JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION AND COMMUNICATION TECHNOLOGY 3RD YEAR 1ST SEMESTER

2018/2019 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: ICT 3312

COURSE TITLE: ADVANCED OPERATING SYSTEMS

EXAM VENUE: **STREAM: ICT**

DATE: DECEMBER 2018 **EXAM SESSION:**

TIME: 2.00 HOURS

INSTRUCTIONS:

1. Answer Question 1 (Compulsory) and ANY other two questions
2. Candidates are advised not to write on the question paper
3. Candidates must hand in their answer booklets to the invigilator while in the examination room

QUESTION ONE (30 Marks)

a) Identify any three activities performed by the operating system in connection with memory management (6 marks)

b) Distinguish between the kernel execution mode and user execution mode. (4 marks)

c) Using a well labeled diagram explain a five-state process model. (10 marks)

d) (i) Assume two operations A(counter++) and B(counter--):

```
A: register1 = Counter          B:  Register2 = Counter;
   register1 = register1 + 1        Register2 =register2 – 1
   Counter = register1              Counter = register2
```

Show a computation sequence to illustrate how race condition may happen. (5 marks)

(ii) Demonstrate how semaphore can be used in (i) to prevent the race condition. (5 marks)

QUESTION TWO (20 MARKS)

Consider the following set of processes with the estimated CPU burst given in milliseconds. The processes are assumed to have arrived in the order P1,P2,P3,P4,P5, all at time 0. (quantum = 2)

Jobs	CPU burst
P1	10
P2	1
P3	2
P4	1
P5	5

a) Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: SRTN, SJN, FCFS, RR. (8 marks)
b) Calculate the average turnaround time and average waiting time for every scheduling algorithm in (a). (8 marks)
c) Compare the performance of algorithms in (a) based on average turnaround time and average waiting time. (4marks)

QUESTION THREE (20 Marks)

a) Identify and explain any five of the contents of a process control block (PCB) (10 Marks)

b) Discuss in detail how operating system utilizes the concept of an interrupt and PCB in multiprogramming environment. (10 Marks)

QUESTION FOUR (20 Marks)

Discuss the following operating system's memory management techniques:

a) Fixed partition (4 marks)
b) Variable partition (4 marks)
c) Variable partition with compaction (4 marks)
d) Paging (4 marks)
e) Segmentation (4 marks)

QUESTION FIVE (20 Marks)

a) For a deadlock to be possible there must be four condition of policy must be present. Identify and explain the four conditions. (16 marks)

b) Discuss the strategy of deadlock avoidance (4 marks)