

University of Ruhuna- Faculty of Technology
Bachelor of Information Communication Technology Honours Degree
Level 2 (Semester II) Examination, November/December 2022
Academic year 2020/2021

Course Unit: ICT2213 Operating System Concepts and Applications (Theory)
Duration: 2 hours

.....

- Answer all **four (04)** questions.
 - Calculators are allowed for this examination.
 - All questions carry equal marks.
- 1)
- a) Briefly explain the role of the Operating System as a “Resource Allocator” using one (01) suitable example.
 - b) Briefly explain the “Computer Startup” process.
 - c) Distinguish between the Multitasking OS and Multiprogramming OS considering one (01) feature
 - d) Briefly explain the layered structure and microkernel structure using suitable diagrams.
 - e) Briefly discuss the dual-mode operation in Operating System.
- 2)
- a) Briefly describe the following terms.
 - i) Process Control Block
 - ii) Context switching
 - iii) Dispatcher
 - b) Illustrate process states with a suitable diagram and briefly explain two (02) states.
 - c) Distinguish between the short-term scheduler and long-term considering one (01) feature.
 - d) Briefly discuss two (02) ways of inter-process communication with suitable diagrams.
 - e) Discuss two (02) ways of establishing a relationship between user and kernel threads.
- 3)
- a) State three (03) advantages of dynamic loading.
 - b)
 - i) What is meant by virtual memory?
 - ii) Briefly explain why it is important.
 - c) State the main purpose of using “Direct Memory Access”.
 - d) Consider the following set of processes, with the length of the CPU burst which is given in milliseconds. Take the time quantum as 4ms when necessary.

Process	Burst time (ms)
A	6
B	5
C	4
D	8
E	2

- i) Draw two (02) Gantt charts or suitable diagrams that illustrate the execution of these processes using the following scheduling algorithms. Calculate the average response time for each algorithm.

- FCFS
- Round Robin

ii) What is the best algorithm for scheduling in terms of average response time? Justify your selection in brief.

4)

- a) Briefly explain the "Race Condition" with an example.
- b) Identify and describe the critical section of a program with a suitable diagram.
- c) State and briefly explain two (02) solutions for the critical section problem.
- d) Consider the following snapshot of the system. P1, P2, P3, P4 and P5 are processes and R1, R2, R3 and R4 are resources. The following resource vector indicates the number of available instances for each resource type.

Process	Current Allocation				Maximum need			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	2	1	2	2	2	1	2	3
P2	0	1	1	0	1	1	2	0
P3	0	2	0	2	2	2	0	2
P4	2	1	0	2	3	1	2	3
P5	0	0	0	0	5	2	3	2

Resource Vector			
R1	R2	R3	R4
5	5	4	7

- i) Calculate the need matrix
- ii) Determine the available resources.
- iii) Is the system in a safe state? Justify your answer.

.....End of the paper.....