

UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

FINAL EXAMINATION, *DECEMBER 2016*

Title of Paper : **Operating Systems**
Course Number : **CS 442**
Time Allowed : **Three (3) Hours**
Instruction : **Answer any FIVE questions**

This exam paper should not be opened until permission has been granted by the invigilator.

1.
 - a) Differentiate between multiprogramming and multiprocessing [4]
 - b) Show that the CPU idle time percentage is given by p^n in multiprogramming and hence, or otherwise compute usage percentage for 5 users at 50% I/O wait [8]
 - c) Discuss the OS as an extended machine. [8]

2.
 - a) Fully discuss the different process states including the suspend states. [12]
 - b) Describe the different possible operations on a process. [8]

3.
 - a) Compare and contrast race conditions and critical regions. [10]
 - b) Discuss starvation in relation to busy waiting. [10]

4.
 - a) Give an example of a deadlock in a business setting. [5]
 - b) Spooling can result in a deadlock if not managed well. Describe two ways in which you could minimize deadlocks in a spooling system paying attention to the advantages and disadvantages of each solution. [7]
 - c) Discuss the necessary conditions for a deadlock. [8]

5.
 - a) Compare and contrast a buddy system and a swapping system. [8]
 - b) Differentiate between a physical address and a virtual address. [4]
 - c) Discuss segmentation (focussing on any two of its implementations). [8]

6. Discuss any four of the page replacement algorithms. [20]