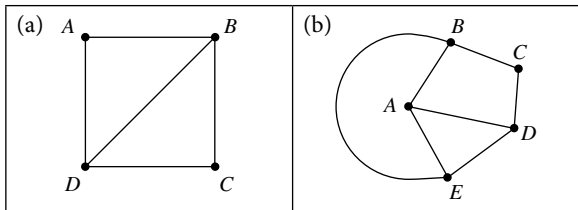# Penyelesaian Lengkap

**Praktis Formatif**

## 5.1 Rangkaian
### *Network*

**1** (a) $V = \{A, B, C, D, E\}$
   $n(V) = 5$

   (b) $E = \{(A, B), (A, D), (A, E), (B, C), (B, D), (C, D), (D, E)\}$
   $n(E) = 7$

   (c) Jumlah darjah/*Sum of degrees* = 2(7) = 14

   (d) Ya, sebab ia tidak mempunyai gelung dan berbilang tepi.
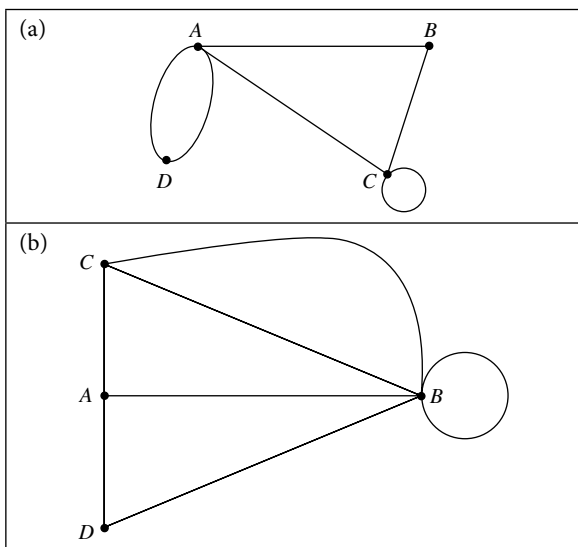   *Yes, because it does not have loop and multiple edges.*

**2**

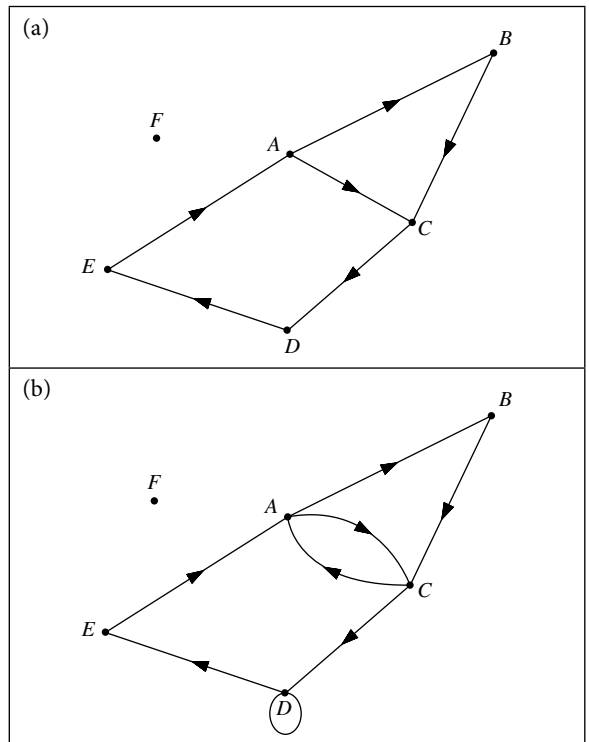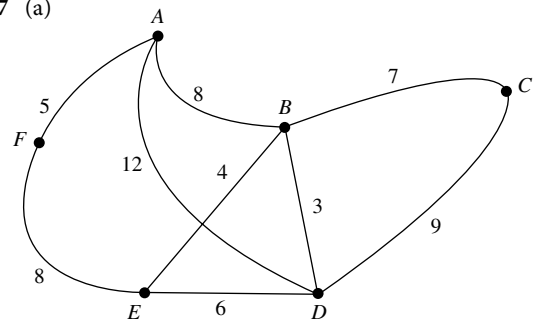| Graf *Graphs* | Bilangan bucu *Number of vertices* | Bilangan tepi *Number of edges* | Jumlah darjah *Sum of degrees* |
|---|---|---|---|
| (a) | 4 | 6 | 12 |
| (b) | 4 | 4 | 8 |
| (c) | 6 | 9 | 18 |

**3**



**4**



**5** (a) Jumlah darjah  = 2 + 3 + 2 + 1 + 2 + 2 + 2
   *Sum of degrees* = 14
   Graf boleh dilukis kerana jumlah darjah adalah genap.
   *The graph can be drawn because the sum of degrees is even.*

   (b) Jumlah darjah = 2 + 1 + 1 + 3 + 2 + 2 + 2
   *Sum of degrees* = 13
   Graf tidak boleh dilukis kerana jumlah darjah adalah ganjil.
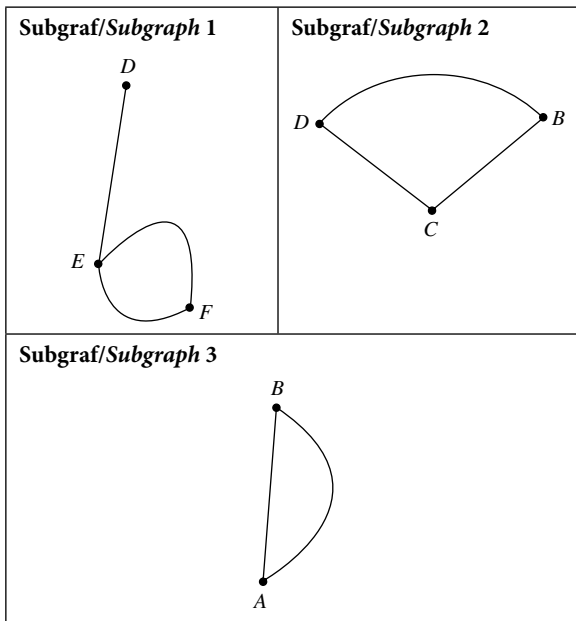   *The graph cannot be drawn because the sum of degrees is odd.*

**6**



**7** (a)

(b) (i) Jarak terpendek ialah C → B → E → F = 19 km
*The shortest distance is* C → B → E → F = 19 km

(ii) Jarak terpanjang ialah F → A → B → E → D → C = 32 km
*The longest distance is* F → A → B → E → D → C = 32 km

Ah Kow: Masa/*Time*

$= \dfrac{19}{60}$

= 0.3167 jam/*hour*

Muthu: Masa/*Time*

$= \dfrac{32}{60}$

= 0.5333 jam/*hour*

Perbezaan masa/*Difference in time*

= 0.5333 jam/*hour* – 0.3167 jam/*hour*

= 0.2166 jam/*hour*
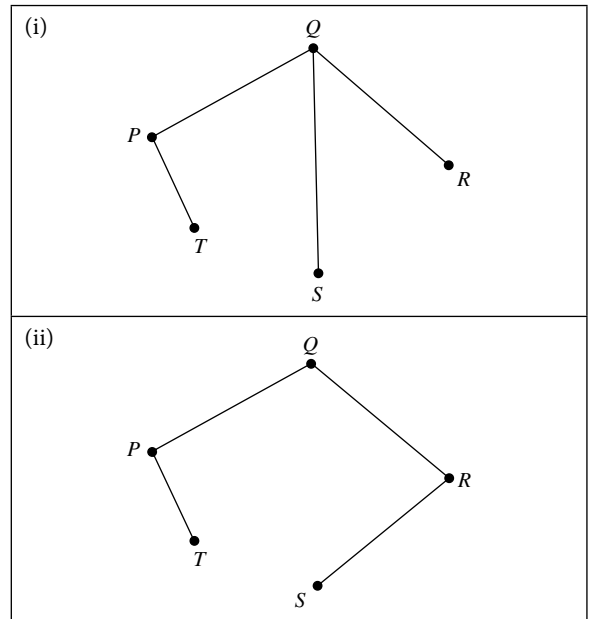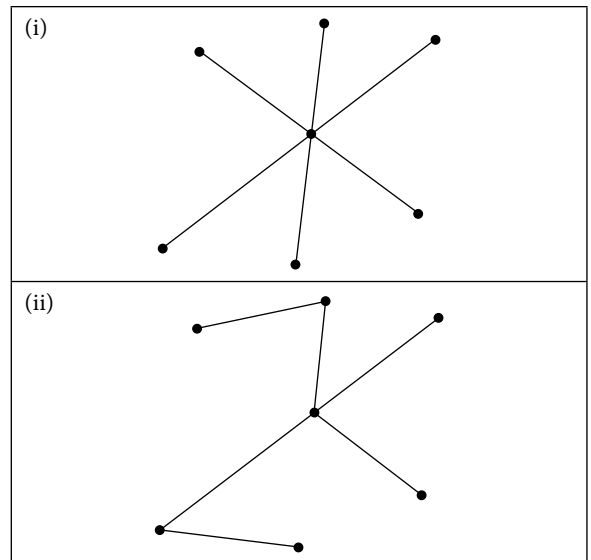
= (0.2166 × 60) minit/*minutes*

= 13 minit/*minutes*

**8**

| Subgraf/*Subgraph* 1 | Subgraf/*Subgraph* 2 |
|---|---|
|  |  |

Subgraf/*Subgraph* 3



**9** (a) Bukan pokok. Bucu = 8, tepi = 8. Bucu *A* dan *C* boleh dikaitkan dengan dua cara.
  (i) $A \to C$
  (ii) $A \to B \to C$
  *Not a tree.* 8 *vertices,* 8 *edges. Vertex A and vertex C can be connected in two ways.*
  (i) $A \to C$
  (ii) $A \to B \to C$

(b) Pokok. Bucu = 5, tepi = 4. Setiap pasangan bucu hanya dikaitkan dengan satu tepi.
  *A tree.* 5 *vertices,* 4 *edges. Each pair of vertices is connected by one edge.*

(c) Pokok. Bucu = 7, tepi = 6. Setiap pasangan bucu hanya dikaitkan dengan satu tepi.
  *A tree.* 7 *vertices,* 6 *edges. Each pair of vertices is connected by one edge.*

(d) Bukan pokok. Bucu = 6, tepi = 6. Bucu *F* mempunyai satu gelung.
  *Not a tree.* 6 *vertices,* 6 *edges. There is a loop at vertex F.*
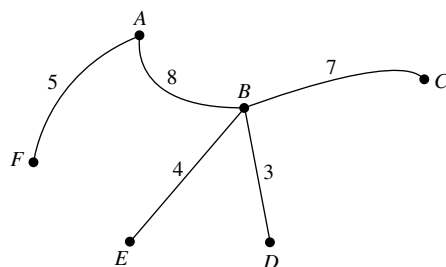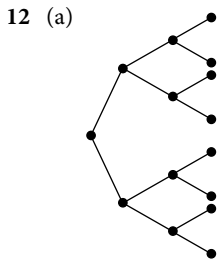
**10** (a)

| (i) |
|---|
|  |
| (ii) |
|  |

(b)

| (i) |
|---|
|  |
| (ii) |
|  |

**11**

Jumlah pemberat minimum pokok
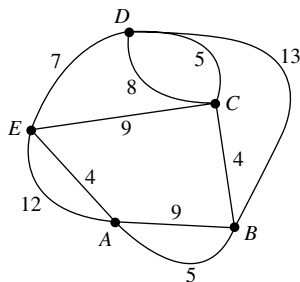*Minimum weightage of tree*
= 3 + 4 + 5 + 7 + 8
= 27

**12** (a)



(b)

| $n$ | Bilangan murid pada peringkat ke-$n$ *Number of students at the $n^{th}$ level* | Jumlah murid terlibat sehingga $n$ peringkat *Total number of students up to n levels* |
|---|---|---|
| 1 | $1 = 2^0$ | $1 = 2^1 - 1$ |
| 2 | $2 = 2^1$ | $3 = 2^2 - 1$ |
| 3 | $4 = 2^2$ | $7 = 2^3 - 1$ |
| 4 | $8 = 2^3$ | $15 = 2^4 - 1$ |

(c)  $T_n = 2^{n-1}$, $S_n = 2^n - 1$

**13**



(a)  7 ($D$ ke/*to* $E$) + 4 ($E$ ke/*to* $A$) = 11 minit/*minutes*
(b)  5 ($B$ ke/*to* $A$) + 4 ($A$ ke/*to* $E$) = 9 minit/*minutes*
(c)  4 ($C$ ke/*to* $B$) + 5 ($B$ ke/*to* $A$) = 9 minit/*minutes*

**14** (a)  120 + 100 + 110 + 70 + 60 + 130 = 590 m
(b)  Boleh/*Can*
Laluan pegawai: Pejabat $\rightarrow E \rightarrow H \rightarrow G \rightarrow F \rightarrow E \rightarrow D \rightarrow C \rightarrow B \rightarrow A \rightarrow$ Pejabat
*The route of the officer: Office* $\rightarrow E \rightarrow H \rightarrow G \rightarrow F \rightarrow E \rightarrow D \rightarrow C \rightarrow B \rightarrow A \rightarrow$ *Office*

**15**  Cadangan jawapan/*Suggested answers:*

| Perjalanan pilihan *Travelling option* | Masa perjalanan *Travelling time* | Perbelanjaan *Expenses* (RM) |
|---|---|---|
| (A) + (E) + (F) | 5 jam 3 minit 5 *hours* 3 *minutes* | 465.90 |
| (C) + (F) | 5 jam 50 minit 5 *hours* 50 *minutes* | 282.90 |
| (D) + (F) | 4 jam 34 minit 4 *hours* 34 *minutes* | 305.50 |

Pilihan perjalanan yang paling optimum (jimat) ialah (C) + (F), iaitu menaiki bas terus ke KLIA lalu menaiki kapal terbang 1 ke Kuching. Dari segi masa, (D) + (F), iaitu memandu ke KLIA lalu menaiki kapal terbang 1 memakan masa yang paling singkat. Akan tetapi, bayaran untuk parkir di KLIA akan meningkatkan perbelanjaan.
*The most optimum travelling option (most economical) is* (C) + (F) *using bus from Ipoh to KLIA then use flight 1 to Kuching. In term of travelling time,* (D) + (F) *that is drive to KLIA then use flight 1 to Kuching is the shortest, but the parking fee will increase the expenses which is not taken into consideration in the calculation of expenses above.*
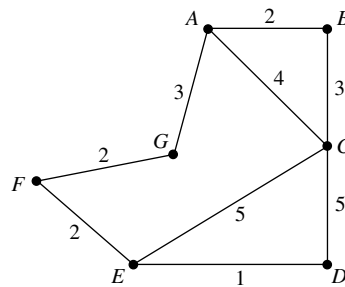
**Praktis Sumatif**

**Kertas 1**
**1** A     **2** D     **3** C     **4** A     **5** D
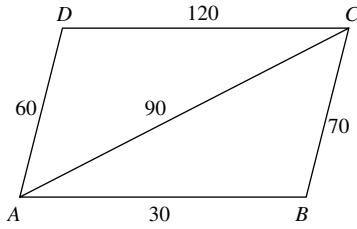**6** D

**Kertas 2**
**Bahagian/*Section* B**

**1**



(a)  (i)  $A \rightarrow B \rightarrow C \rightarrow D$
   (ii)  $A \rightarrow C \rightarrow E \rightarrow D$
(b)  $A \rightarrow G \rightarrow F \rightarrow E \rightarrow D$
   8 minit/*minutes*

**2** (a)  1.  Pejabat/*Office* $\rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow$ Pejabat/*Office*
   2.  Pejabat/*Office* $\rightarrow E \rightarrow D \rightarrow C \rightarrow B \rightarrow A \rightarrow$ Pejabat/*Office*
   3.  Pejabat/*Office* $\rightarrow A \rightarrow B \rightarrow E \rightarrow D \rightarrow C \rightarrow$ Pejabat/*Office*
   4.  Pejabat/*Office* $\rightarrow C \rightarrow D \rightarrow E \rightarrow B \rightarrow A \rightarrow$ Pejabat/*Office*

(b)  (i)  1.  $E \rightarrow D \rightarrow C \rightarrow B \rightarrow A \rightarrow$ Pejabat/*Office* $\rightarrow E$
   2.  $E \rightarrow$ Pejabat/*Office* $\rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow E$
   3.  $E \rightarrow$ Pejabat/*Office* $\rightarrow B \rightarrow D \rightarrow C \rightarrow$ Pejabat/*Office* $\rightarrow A \rightarrow B \rightarrow E$

   (ii)  Laluan Puan Aini bukan sebuah pokok kerana bucu-bucu boleh dikaitkan dengan lebih daripada satu cara.
   *Puan Aini's route is not a tree because the vertices are connected in more than one way.*
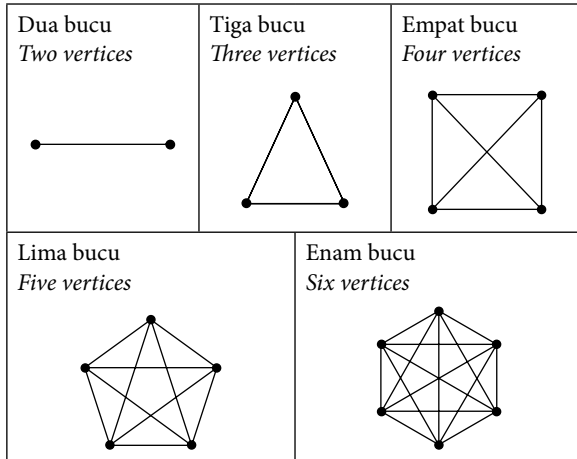
**3** (a)



(b) Rumah Ahmad (*A*), Bob (*B*), Chan (*C*) dan Daniel (*D*).
*Houses of Ahmad (A), Bob (B), Chan (C) and Daniel (D).*

(c) Jarak, dalam m, di antara rumah Ahmad, Bob, Chan dan Daniel.
*Distance, in m, between the houses of Ahmad, Bob, Chan and Daniel.*

(d) Bob dan/*and* Daniel

## Bahagian/*Section C*

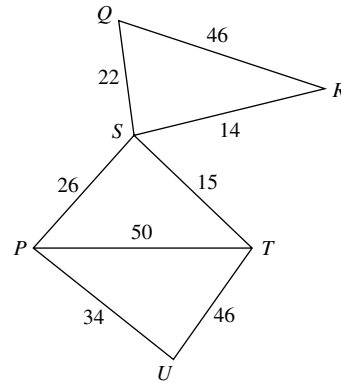**4** (a)

| Dua bucu *Two vertices* | Tiga bucu *Three vertices* | Empat bucu *Four vertices* |
|---|---|---|
|  |  |  |

| Lima bucu *Five vertices* | Enam bucu *Six vertices* |
|---|---|
|  |  |

(b)

| Bilangan bucu *Number of vertices* | Bilangan tepi untuk graf lengkap yang dilukis *Number of edges for complete graph drawn* |
|---|---|
| 2 | $1 = \dfrac{2(2-1)}{2}$ |
| 3 | $3 = \dfrac{3(3-1)}{2}$ |
| 4 | $6 = \dfrac{4(4-1)}{2}$ |
| 5 | $10 = \dfrac{5(5-1)}{2}$ |
| 6 | $15 = \dfrac{6(6-1)}{2}$ |

$\dfrac{(n)(n-1)}{2}$, $n = 2, 3, 4, \ldots$

(c) $n = 7$, bilangan tepi/*number of edges* $= \dfrac{7(7-1)}{2}$
$= 21$

**5** (a)



(b) Bandar-bandar *P, Q, R, S, T* dan *U*.
*Towns P, Q, R, S, T and U.*

(c) Jarak, dalam km, di antara bandar.
*Distance, in* km, *between towns*.

(d) *Q* dan/*and R*

(e) (i) $U \to T \to S$ atau/*or* $U \to P \to S$ atau/*or* $U \to T \to P \to S$ atau/*or* $U \to P \to T \to S$

(ii) $U \to P \to S$, 60 km