Department of Computer Science & Engineering
University of Asia Pacific (UAP)

Repeat Examination **Spring 2019** **4th Year 2nd Semester**

Course Code: CSE 407 **Course Title: Artificial Intelligence** **Credits: 3**

Full Marks: 150 **Duration: 3 Hours**

Instructions:

1. There are **Eight (8)** Questions. Answer any **Six (6)**. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. a) Mention the name of at least four pioneers of AI along with their contributions. (5)

   b) What are the main objectives of AI? Also explain the test mechanism to determine the intelligence of a machine. (10)

   c) Write short notes on the following two project: i) MYCIN, ii) DENDRAL (10)

2. a) Define knowledge, meta-knowledge and hypothesis. Also give examples of each. (10)

   b) Design and describe a simple rule-based expert system. (10)

   c) Explain 5 important properties of an intelligent agent. (5)

3. a) With the help of two agents explain how conflict resolution can be performed. (10)

   b) Explain the PEAS description of a medical expert system. (10)

   c) Briefly describe the generic classifications of intelligent agents. (5)

4. a) Differentiate the following along with examples: (15)
      (i) Deductive logic and inductive logic
      (ii) Propositional and predicate logic

   b) Convert the following sentence into a logical expression; (5)
   "You can access the Internet from campus only if you are a computer science major or you are not a freshman."

   c) Describe the environment of a robotic taxi. (5)

5. a) Consider a state space where the start state is 1 and the successor function for state n returns two states, numbers 2n and 2n+1. Now suppose the goal state is 24. List the order in which nodes will be visited for the iterative deepening search strategy. (10)

   b) Discuss the basic principle of game theory. Explain the mechanism of Tic-Tac-Toe game. (15)

6. a) Explain gradient, greedy and A* search techniques from objective function perspectives. (15)

   b) Discuss the complexities of BFS, DFS and iterative deepening search strategies. (10)

7. a) Why mutation is important in in genetic evolution? (10)

   b) It is necessary to optimize (maximize) the following function. Genetic algorithm is a good way to optimize this function. Show the fitness for the first two generations and (15)

also comments on the solutions.

$$f(x) = \frac{3x + 10}{5x - 10} \quad 0 \leq x < 256$$

8. a) Differentiate among binary, fuzzy and probability citing examples. (10)

b) Explain fuzzy modifiers with examples? Draw some standard fuzzy membership functions. (10)

c) For fuzzy inferencing Mamdani rule is used widely. Explain Mamdani rule. (5)

University of Asia Pacific
Department of Computer Science & Engineering
Final Examination Fall-2018
Program: B. Sc Engineering (Third Year/ Second Semester)

Course Title: Operating System Course No: CSE 303 Credit: 3.00
Time: 3.00 Hours. Full Mark: 150

There are **Eight** Questions. Answer any **Six.** All questions are of equal value/Figures in the right margin indicate marks.

1.a) What is the relationship in between operating system and computer hardware? What are the inconveniences a user may face during interacting with the computer without operating system? List out them. 12

b) Draw the general Unix system architecture. 4

c) Define the following terms: 9

i. Shell
ii. Kernel
iii. System Call

2. a) What are the advantages of a multiprocessing system? A process needs: 5 +6 +4

i. Job Queue
ii. Ready Queue
iii. Device Queue

Define them. Show the switching diagram of processes among them towards CPU for execution.

b) What are the differences between Long-term scheduler and short-term scheduler? 5

c) What is the responsibility of stack during the execution of child and parent processes? 5

3. Consider the following set of processes, with the estimated CPU burst given in milliseconds, and lower priority numbers corresponding to higher CPU priority. The processes are arrived according to the arrival time given in the table: 25

Process	Burst Time	Arrival time	Priority
P1	8	0	3
P2	15	3	1
P3	5	7	3
P4	2	5	4
P5	7	4	2

1.Draw the Gantt charts that illustrate the execution of these processes using the following scheduling algorithms:

i. FCFS

ii. preemptive SJF

iii. preemptive priority

2. Calculate the turnaround time of each process for each of the scheduling algorithms in part (1).

3. Calculate average waiting time of each process for each of these scheduling algorithms in part (1).

4. Find out the shortest average waiting time among these scheduling algorithms.

4.a) Find the average waiting time (A.W.T.) and the average turnaround time (A.T.A.T.) for executing the following processes using round -robin algorithm, where time quantum is 4? 12

Process	Burst Time (ms)	Arrival Time (ms)
P1	8	0
P2	4	9
P3	12	2
P4	7	6
P5	15	10

b) What are the differences between preemptive and non-preemptive scheduling? 4

c) Thread is tiny and process is thick- Why? Explain with the contents of thread and process. 9

5. a) 'Segmentation helps multiprogramming and paging helps virtual memory 10

management'- Explain with examples.

b) What is TLB? Define the following registers: 6

i. PTBR

ii. PTLR

iii. STBR

iv. STLR

c) Given memory partitions of 200K, 700K, 400K, 300K, and 500K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 256K, 425K, 125K, and 450K (in order)? Which algorithm makes the most efficient use of memory? 9

6. a) What are the functions of MMU and relocation register? 5

b) Consider the given page reference string: 20

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Frame = 3

Compare the page fault ratio for

i. LRU

ii. FIFO and

iii. Optimal page replacement algorithm

7. a) Define the followings: 12

i. Race condition

ii. Critical Section

iii. Semaphore

iv. Dining philosopher problem

b) Explain the bounded buffer problem using producer and consumer processes. Write down the both algorithms with mutual exclusions. 10

c) What is the deadlock situation in dining philosopher problem? How this can be avoided? 3

8. a) What is deadlock? Give an example. 5

b) Consider the following snapshot of a system with processes P1, P2, P3,P4 and P5 and resources A, B, C, D : 20

Allocation	Max	Available
A B C D	A B C D	A B C D
P1 0 0 1 2	0 0 1 2	1 5 2 0
P2 1 0 0 0	1 7 5 0	
P3 1 3 5 4	2 3 5 6	
P4 0 6 3 2	0 6 5 2	
P5 0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

a. What is the content of the matrix Need?

b. Find out the sequence of safe state.

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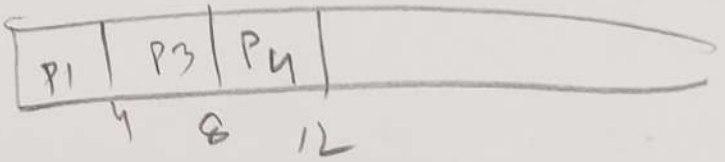

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