UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

COURSE	:	**INTELLIGENT SYSTEMS DEVELOPMENT**
COURSE CODE	:	**ITS662**
EXAMINATION	:	**JULY 2017**
TIME	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of five (5) questions.
2. Answer ALL questions in the Answer Booklet. Start each answer on a new page.
3. Do not bring any material into the examination room unless permission is given by the invigilator.
4. Please check to make sure that this examination pack consists of :
   i) the Question Paper
   ii) an Answer Booklet – provided by the Faculty
5. Answer ALL questions in English.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of 4 printed pages

QUESTION 1

a) Define intelligent systems. Give **ONE (1)** example of intelligent systems.

(4 marks)

b) Describe **TWO (2)** characteristics of intelligent systems.

(4 marks)

c) Discuss **TWO (2)** disadvantages of expert system.

(6 marks)

d) Differentiate the knowledge representation and knowledge acquisition.

(6 marks)

QUESTION 2

a) Discuss **THREE (3)** domain problems addressed by intelligent systems development.

(6 marks)

b) List **FIVE (5)** characteristics that need to be considered when selecting an expert system shell.

(5 marks)

c) List **FOUR (4)** differences between backward chaining and forward chaining process.

(4 marks)

QUESTION 3

a) Describe **FIVE (5)** main features of Genetic Algorithm (GA).

(5 marks)

b) Zakaria is the owner of an assembly manufacturing factory that wants to maximize its product output and to minimize the production cost over demand. He wants to decide how many products to be assemble with 10 machines simultaneously. He deploys a GA using a population of binary strings. Each string is composed of 10 bits in length representing alternative number of machine output over demand. The two following strings are the parents.

Parent 1	0 0 1 1 0 0 0 1 1 1
Parent 2	0 0 0 0 1 1 1 0 0 0

i) Based on the above pair of bit strings, produce children by performing crossover. The selected crossover point is between the fifth and sixth bits (reading from the left).

(4 marks)

ii) Perform mutation for the fifth bit (reading from the right) for Child 1 and 2 resulted from part (i). List the current population.

(10 marks)

iii) Suggest **ONE (1)** possible fitness function to evaluate the population performance.

(2 marks)

iv) Show the calculation for each chromosome performance using fitness function in (iii).

(4 marks)

QUESTION 4

a) Explain how the learning tasks are performed using Artificial Neural Networks (ANN).

(6 marks)

b) Sketch ANN for positive - negative emotion classification from social media linguistic variables with **THREE (3)** input nodes, **TWO (2)** hidden layers with **THREE (3)** nodes and **TWO (2)** output nodes. Label the nodes properly.

(8 marks)

c) Describe **TWO (2)** categories of Internet-Based Software Agents. Include the example for each category.

(6 marks)

QUESTION 5

a) Given the rules below.

R1	IF student hardworking	{-0.2}
	AND student is good	{0.4}
	THEN assignment done	{0.6}
R2	IF lecturer is handsome	{-0.2}
	OR lecturer is lenient	{0.7}
	THEN come to class	{0.3}
R3	IF assignment done	
	THEN come to class	{0.5}
R4	IF today is not rain	{0.4}
	OR class is after 10am	{0.6}
	THEN come to class	{-0.5}

Calculate the Certainty Factor (CF) for 'come to class' and provide a conclusion.

(10 marks)

b) State a simple **IF-THEN** fuzzy rules with a fuzzy graph.

(4 marks)

c) Describe the 3 stages of a fuzzy logic program.

(6 marks)

END OF QUESTION PAPER