

MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF COMPUTING AND INFORMATICS

**End of Semester Two Examination for the Degree of Bachelor of
Information Technology**

Course Code: BIT1201
Course Name: Operating Systems
Course Year: One
Academic Year 2021/2022
Date: 10th October 2022
Room: S311
Duration: Three hours
Time 2:00 P.M. - 5:00 P.M.

Instructions:

1. The paper has two sections: A and B.
2. Section A is Compulsory and carries 40 marks.
3. Attempt any three out of the five questions in section B. Each question carries 20 marks.
4. Begin each question of Section B on a new page.
5. This is not an Open Book Examination – Candidates should not consult any Reference Material During this sitting.
6. No programmable Electronic device will be allowed in the examination room
7. Any form of Examination Malpractice will be handled with Reference to the Examination Rules and Regulations.
8. Do not write anything on this Question Paper
9. All answers and rough work (use the last page) should be in answer booklet¹

SECTION A - Part I (30 Marks). Choose the best answer

- A. Starvation
C. Revocation
- B. Aging
D. Relocation
11. The Hardware mechanism that enables a device to notify the CPU is called ____.
A. Polling
B. Interrupt
C. System Call
D. None of the above
12. The scheduling in which the CPU is allocated to the process with least CPU-burst time is called
A. Priority Scheduling
B. Shortest job first Scheduling
C. Round Robin Scheduling
D. Multilevel Queue Scheduling
13. _____ is the situation in which a process is waiting on another process, which is also waiting on another process ... which is waiting on the first process. None of the processes involved in this circular wait are making progress.
A. Deadlock
B. Starvation
C. Dormant
D. None of the above
14. The term 'page traffic' describes
A. Number of pages in memory at a given instant.
B. Number of papers required to be brought in at a given page request.
C. The movement of pages in and out of memory.
D. Number of pages of executing programs loaded in memory.
15. Which of the following is not the state of a process?
A. Blocked
B. Running
C. Ready
D. Privileged

SECTION A – Part 2 (10 Marks)

16. a) What is an operating system? (2 marks)
- b) "Very good programmers can develop applications that can run on computers without needing an operating system" argued one businessman. Do you agree with this businessman? Give a reason for your answer. (4 marks)
- c) Differentiate between application programs and system programs, give an example for each (4 marks)

SECTION B (60 Marks). Choose ONLY three questions

17. Application programs help the users to do specialized work if they are installed on an operating system. These programs latter turn into processes throughout their entire operation on a computer.
- a) Explain the two fundamental models of inter process communication (4 Marks)
- b) Draw and explain the Structure of a Process Control Block (PCB) (8 marks)

c) Using an illustration, explain the various states that a process passes through? (8 Mark)

18. You are part of the team that wants to develop a new CPU scheduling algorithm. Your first role is to evaluate the current CPU scheduling algorithms and determine their efficiency in terms of the waiting time and turnaround time of the processes. Given the following processes with their respective burst times as shown below

Processes	Burst time
P1	5
P2	10
P3	2
P4	8

a) Calculate the average turnaround time using the following algorithms (4 marks@)

- i) Short Job First scheduling algorithm
- ii). Round Robin scheduling algorithm (consider quantum time of 2ms)

b) If the priority of the above processes P1, P2, P3, and P4 is 3, 2, 1, and 2 respectively. Calculate the average waiting time using the priority scheduling algorithm. (4 marks)

c) If the above processes have different arrival times as indicated in the table below.

Processes	Burst time	Arrival time
P1	5	0
P2	10	1
P3	2	2
P4	8	3

(4 marks@)

Calculate the average waiting time using

- i). First Come First Served scheduling algorithm
- ii). Short Job First (preemptive) scheduling algorithm

19. a) State and explain the two types of threads

(4 marks)

b) Using illustrations, explain the three multithreading models

(6 marks)

c) Without the operating system, we can ascertain that the computer has no use. Being one of the users of Operating systems, explain the functions of Operating Systems

(10 marks)

20. a) Distinguish between the following 2
- i). Symmetric and asymmetric multiprocessing (3 Marks)
 - ii). client-server and peer-to-peer systems (2 Marks)
- b. Given the reference string : 5,7,1,3,0,4,5,8,0,1,2,0,3,2 and 1, use the following page replacement algorithms to find the number of page faults for each. Use a 3 page frame (5 Marks)
- i). FIFO (5 Marks)
 - ii). Optimal (5 Marks)
 - iii). LRU (5 Marks)
21. a) List three functions of an operating system in relation to secondary storage management? (5 Marks)
- b) A computer would be very inconvenient to use if the user was manually managing storage allocation. As an expert of operating systems, explain the following dynamic storage allocation mechanisms using examples. (5 Marks)
- i). First fit (5 Marks)
 - ii). Best fit (5 Marks)
 - iii). Worst fit (5 Marks)

Best Wishes!