INSTRUCTION:
This section consists of **FOUR (4)** subjective questions. Answer **ALL** the questions in the answer booklet provided.

ARAHAN :
*Bahagian ini mengandungi **EMPAT (4)** soalan subjectif. Jawab **SEMUA** soalan dalam buku jawapan yang disediakan.*

QUESTION 1
SOALAN 1

CLO2
C1

(a) Determine each of the following sentences whether it is a proposition or not.
Tentukan sama ada setiap pernyataan berikut adalah pernyataan atau tidak.

(i) Give me a cup of coffee.
Berikan saya secawan kopi.

(ii) Kuala Lumpur is capital of Malaysia.
Kuala Lumpur adalah ibu negara Malaysia.

(iii) $5a \geq 10$, if $a = 2$
$5a \geq 10$, *jika* $a = 2$

(iv) The sun will rise tomorrow.
Matahari akan terbit esok.

(v) Stop the car now.
Berhentikan kereta itu sekarang.

[5 marks]
[5 markah]

CLO2
C2

(b) Given *p*, *q* and *r* are the propositions.
Diberi p,q dan r adalah pernyataan:

P: Marzuki will study Science.
P: Marzuki akan belajar Sains.

Q: Marzuki will go for tuition class.
Q: Marzuki akan pergi ke kelas tusyen.

R : Marzuki feels happy.
R : Marzuki berasa gembira.

State each of the following proposition using the symbols and logical connectives.
Nyatakan setiap pernyataan berikut kepada simbol dan penyambung logik.

(i) Marzuki will go for tuition class but he will not study Science.
Marzuki akan pergi ke kelas tusyen tetapi dia tidak akan belajar Sains.

[2 marks]
[2 markah]

(ii) Marzuki feels not happy if and only if he will go for tuition class or study Science.
Marzuki berasa tidak gembira jika dan hanya jika dia akan pergi ke kelas tusyen atau belajar Sains.

[3 marks]
[3 markah]

CLO2
C2

(c) Given that p is True, q is false and r is false. Find the truth value of each of the following proposition.

(i) $q \vee r \wedge \sim p$

[2 marks]
[2 markah]

(ii) $(p \rightarrow q) \wedge (q \rightarrow r) \vee \sim r$

[3 marks]
[3 markah]

CLO2
C3

(d) Construct circuits for these outputs.
Bina litar untuk output berikut.

(i) $\overline{(X+Y)}\ .X$

[3 marks]
[3 markah]

(ii) $XYZ + \overline{XYZ}$

[3 marks]
[3 markah]

(iii) $\overline{AB(C+D)}\ E$

[4 marks]
[4 markah]

QUESTION 2
SOALAN 2

CLO1
C1

(a) Given the universal set $\xi = \{x | 20 \leq x \leq 30\}, K = \{$the number that end with 1, 7 or 9$\}$, $M = \{$multiple of 3$\}$ and $N = \{$factor of 200$\}$.

Diberi set universal $\xi = \{x | 20 \leq x \leq 30\}, K = \{$nombor yang berakhir dengan 1, 7 or 9$\}$, $M = \{$gandaan 3$\}$ and $N = \{$faktor 200$\}$.

(i) Write set *K*, *M* and *N* by listing their elements.

Tulis set K, M dan N dengan menyenaraikan semua elemen.

[2 marks]
[2 markah]

(ii) Draw the Venn Diagram to represent the above set.

Lukis gambarajah Venn mewakili set tersebut.

[2 marks]
[2 markah]

(iii) Write each of the following set by listing their element.

Tulis setiap set berikut dengan menyenaraikan elemen masing-masing.

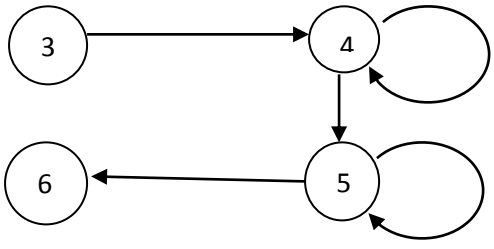
(a) $(K \cup M') \cap N$

(b) $n(M - K)' \cup N$

[4 marks]
[4 markah]

CLO1
C2

(b) The following digraph as in following figure shows the relation R on a set {3, 4, 5, 6}.



(i) Write the ordered pairs of relation R.

Tulis pasangan hubungan R.

[2 marks]
[2 markah]

(ii) State the in-degree and out-degree of all vertices of R.

Nyatakan in-degree dan out-degree untuk semua vertex R

[2 marks]
[2 markah]

(iii) Explain whether the relation R is equivalence or not.

Jelaskan sama ada hubungan R seimbang atau tidak.

[3 marks]
[3 markah]

CLO1
C3

(c) Given f(x) = 7 x + 6 and g(x) = 3x - 5, find the value of

Diberi f(x) = 7 x + 6 dan g(x) = 3x - 5, carikan nilai

(i) $gf(x)$

[2 marks]
[2 markah]

(ii) $fg(4)$

[2 marks]
[2 markah]

(iii) $g^2f(x)$

[3 marks]
[3 markah]

(iv) $f^2(x)$

[3 marks]
[3 markah]

QUESTION 3
SOALAN 3

CLO2
C1

(a) Draw the following graphs.
Lukis graf-graf berikut.

(i) A discrete graph D5
Graf diskrit D_5

[1 mark]
[1 markah]

(ii) A linear graph L_7
Graf linear L_7

[2 marks]
[2 markah]

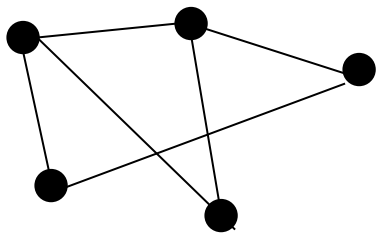
(iii) A complete Bipartite graph $K_{4,3}$
Graf lengkap bipartite $K_{4,3}$

[2 marks]
[2 markah]

CLO2
C1

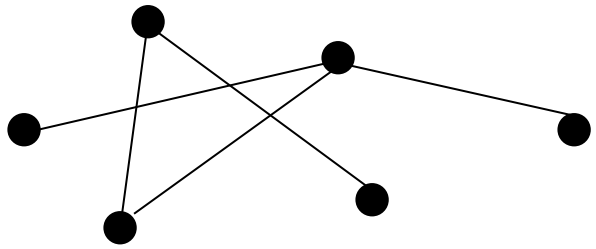
(b) Identify the following graph whether it is a tree or not. If it is not a tree, state your reason.
Kenal pasti sama ada graf berikut adalah pepohon atau tidak. Jika tidak, nyatakan sebab anda.

(i)



[2 marks]
[2 markah]

(ii)

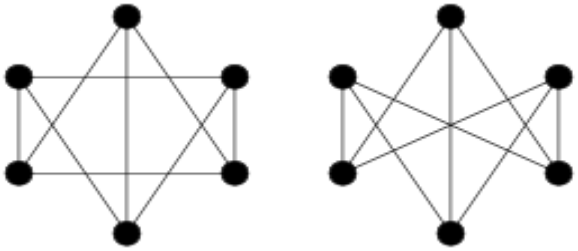


[2 marks]
[2 markah]

CLO2
C2

(c) Determine whether or not Graph A is isomorphic to Graph B. Describe your answer.

Tentukan sama ada Graf A adalah isomorphic kepada Graf B atau tidak. Terangkan jawapan anda.



Graph A
Graf A

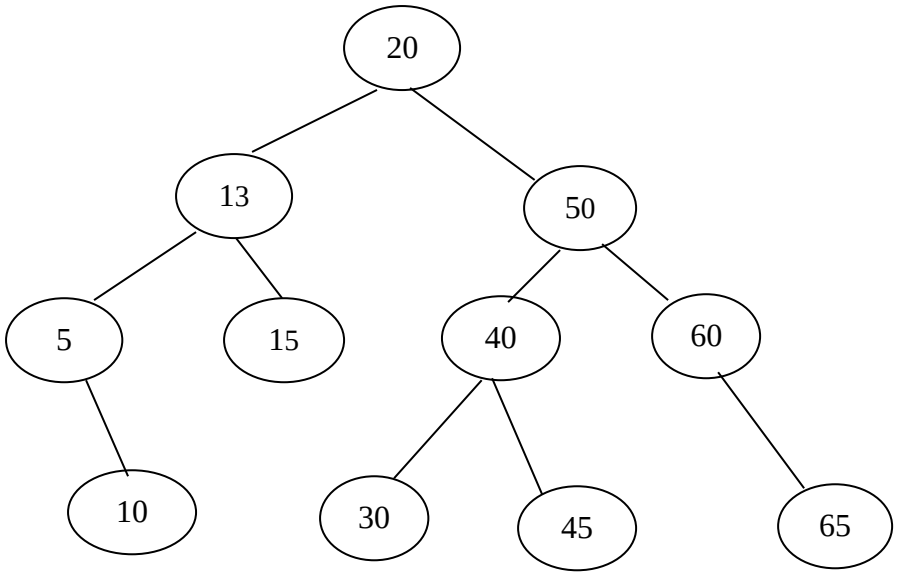
Graph B
Graf B

[3 marks]
[3 markah]

CLO2
C2

(d) Based on the order rooted tree in the following figure, state the pre-order, in-order and post order.

Berdasarkan pohon susunan berakar pada rajah berikut, nyatakan penyusunan pra-tertib, dalam-tertib dan pre-tertib.

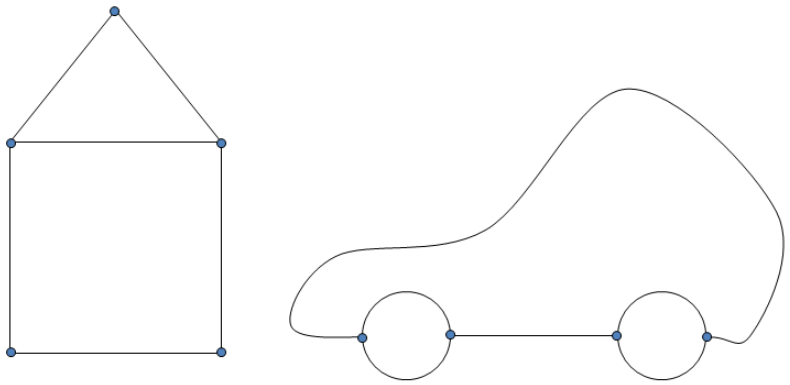


[3 marks]
[3 markah]

CLO2
C3

(e) Which of the following graph has an Euler Path? Justify your answer.

Manakah antara graf berikut mempunyai Euler Path? Terangkan jawapan anda.



Graph A
Graf A

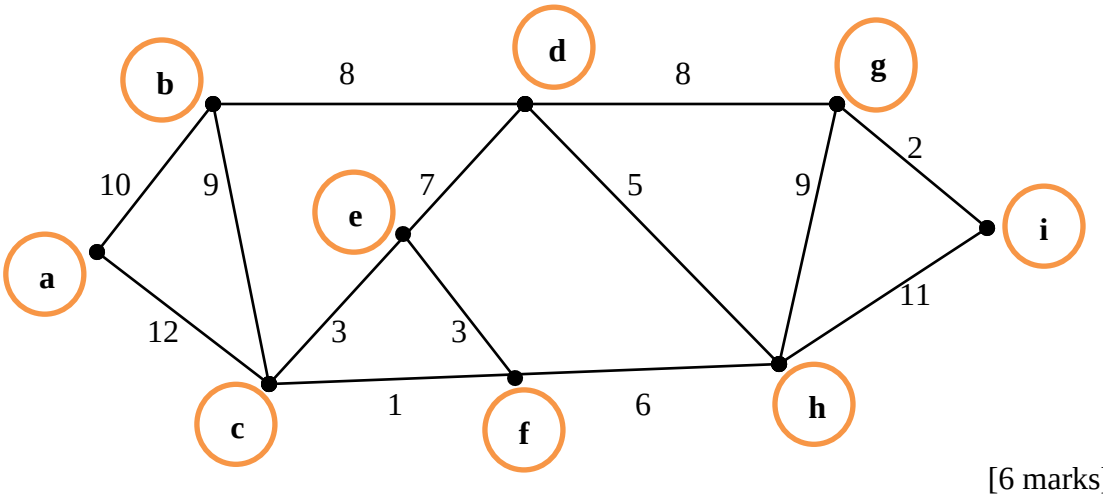
Graph B
Graf B

[4 marks]
[4 markah]

CLO2
C3

(f) Refer to the following figure, find a minimal spanning tree using Kruskal's Algorithm.

Rujuk kepada rajah berikut, cari spanning tree paling minimum dengan menggunakan algorithm Kruskal.



[6 marks]
[6 markah]

QUESTION 4
SOALAN 4

CLO1
C1

(a) Suppose that f is defined recursively by $f(0) = 2$ and $f(n+1) = 3f(n) - 2[3 - f(n)]$. Find the following functions.
Diberi f yang ditakrifkan dengan $f(0) = 2$ and $f(n+1) = 3f(n) - 2[3 - f(n)]$. Cari fungsi-fungsi berikut.

(i) $f(1)$
(ii) $f(2)$
(iii) $f(3)$
(iv) $f(4)$

[8 marks]
[8 markah]

CLO1
C2

(b) Let $P(n)$ be the statement that $1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$ for the positive integer n.
Diberi $P(n)$ adalah pernyataan $1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$ untuk nombor integer positif n.

(i) Show that $P(1)$ is true by completing the basis step of the proof.
Buktikan $P(1)$ adalah betul dengan menyempurnakan langkah asas bagi pembuktian.

[2 marks]
[2 markah]

(ii) Complete the inductive step. Justify the answer.
Sempurnakan langkah induktif. Terangkan jawapan.

[5 marks]
[5 markah]

(c) Produce a recursive definition for the following if n = 1, 2, 3, ...

Hasilkan definisi rekursif bagi persamaan berikut jika n = 1, 2, 3, ...

(i) $a_n = 7n$

[2 marks]
[2 markah]

(ii) $K_n = 2n + 1$

[4 marks]
[4 markah]

(iii) $a_n = 3 - n^2$

[4 marks]
[4 markah]