CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN INFORMATION SCIENCE

BSIS 352: OPERATING SYSTEM THEORY

STREAMS: **TIME:2 HOURS**

DAY/DATE: MONDAY 9/12/2019 **2.30 P.M – 4.30 P.M**

INSTRUCTIONS:

Answer question one and any other two questions

QUESTION ONE (30 MARKS)

(a) Explain briefly what operating system software is. (2 marks)

(b) Briefly explain what process synchronization is. (2 marks)

(c) Briefly explain what a deadlock is in process management. (2 marks)

(d) Discuss two major functions of an Operating system. (4 marks)

(e) Differentiate between the following types of operating systems. (4 marks)

(i) Multi-user vs Single-user

(ii) Multi-tasking vs Single-tasking

(f) In process scheduling, explain what is a context switch? (4 marks)

(g) While giving an example in each case, explain the difference between contiguous memory allocation and non-contiguous memory allocation schemes. (4 marks)

(h) Explain what is external fragmentation? Suggest a possible solution to this issue both in contiguous memory allocation and non-contiguous memory allocation. (4 marks)

(i) What is swapping as used in memory management? Explain the role of swapping in operating system memory management. (4 marks)

QUESTION TWO (20 MARKS)

(a) Discuss the critical section problem in process management. (6 marks)

(b) Discuss the three requirements that a solution to a critical section problem must satisfy. (6 marks)

(c) Discuss the four conditions necessary for a deadlock to occur. (8 marks)

QUESTION THREE (20 MARKS)

(a) State two reasons for processor scheduling by the operating system. (2 marks)

(b) The table below shows jobs submitted for execution in a computer system with Time-sharing Capability

Job	CPU burst	Arrival time
P1	12	0
P2	6	3

P3	3	6
P4	8	7

The Arrival Time and CPU burst are in arbitrary units. Using the table

(i) Construct Gantt chart for the following scheduling algorithms.

First Come First Served (4 marks)

Shortest Job First (4 marks)

Round Robin (with a time slice of 4 milliseconds) (4 marks)

(ii) Compute the average waiting time for each algorithm in (i) above. (6 marks)

QUESTION FOUR (20 MARKS)

(a) With the aid of a diagram, explain the various process states that exist during execution of a program. (6 marks)

(b) Discuss the two major types of user interfaces provided by the operating systems. (6 marks)

(c) Discuss four considerations made in CPU scheduling criteria. (8 marks)

QUESTION FIVE (20 MARKS)

(a) Explain what is a process in operating system concepts? (2 marks)

(b) Using an illustration, discuss two memory allocation schemes for dynamic memory allocation problem. (4 marks)

(c) Discuss three major activities of an operating system in regard to memory management? (6 marks)

(d) Discuss four situations that may trigger CPU scheduling decisions to take place. (8 marks)
