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# SECI1013 : DISCRETE STRUCTURE

## ASSIGNMENT 3

## SECPH-02

| | |
|---|---|
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Question 1:

(a) $P(\text{Private university}) = \frac{175}{500}$

$= 0.35$

(b) $P(\text{Local Public university}) = 1 - 0.35$

$= 0.65$

(c) Yes, these two events are mutually exclusive events because the conditions does not occur at the same time and place. There are also no students that studies in both private and local public university at the same time.

(d) P = Private university

L = Local public university

B = Business-related field

- $P(B|P) = 0.6$
- $P(B|L) = 0.4$
- $P(P|B) = 0.7$

(i) $P(B|P) = \frac{P(P \cap B)}{P(P)}$

$P(P \cap B) = P(B|P) \times P(P)$

$= 0.6 \times 0.35$

$= 0.21$

(ii) $P(P|B) = \frac{P(B \cap P)}{P(B)}$

$P(B) = \frac{P(B \cap P)}{P(P|B)}$

$= \frac{0.21}{0.7}$

$= 0.3$

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(iii) $P(L|B) = \dfrac{P(B|L) \times P(L)}{[P(B|L) \times P(L)] + [P(B|P) \times P(P)]}$

$= \dfrac{0.4 \times 0.65}{(0.4 \times 0.65) + (0.6 \times 0.35)}$

$= 0.55$

Question 2

Number of vertices:

GLUCONEOGENESIS = 6 vertices

GLYCOLYSIS = 6 vertices

Number of edges:

GLUCONEOGENESIS = 6 edges

GLYCOLYSIS = 6 edges

Number of degrees of each vertex:

GLUCONEOGENESIS

| Vertex | Degree |
|---|---|
| ENO1 | 1 |
| PCK1 | 1 |
| LDHA | 1 |
| Pyruvate | 3 |
| PKLR | 2 |
| PEP | 4 |

GLYCOLYSIS

| Vertex | Degree |
|---|---|
| ENO2 | 1 |
| PCK2 | 1 |
| LDHB | 1 |
| Pyruvate | 3 |
| PKM | 2 |
| PEP | 4 |

Incident function; $f$ : GLUCONEOGENESIS → GLYCOLYSIS

GLUCONEOGENESIS = {ENO1, PCK1, LDHA, Pyruvate, PKLR, PEP}

GLYCOLYSIS = {ENO2, PCK2, LDHB, Pyruvate, PKM, PEP}

$f(ENO1) = ENO2$

$f(PCK1) = PCK2$

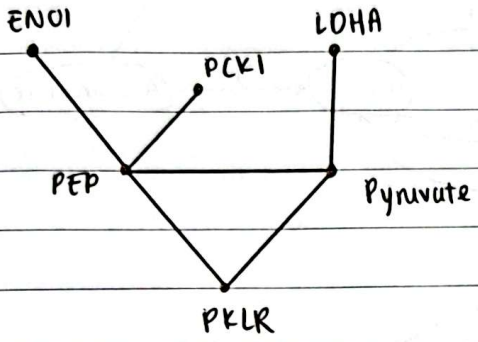
$f(LDHA) = LDHB$

$f(Pyruvate_{GLUCONEOGENESIS}) = Pyruvate_{GLYCOLYSIS}$

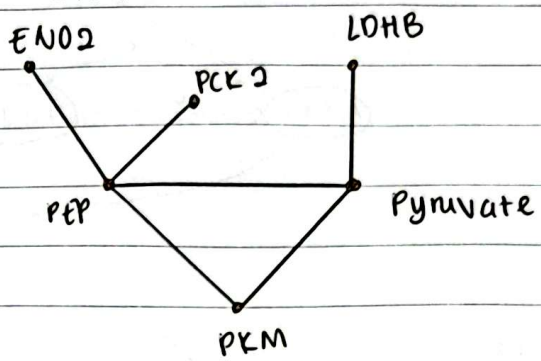
$f(PKLR) = f(PKM)$

$f(PEP_{GLUCONEOGENESIS}) = PEP_{GLYCOLYSIS}$

GLUCONEOGENESIS




GLYCOLYSIS




$A_{GLUCONEOGENESIS}$ =

| | ENO1 | PCK1 | LDHA | Pyruvate | PKLR | PEP |
|---|---|---|---|---|---|---|
| ENO1 | 0 | 0 | 0 | 0 | 0 | 1 |
| PCK1 | 0 | 0 | 0 | 0 | 0 | 1 |
| LDHA | 0 | 0 | 0 | 1 | 0 | 0 |
| Pyruvate | 0 | 0 | 1 | 0 | 1 | 1 |
| PKLR | 0 | 0 | 0 | 1 | 0 | 1 |
| PEP | 1 | 1 | 0 | 1 | 1 | 0 |

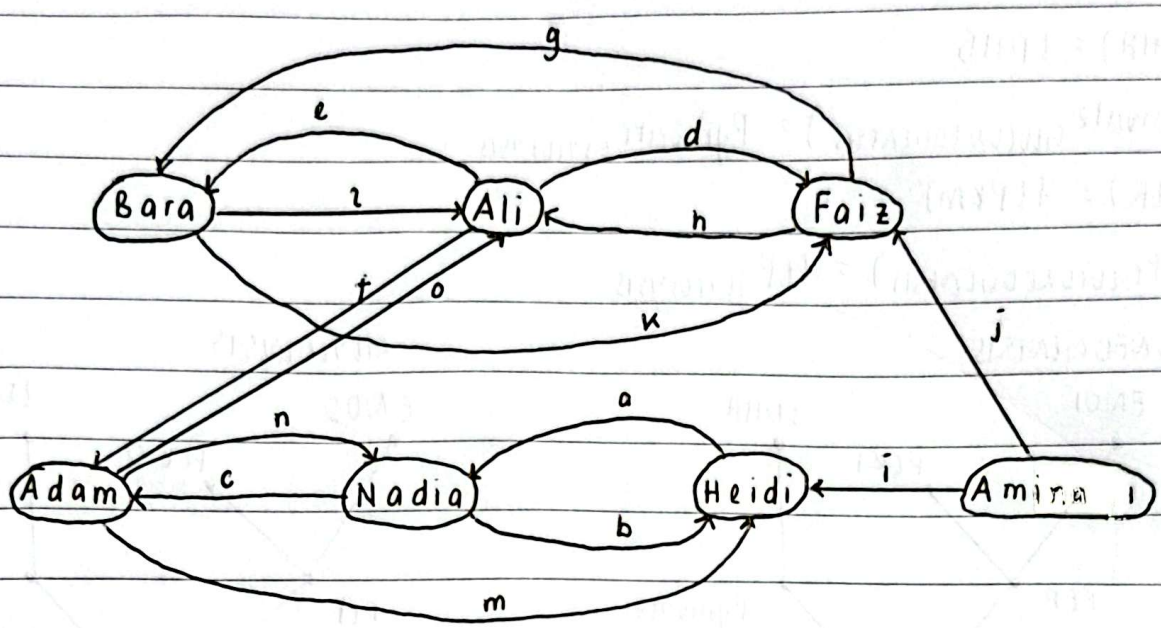
$A_{GLYCOLYSIS}$ =

| | ENO2 | PCK2 | LDHB | Pyruvate | PKM | PEP |
|---|---|---|---|---|---|---|
| ENO2 | 0 | 0 | 0 | 0 | 0 | 1 |
| PCK2 | 0 | 0 | 0 | 0 | 0 | 1 |
| LDHB | 0 | 0 | 0 | 1 | 0 | 0 |
| Pyruvate | 0 | 0 | 1 | 0 | 1 | 1 |
| PKM | 0 | 0 | 0 | 1 | 0 | 1 |
| PEP | 1 | 1 | 0 | 1 | 1 | 0 |

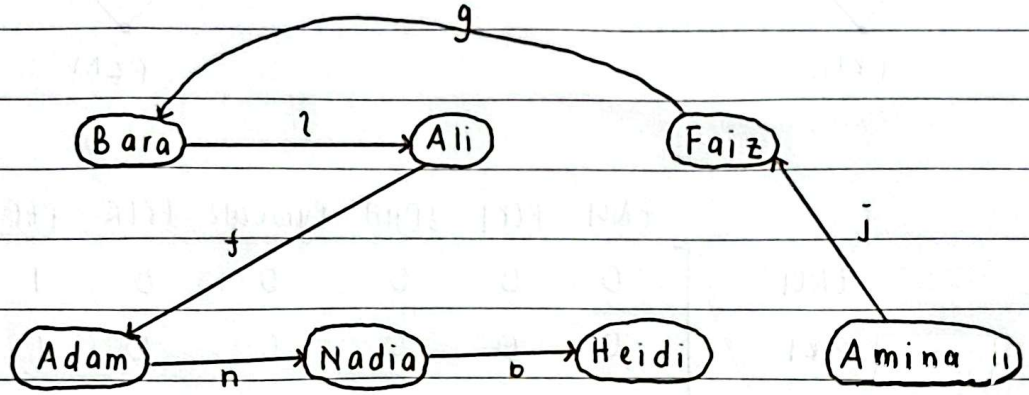
$\therefore$ Graph GLUCONEOGENESIS and GLYCOLYSIS are isomorphic.

Question 3

(a)




(b)




(Amina, j, Faiz, g, Bara, l, Ali, f, Adam, n, Nadia, b, Heidi)

(c) Hamilton path

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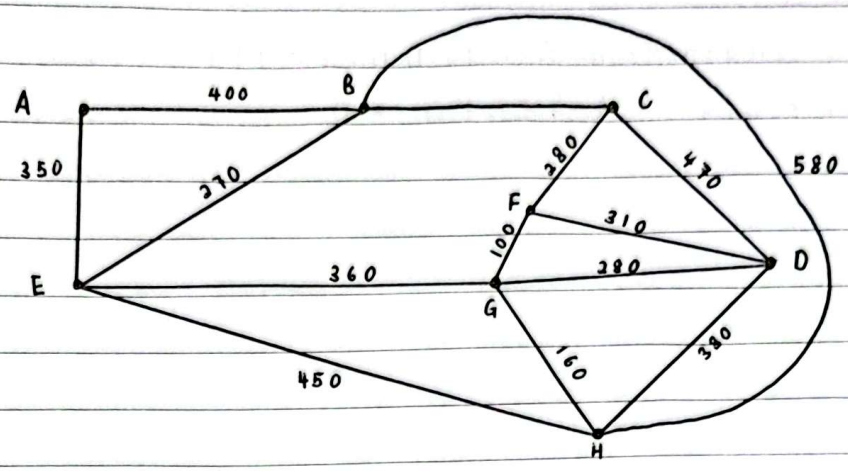
(d)(i)




(ii) d(A) = 2 d(E) = 4

d(B) = 4 d(F) = 3

d(C) = 3 d(G) = 4

d(D) = 4 d(H) = 4

(iii) (F, 100, G, 160, H, 450, E, 350, A, 400, B, 580, H, 380, D, 280, G, 360, 270, B, 260, C, 470, D, 310, F, 280, C)

It is possible. Based on Euler trail theorem, start and end station should has odd degree number, so we can start from F and end with C or vice versa.

(iv) Line between C and F should be closed, so that all vertices has even degree numbers. So, Euler's circuit exist.

(v)

| i | S | N | L(A) | L(B) | L(C) | L(D) | L(E) | L(F) | L(G) | L(H) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | ∅ | {A,B,C,D,E,F,G,H} | 0 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| 1 | {A} | {B,C,D,E,F,G,H} | - | 400 | ∞ | ∞ | 350 | ∞ | ∞ | ∞ |
| 2 | {A,E} | {B,C,D,F,G,H} | | 400 | ∞ | ∞ | - | ∞ | 710 | 800 |
| 3 | {A,E,B} | {C,D,F,G,H} | | - | 660 | ∞ | | ∞ | 710 | 800 |
| 4 | {A,E,B,C} | {D,F,G,H} | | | - | 1130 | | 940 | 710 | 800 |
| 5 | {A,E,B,C,G} | {D,F,H} | | | | 990 | | 810 | - | 800 |
| 6 | {A,E,B,C,G,H} | {D,F} | | | | 990 | | 810 | | - |
| 7 | {A,E,B,C,G,H,F} | {D} | | | | 990 | | - | | |
| 8 | {A,E,B,C,G,H,F,D} | ∅ | | | | - | | | | |

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Question 3

(v) minimum length from Ash to Daisy = 990

shortest route = A, E, G, D