# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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**University Examinations 2013/2014**

SECOND YEAR, FIRST EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE,FIRST YEAR, SECOND SEMESTER FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY AND FIRST YEAR, SECOND SEMESTER FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER TECHNOLOGY

**BIT/ICS 2202: OPERATING SYSTEMS 1**

**DATE: APRIL 2014** **TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question **one Compulsory and** any other **two** questions*

**QUESTION ONE – 30 MARKS**

a. Define the term operating system and provide a justification for your definition based on the functions of operating system. (2marks)

b. Using example, show the danger of allowing multiple processes access to their critical section at the same time. (4 marks)

c. Using an illustration, describe the five layers of layered operating system architecture. (5 marks)

d. Distinguish between a **program** and a **process**, explaining why the use of the process concept is necessary in studying operating systems. (3 marks)

e. Using example, demonstrate the principle of memory Managements using variable partitioning. (5 marks)

f. State two examples of shared resources used in concurrent programs. (2 marks)

g. Explain the importance of the following goals of a CPU scheduler:
   i. Fairness
   ii. Efficiency (3 marks)

h. Discuss the role of the following scheduler in process control.

   i. Short-term scheduler (2 marks)
   ii. Mid-term scheduler (2 marks)
   iii. Long-term scheduler (2 marks)

**QUESTION TWO – 20 MARKS**

a. Describe the key objective of virtual memory management technique. (2 marks)

b. With an aid of a diagram illustrate the paging technique as used in memory management by operating system; include the page table. (8marks)

c. Briefly explain any five disk scheduling policies implemented by Linux operating system. (10 marks)

**QUESTION THREE – 20 MARKS**

a. Describe the conditions sufficient and necessary to produce deadlock. (8 marks)

b. Identify three strategies that can be used to deal with deadlocks. (3 marks)

c. A process may be in any of the following states: ready, running, or blocked.

i. Use a diagram to illustrate all the possible transitions a process may make from one state to another. (5 marks)

ii. Choose any two transitions and explain for each case what causes a process to make that transition. (4 marks)

**QUESTION FOUR – 20 MARKS**

a. Below is a set of processes available for execution in a programmed environment:

| **Process** | **Burst time** | **Arrival time** |
|---|---|---|
| 1 | 10 | 0 |
| 2 | 6 | 1 |
| 3 | 2 | 2 |
| 4 | 4 | 3 |
| 5 | 9 | 6 |

i. Schedule the processes using FCFS,SJF,SRTN and RR(t=3) and comment on your average turnaround time and average waiting time. (10 marks)

b) i. With respect to memory compaction, explain what makes it necessary for the operating system to undertake this task, explain what this task (memory compaction) involves. (2 marks)

ii. A university department has decided that for ease management, all applications should run on a central computer server. It has been observed, when large numbers of students simultaneously work on their programming exercise, response time increases considerably and starting up new programs takes a very long time. The time to download large data is not affected. Explain the reason(s) for this slowdown, suggest a remedy. (8 marks)

**QUESTION FIVE – 20 MARKS**

a. Using the " Dining Philosophers" Analogy, explain how UNIX deals with concurrency using semaphores (8 marks)

b. Using a well labeled diagram illustrate interrupt driven input/output cycle. (10 marks)

c. Describe the importance of buffering in the I/O subsystem of operating system (2 marks)