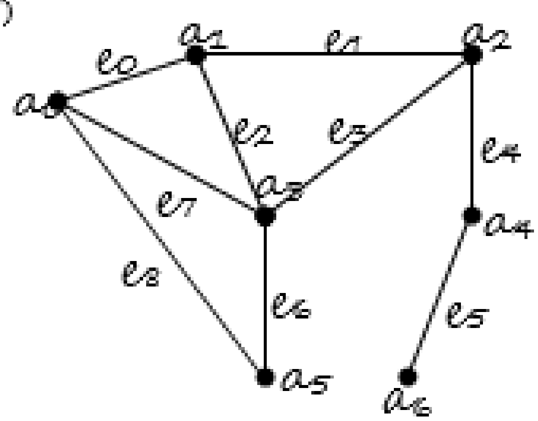

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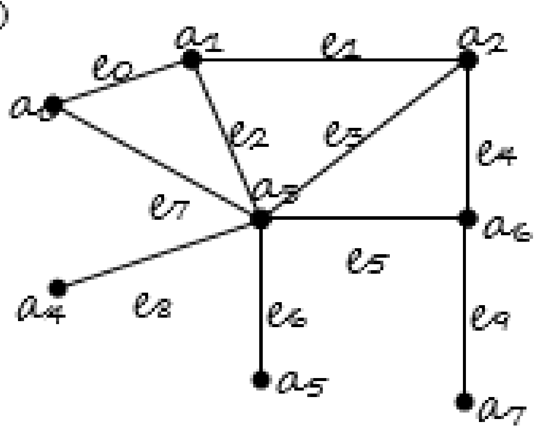

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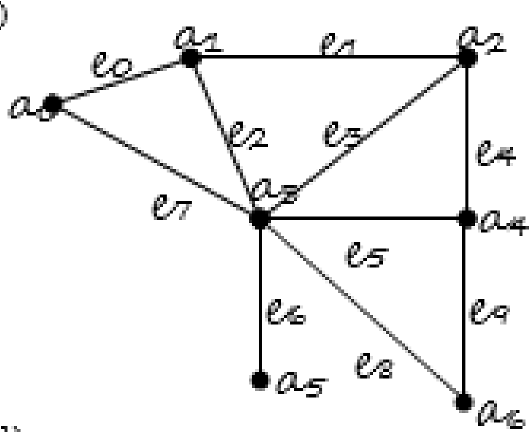

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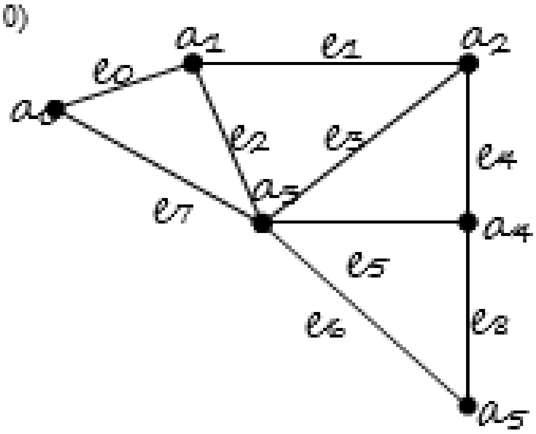

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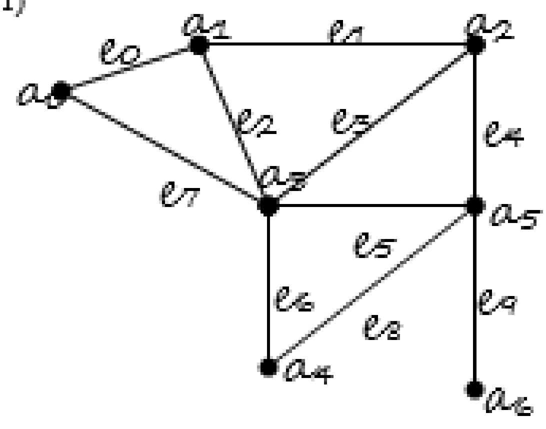

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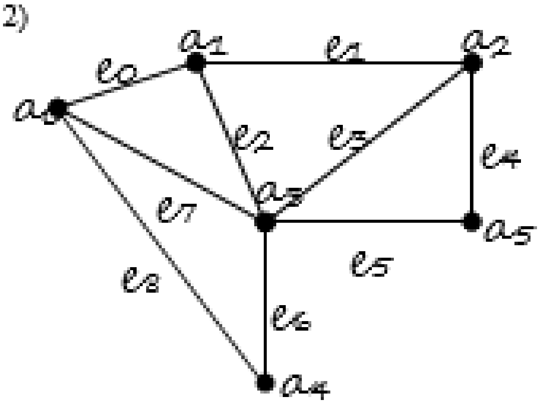

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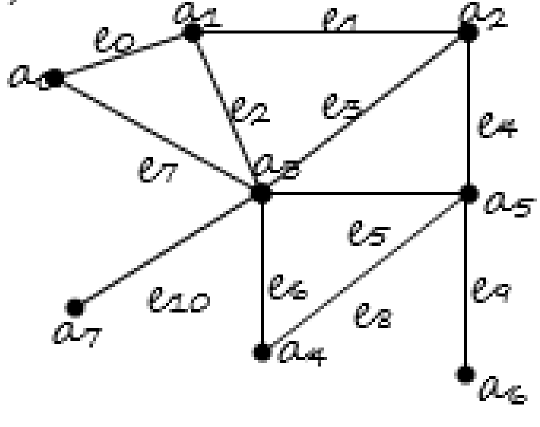

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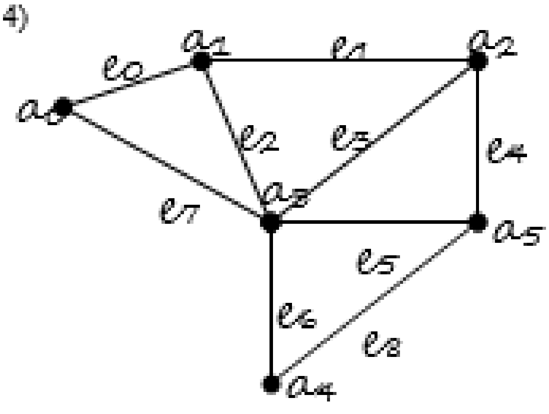

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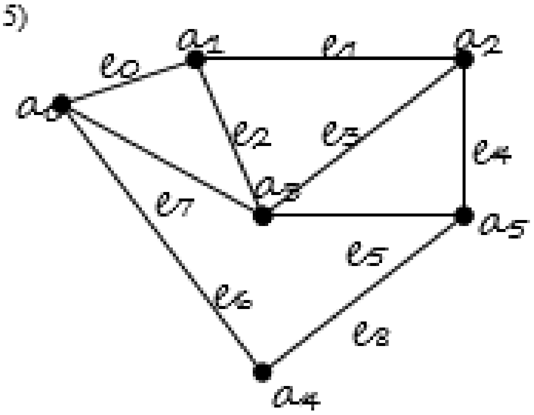

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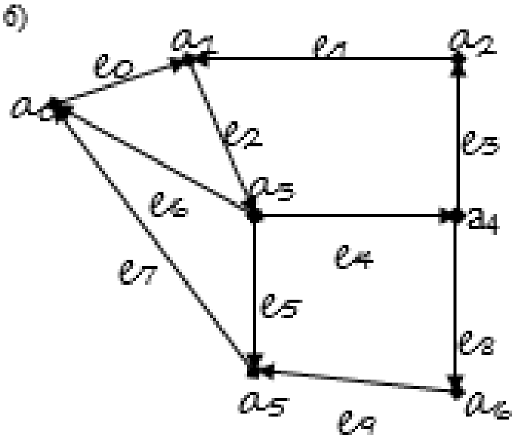

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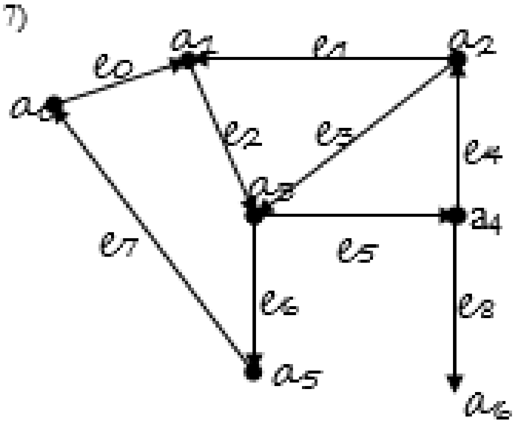

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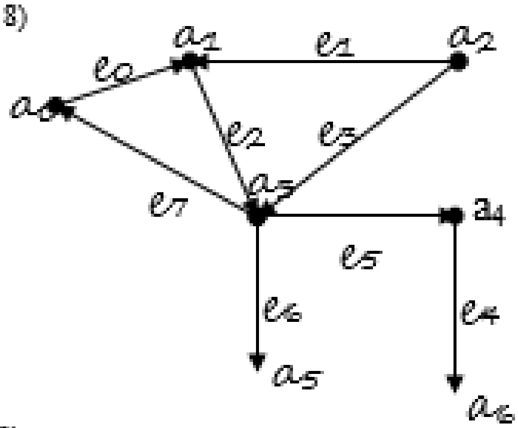

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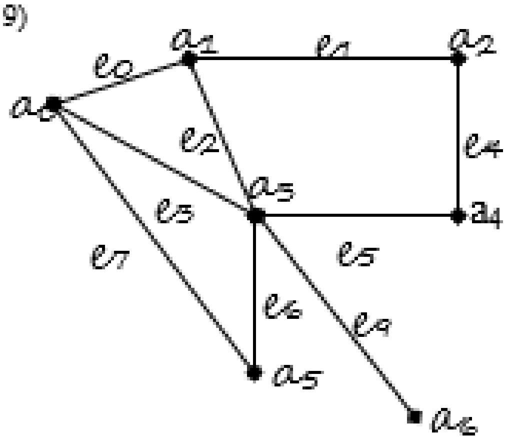

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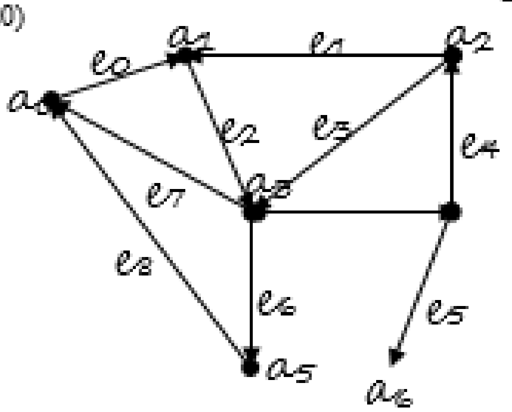

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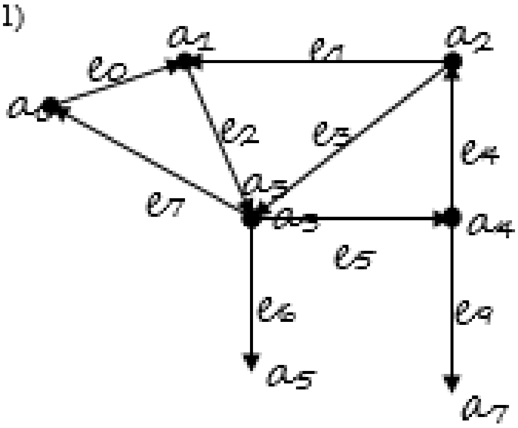

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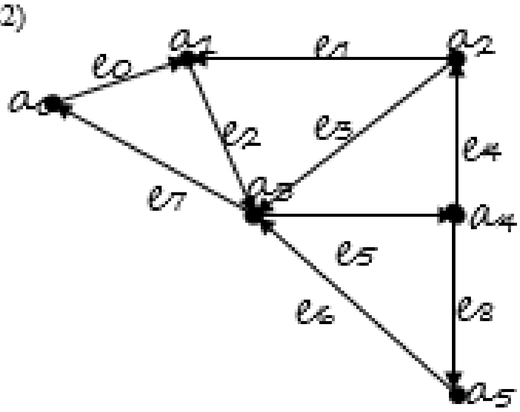

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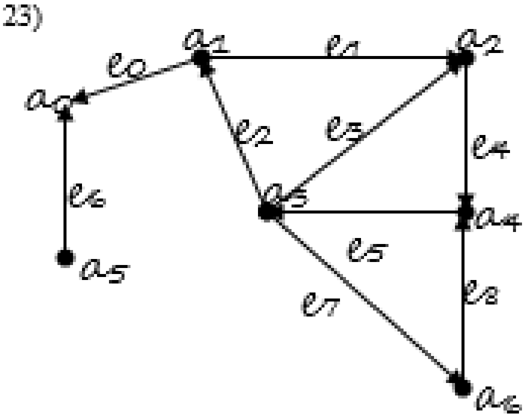

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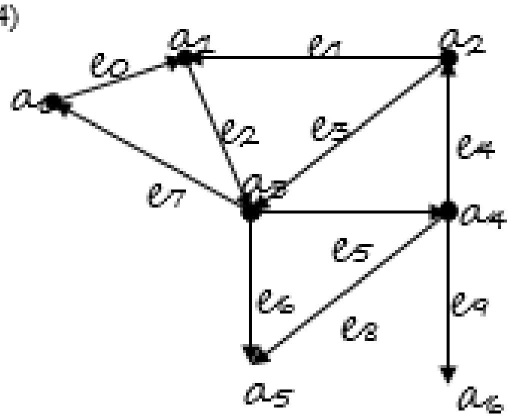

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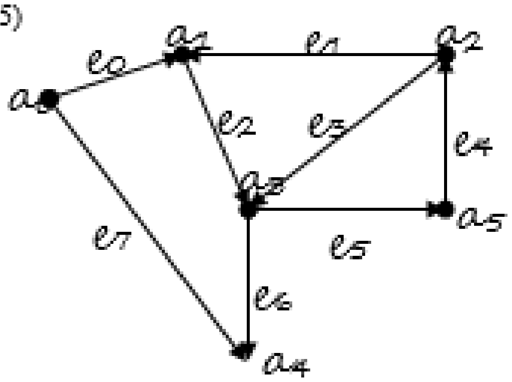

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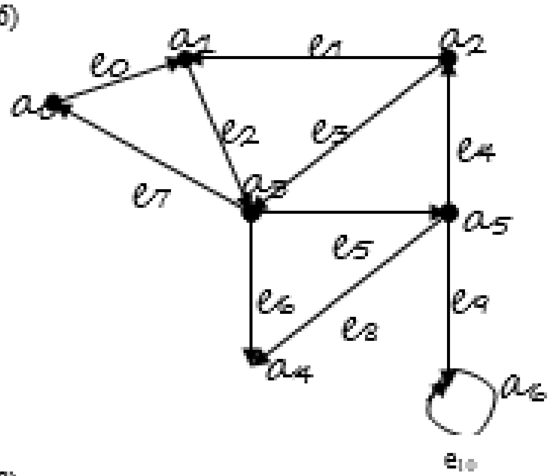

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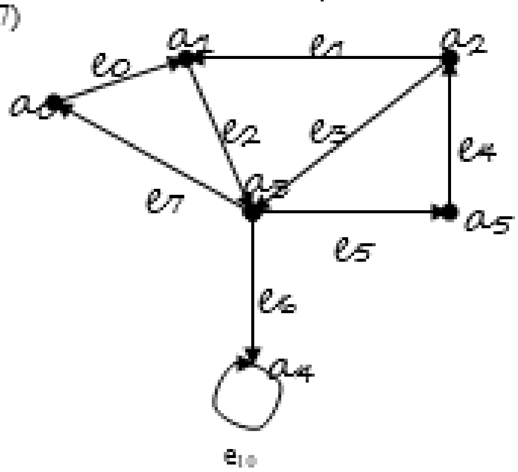

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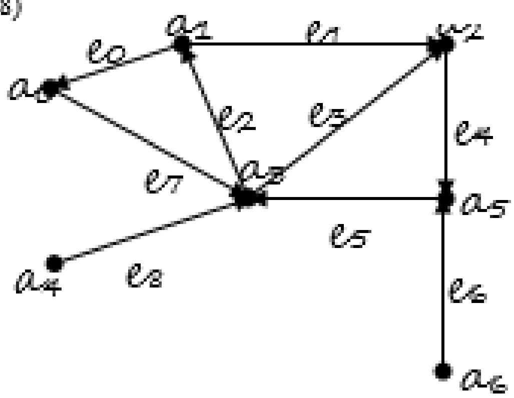

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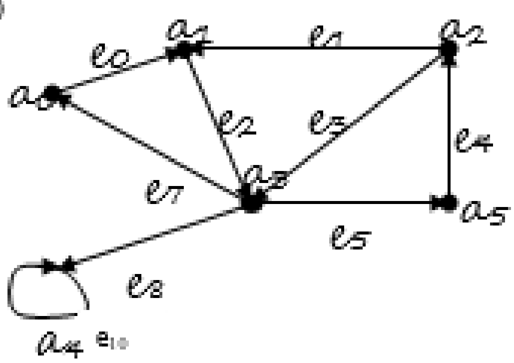

30)