



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS  
2019/2020 ACADEMIC YEAR  
SECOND YEAR FIRST SEMESTER**

**SCHOOL OF SCIENCE AND INFORMATION SCIENCES  
BACHELOR OF SCIENCE  
(INFORMATION SCIENCE)**

**COURSE CODE: INS 2104**

**COURSE TITLE: DATABASE SYSTEMS THEORY**

**DATE: 5<sup>TH</sup> DECEMBER, 2019**

**TIME: 8:30 – 10.30 A.M**

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## **INSTRUCTIONS**

- Answer Question ONE and any other TWO Questions From Section II
- Question 1 is compulsory.
- Time 2Hrs.
- SWITCH your mobile phones **OFF** during the exam period.

## **SECTION I (Compulsory)**

- (a) Give a definition of a process. (2 marks)  
(b) Explain two responsibilities of the operating system. (8 marks)  
(3 marks)  
(c) Give a description of a distributed system. (2 marks)  
(d) Using a well labelled diagram, describe the five main process states. (10 marks)  
(e) Explain a Race condition. (2 marks)  
(f) Identify and explain the three conditions that should be satisfied by any good process synchronization method. (6Marks)

## **Section II (Answer Two questions)**

### **Question 1 (Compulsory) – 20 marks**

Suppose the following processes arrive for execution at the times indicated and each process will run the listed amount of time in ms.

In answering the questions below, use preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	Arrival Time	Burst Time
P1	0	7
P2	3	1
P3	2	3

- a) What is the average waiting time for these processes with the FCFS scheduling algorithm? (5 Marks)  
b) Calculate the average waiting time and the turnaround time for these processes with the SJF scheduling algorithm? (10 Marks)  
c) What is the average turn-around time for these processes with the FCFS scheduling algorithm? (5 Marks)

### **Question 2 (15 marks)**

- (a) Explain the deadlock problem. (2 marks)  
(b) Deadlock can occur if four conditions hold simultaneously, briefly explain each of the four conditions. (8 marks)  
(c) Describe each of the three main strategies for handling deadlocks? (10 marks)

### **Question 3**

- (a) Give an elaborate description of the critical section problem. (5 marks)  
(b) There are a number of both software and hardware solutions to the critical section problem, illustrate how Dekker's algorithm 1 attempts to solve this problem. (10marks)  
(c) Explain the main problem with this algorithm that Dekker's algorithm 2 attempts to solve? (5 marks)

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