UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

Main Examination, December 2017

Course Name: Modern Operating Systems / Operating Systems

Course Code: CS442/ CSC 322

Time allowed: Three (3) Hours

INSTRUCTIONS TO THE CANDIDATES
1) Answer any **five (5)** questions out of the **six (6)** questions.
2) Each question carries **twenty (20)** marks.
3) This examination paper should **NOT** be opened until permission has been granted by the invigilator.
4) This examination consists of **three (3)** printed pages.
5) Number of marks per each question is written at the end of each question.

Question 1

a) Modern Operating Systems are interrupt driven. Define the term **"Interrupt"**. [2 marks]

b) Describe **two (2)** types of interrupts that are used by modern Operating Systems. [4 marks]

c) Describe any **four (4)** functions of an Operating System. [8 marks]

d) Using relevant examples, explain any **three (3)** types of Operating Systems. [6 marks]

Question 2

a) Describe any **four (4)** attributes of a Process. [8 marks]

b) With the aid of a diagram, explain the process state transition model or process life cycle model. [12 marks]

Question 3

a) With the aid of a diagram, describe **three (3)** types of process scheduling queues in Operating System. [9 marks]

b) Explain the differences between long term scheduler and short term scheduler in Operating System. [6 marks]

c) Describe any **four (4)** process information found in Process Control. [5 marks]

Question 4

a) Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order).

    (i) How would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Show your calculations or working. [18 marks]

    (ii) Which algorithm in **(i)** makes the most efficient use of memory? [2 marks]

Question 5

a) Consider the following set of processes, with the length of the CPU burst given in milliseconds.

Process	Burst Time	Priority
P_1	24	2
P_2	3	1
P_3	4	1

The processes are assumed to have arrived in the order P_1, P_2, P_3, all at time 0.

(i) Draw three Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: First Come First Service (FCFS), Shortest Job First (SJF), Priority Scheduling and Round Robin (quantum = 3). **[12 marks]**

(ii) Calculate the average waiting time for each of the process scheduling algorithms in **(i)** above. **[8 marks]**

Question 6

a) Describe **four (4)** conditions that must hold for deadlock to occur. **[8 marks]**

b) Explain **three (3)** strategies which can be used to deal with deadlocks. **[12 marks]**