



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
**University Village, 91 Cadastral Zone, Nnamdi Azikwe Expressway, Jabi, Abuja**  
**FACULTY OF SCIENCES**  
**COMPUTER SCIENCE DEPARTMENT**  
**2020 EXAMINATIONS**

**CIT 752 – Operating System (OS) Concepts**

**Credit: 2 units**

**TIME ALLOWED: 2 Hours**

**INSTRUCTION: Answer Question 1 and any other THREE (3) Questions**

**QUESTION 1**

- (a) What are the three main functions of Operating Systems, and how are they important? (4 ½ marks)
- (b) With the aid of a diagram, distinguish between the Operating System Shell and the Kernel. (4 marks)
- (c) Discuss two (2) advantages of Spooling Systems. (4 marks)
- (d) Explain what happens when a context switching occurs? (4 ½ marks)
- (e) Discuss briefly how the following pairs of scheduling criteria conflict in certain settings:
  - (i) CPU utilization and response time (2 marks)
  - (ii) Average turnaround time and maximum waiting time (2 marks)
  - (iii) I/O device utilization and CPU utilization. (2 marks)
- (f) Multi-programming enables more than a single process to apparently execute simultaneously. How is this achieved on a uni-processor? (2 marks)

**QUESTION 2**

- (a) State three attributes of a process. (1 ½ marks)
- (b) What are the relationships between threads and processes? State four. (4 marks)
- (c) A process enters the blocked state when it is waiting for an event to occur.
  - (i) Name two (2) events that might cause a process to enter the blocked state. (2 marks)
  - (ii) State the similarities among waiting, blocked and sleeping state of a process. (3 marks)
- (d) How does the OS prevent a process from monopolizing a processor? (2 ½ marks)
- (e) State two (2) ways by which a process can respond to a signal. (2 marks)

**QUESTION 3**

- (a) What file access pattern is particularly suited to chained file allocation on disk? (2 marks)

- (b) Differentiate by giving three (3) examples each, the basic operations that can be performed on a File and a Directory. (3 marks)
- (c) Describe the difference between external and internal fragmentation. (2 marks)
- (d) Describe the four memory management schemes. (4 marks)
- (e) Explain the two purposes of protecting a system. (3 marks)
- (f) What do you understand by the word 'multi-dislocation'? (1 mark)

#### QUESTION 4

- (a) Describe is a deadlock situation. (2 marks)
- (b) Give four conditions that must hold in order for a deadlock to occur. (2 marks)
- (c) Describe the proof that two-phase locked systems are safe. (4 marks)
- (d) What does it mean for a process to be in a Critical Section? (3 marks)
- (e) State one major problem associated with Critical Section. (1 marks)
- (f) Explain three properties that could guarantee a solution to the Critical Section problem. (3 marks)

#### QUESTION 5

- (a<sub>i</sub>) What is the difference between pre-emptive scheduling and non-pre-emptive scheduling? (2 marks)
- (a<sub>ii</sub>) What is the issue with the latter? (1 marks)
- (b) Name and explain four types of scheduling. (4 marks)
- (c<sub>i</sub>) Can Indefinite Postponement occur in a system that uses a FCFS Scheduler? (2 marks)
- (c<sub>ii</sub>) Justify your answer. (2 marks)
- (d) What is meant by a process scheduler. (2 marks)
- (e) What criteria affects the scheduler's performance? (2 marks)