SULIT

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI 1 2018/2019

BEU5183 : ARTIFICIAL INTELLIGENCE

TARIKH : 07 JANUARI 2019
MASA : 9.00 PAGI – 12.00 TENGAH HARI (3 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1
C2

a) Explain briefly the Artificial Intelligence (AI)
Terangkan dengan ringkas dan jelas Artificial Intelligence (AI).

[4 marks]
[4*markah*]

CLO1
C3

b) List **FOUR (4)** examples of human intelligence in our everyday lives. *Senaraikan **EMPAT (4)** contoh kecerdasan manusia dalam kehidupan seharian kita.*

[8 marks]
[8*markah*]

CLO2
C4

c) Illustrate the Forward Chaining inferences technique.
Gambarkan Forward Chaining inferences technique.

[7 marks]
[7*markah*]

CLO2
C5

d) There are five types of rule can be represented in Artificial Intelligence (AI). Propose **THREE (3)** rules with the appropriate cases.
*Terdapat lima jenis rules yang boleh digunakan dalam Artificial Intelligence (AI). Cadangkan **TIGA (3)** peraturan dengan kes yang bersesuaian.*

[6 marks]
[6*markah*]

QUESTION 2

SOALAN 2

CLO1 C2

a) Explain the uncertainty management in rule base expert.
Terangkan uncertainty management dalam rule base expert.

[4 marks]
[4*markah*]

CLO1 C3

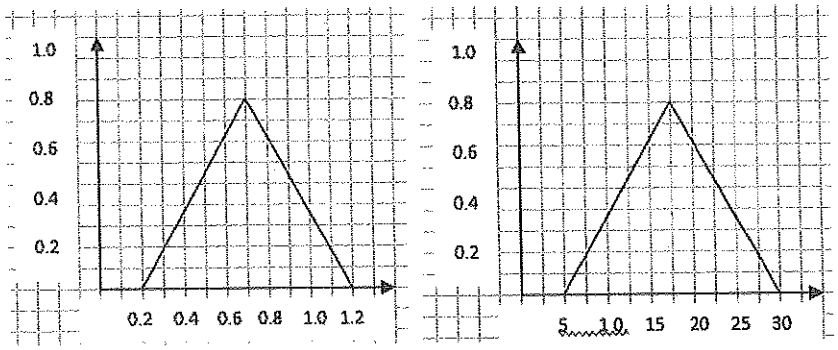
b) Determine the limitations of expert systems in Artificial intelligence
Tentukan kelemahan-kelemahan bagi expert system dalam Artificial intelligence.

[8 marks]
[8*markah*]

CLO2 C4

c) i. Calculate the value of A∩B and *AUB* given that A is 0.4 and B is 15 as in **Figure 2(c).**
Kirakan nilai bagi A∩B and AUB jika diberi A adalah 0.4 and B adalah 15 seperti ***Rajah 2 (c).***

[7 marks]
[7*markah*]



A B

Figure 2 (c)

ii. Suppose a database initially includes facts of White, Black and Grey for Left and Right. The knowledge base contain five rules. Illustrate diagram tabular relationship for the following cases.

Andaikan pangkalan data adalah Putih, Hitam dan Kelabu untuk Kiri dan kanan. Terdapat lima Rules (peraturan) dalam knowledge base. Gambarakan rajah jadual hubungan bagi kes-kes ini.

Rule 1: IF (Left Sensor is WHITE)
AND (Right Sensor is WHITE)
Then Move Hard Forward

Rule 1: IF (Left Sensor is BLACK)
AND (Right Sensor is WHITE)
THEN Move Hard Left

Rule 3: IF (Left Sensor is GREY)
AND (Right Sensor is
WHITE) THEN Move Soft Left

Rule 4: * IF (Right Sensor is BLACK)
AND (Right Sensor is WHITE)
THEN Move Hard Right

Rule 5: IF (Right Sensor is GREY)
AND (Left Sensor is WHITE)
THEN Move Soft Right

CLO2
C5

d) Formulate the Equation 1 below.
Rumuskan persamaan 1 di bawah.

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

Equation 1

[6 marks]
[6*markah*]

QUESTION 3

SOALAN 3

CLO1 C2

a) Explain membership function of a fuzzy set.
Terangkan fungsi keahlian set fuzzy. [4 marks] [4*markah*]

CLO1 C3

b) i. Location of Containment: The aquatic environment for Lilliput where oil spillage can take place comprises: the open waters of the Degul Sea (DS) together with its 3-mile (Z3) and 12-mile (Z12) zones regarded as Lilliput aquatic territory under international law. Furthermore, oil spills can also take place in the various canal systems in Lilliput (LCS), in the Lilliput harbour (LH), and in the refuelling (RD) and loading docks (LD) in the harbor. [8 marks] [8*markah*]

Predict the members of the term-sets related to each of the three domains based on the description of the aquatic environment protection system for oil spills.

Lokasi kejadian: Persekitaran akuatik Lilliput di mana tumpahan minyak boleh berlaku terdiri daripada: perairan terbuka Laut Degul (DS) bersama-sama dengan zon 3-batu (Z3) dan 12-batu (Z12) yang dianggap sebagai kawasan akuatik Lilliput bawah undang-undang antarabangsa. Selain itu, tumpahan minyak juga boleh berlaku dalam pelbagai sistem terusan di Lilliput (LCS), di pelabuhan Lilliput (LH), dan dalam mengisi bahan api (RD) dan memuatkan dok (LD) di pelabuhan

ii. The Functions of Bayesian networks are includes facts of A, B, C and D. Develop a diagram of inference chain for the following cases.

P(B/A), P(C/A), P(C/B), P(A) and P(D/C).

Fungsi rangkaian Bayesian terdiri dari pangkalan data termasuk fakta A, B, C, D dan E. Bina gambarajah rantaian inferens untuk kes-kes ini.

CLO2
C4

c) **Figure 3 (c)** shows the sensor input membership function

i. Identify the input membership level of member function at **Figure 3 (c).** [7 marks]

ii. Determine the degree of membership belong to X1 and Y1 for appropriate fuzzy set. [7*markah*]

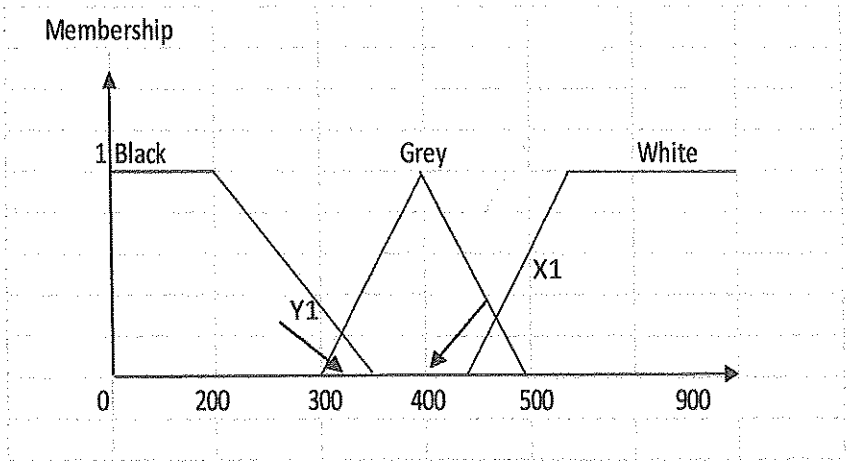


Figure 3 (c) / *Rajah 3 (c)*

Rajah 3 (c) *menunujukkan membership function bagi pengesan masukan.*

i. Kenal pastikan nilai masukan bagi membership level bagi membership function.

ii. Tentukan degree of membership level pada X1 dan Y1 untuk fuzzy set yang sesuai.

CLO2
C5

d) Consider a rule base for a 2-Input-1-Output Mamdani controller: The input variables, λ1 and λ2 and η is the output variable. Construct the rule base for the controller is given in **Table 1:**
*Pertimbangkan asas peraturan untuk 2-Input-1-Output Mamdani pengawal: Pembolehubah input, λ1 dan λ2 dan η adalah pembolehubah output. Bina rule base untuk pengawal itu diberikan dalam **Jadual 1**:*

Legend	λ1		
λ2	False	unknown	Yes
False	False		Unknown
unknown		Unknown	
Yes	Unknown		Yes

Table 1 / *Jadual 1*

[6 marks]
[6 *markah*]

QUESTION 4

SOALAN 4

CLO1 C2

a) Explain the training set used to train Artificial Neural Network (ANN).

Terangkan training set yang digunakan untuk train Artificial Neural Network (ANN). [4 marks]

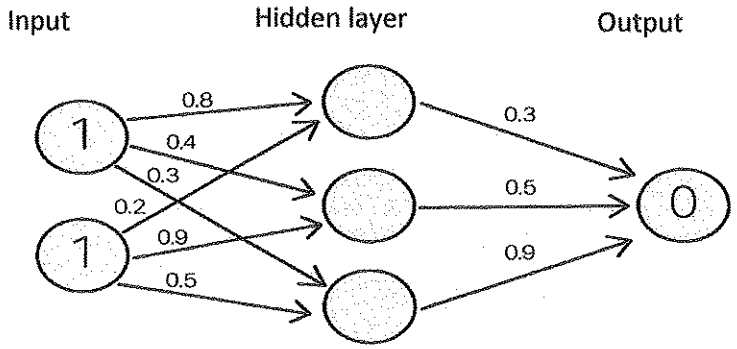
[4 *markah*]

CLO1 C3

b) i. **Figure 4 (b)** shows single hidden layer with three neurons. Calculate the value of hidden layer inputs with their corresponding set of weights value given.

Rajah 4 (b) *menunjukkan satu hidden layer dengan tiga neuron. Kirakan nilai masukan bagi hidden layer mengikut nilai weight yang diberikan.* [8 marks]

[8 *markah*]



Rajah 4 (b)

ii. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. With the aid of Artificial Neural Network (ANN) architecture, calculate the output of the activation function of ANN.

Neuron 4-masukan mempunyai berat (weigh) 1, 2, 3 dan 4. Pemindahan fungsi linear dengan pemalar perkadaran yang sama dengan 2. Input adalah 4, 10, 5 dan 20 masing-masing. Dengan bantuan gambarajah Neural Network Architecture, kirakan output fungsi ANN

CLO2
C4

c) Identify **FOUR (4)** Applications of Artificial Neural Networks (ANN).

*Kenal pastikan **EMPAT (4)** penggunaan rangkaian neural*

[7 marks]
[7 *markah*]

CLO2
C5

d) With the aid of a diagram, compare the biological neuron With Artificial Neural Network (ANN).

Dengan bantuan gambarajah, bandingkan biologi neuron dengan Artificial Neural network.

[6 marks]
[6 *markah*]

SOALAN TAMAT