NATIONAL SCHOOL OF BUSINESS MANAGEMENT
BSc. (Honours) in software Engineering – 19.2/20.1
BSc. (Honours) in Computer Science – 19.2/20.1
BSc. (Honours) in Computer Networks – 19.2/20.1
2nd Year 1st Semester Examination
03 June 2021
CS201.3 – Operating Systems

Instructions to Candidates

1) **Answer ALL questions.**

2) **Time allocated for the examination is three (03) hours and 30 minutes (Including downloading and uploading time)**

3) **Google diagrams, images are not allowed in the answers.**

4) Download the paper, provide answers to the questions in a word document.

5) Answer script should be uploaded in PDF Format.

6) The Naming convention of the answer script – Module Code_Subject name_Index No

7) Please upload the document with answers (Answer Script) to the submission link before the submission link expires.

8) Under any circumstances E-mail submissions would not be taken into consideration for marking. Incomplete attempt would be counted as a MISSED ATTEMPT.

9) You must adhere to the online examination guidelines when submitting the answer script to N-Learn.

10) Your answers will be subjected to Turnitin similarity check, hence, direct copying and pasting from internet sources, friend's answers etc. will be penalized.

Question 1 **(20 MARKS)**

1. "What is an operating system" describe the statement with the use of diagram "Abstract view of the Operating System". [3 marks]
2. Mention four types of operating systems and briefly explain one of it. [4 marks]
3. Describe the states of a process. Your answer should include a detailed description of each state. Use diagrams and examples to assist your answer. [6 marks]
4. What is the process control block and list down three information contains in it? [4 marks]
5. Describe the concept of thread. Use diagrams to assist your answer. [3 marks]

Question 2 **(20 MARKS)**

1. Explain the difference between the two CPU scheduling algorithm types Preemptive and Non-Preemptive. [2 marks]
2. Draw gantt charts to represent the scheduling of the following processes under **First Come First Serve** and **Shortest Remaining Job First** and calculate the Average Waiting time and Average Turnaround time for both algorithms. [6 marks]

Process	Arrival Time	Execution Time (Burst)	Priority
P0	0	7	2
P1	0	5	4
P2	1	3	6
P3	3	4	5
P4	3	3	7

3. Assume a processor with quantum time units of 2, draw a diagram showing how RR (round robin) would schedule the processes for the above processes. What is the average waiting time in this case? [4 marks]
4. Explain the difference between Preemptive Priority scheduling and Non-Preemptive Priority scheduling. Draw the Gantt charts for those to algorithms for above processes and find the best algorithm from those two. [6 marks]
5. List down four aims of CPU scheduling and briefly describe them. [2 marks]

Question 3 **(20 MARKS)**

1. Explain the functionality of the Virtual Memory. Use a diagram to assist your answer. [4 marks]
2. Describe the following two terms. Your answer should include a detailed description. Use diagrams and examples to assist your answer.
   I. Memory Segmentation.
   II. Paged Memory Allocation. [4 marks]
3. Perform an analysis using Optimal policy algorithm for the following string of memory reference addresses. Assume that there are three frames available within the memory for holding pages. Find how many page faults has been occurred. [6 marks]

4	1	3	1	4	3	0	4	2	3	0	4	1	1	1	0	2	5	0	1

4. What is page thrashing? Why it is important to avoid thrashing? [2 marks]
5. Describe the memory hierarchy of the computer system. [4 marks]

Question 4 (20 MARKS)

1. State down the four conditions must be fulfilled for a deadlock to occur. [2 marks]
2. Convert the following matrix representation to a resource allocation graph. Use the deadlock detection algorithm to determine whether the system contains a deadlock. Which processes are involved in the deadlock? While you are use the deadlock detection algorithm, add, and remove directed edges of the resource allocation graph. [6 marks]

	Allocation					Request					Available				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
P_0	1	0	1	1	0	0	1	0	0	1	2	1	1	2	1
P_1	1	1	0	0	0	0	0	1	0	1					
P_2	0	0	0	1	0	0	0	0	0	1					
P_3	0	0	0	0	0	1	0	1	0	1					

3. Describe two deadlock prevention methods can apply in computer science. [4 marks]
4. Memory management is a basic operation carried out by the operating system. Describe the term Memory Management. [2 marks]
5. List down the two memory management techniques. [2 marks]
6. Explain the following two terms. Use diagrams to assist your answer.
    I.   Internal Fragmentation
    II. External Fragmentation [4 marks]

Question 5 (20 MARKS)

1. Describe User Mode and the Kernel Mode of an operating system with the use of a diagram? [3 marks]
2. Write down four functions carried out by the Kernel. [2 marks]
3. Describe how users interact with the kernel. Use diagrams to assist your answer. [3 marks]
4. There are different types of kernels used in various operating systems such as Monolithic Kernel, Micro Kernel. Explain about the kernel used in Linux. [2 marks]
5. Describe the following Linux directory permission. You need to describe the permissions of all three users.
    d-w---x-w- [3 marks]
6. Write down the Linux commands to complete following.
    a. Print name of current/working directory.
    b. List all directory contents.
    c. Create a new directory of "Mydocuments".
    d. Create a new text file name "myself" inside directory "Mydocuments" and write five lines about yourself.
    e. Print first three lines of the document.
    f. Print all the five line with line numbers.
    g. Create a copy of the "myself" and name it "myselfcpy".
    h. Go back to the previous directory and List down the permissions of all the directories.
    i. change the permission of the owner to only read and write of "Text-Documents".
    j. change the permission of the group to only read of "Text-Documents". [7 marks]
        *****END OF THE Paper****