II B. E. Examination June 2021
Computer Engineering
CER4C2: Operating System

Duration: 3 Hrs. **Maximum Marks : 60**

Note: Attempt any two parts from each question. Make suitable assumptions if necessary.

Q. 1 **(a)** What is Operating System? Explain Booting Process. **6**

(b) What is the main advantage of the layered approach to system design? Draw the structure of Linux Operating System. **6**

(c) Define the essential properties of the following types of operating systems: **6**
(i) Batch (ii)Time sharing (iii) Embedded (iv) Real Time

Q. 2 **(a)** What is a process control block? Draw process state diagram and explain it. **6**

(b) What is the purpose of CPU scheduler and Job scheduler? Explain the role of Medium-term Scheduler with diagram in Time sharing System. **6**

(c) Consider the following set of processes with the length of CPU burst time given in millisecond : **6**

Process	Burst-time	Priority
P1	5	3
P2	2	1
P3	3	3
P4	3	4
P5	5	2

The processes are assumed to have arrived in order P1, P2, P3, P4, and P5 all at time 0. Draw four Gantt charts illustrating the execution of these processes using
(i) FCFS. (ii) SJF scheduling. (iii) A non-pre-emptive priority (a smaller priority number implies a higher priority) scheduling. (iv) Round Robin (time quantum = 2) scheduling.

Q. 3 **(a)** What are three essential conditions for solution to critical section problem? Write hardware solution that satisfies all three conditions for critical section problem. **6**

(b) Consider the following snap-shot of a system: **6**

	Allocation	Max	Available
	A B C	A B C	A B C
P0	0 0 1	0 0 1	1 5 2
P1	1 0 0	1 7 5	
P2	1 3 5	2 3 5	
P3	0 6 3	0 6 5	
P4	0 0 1	0 6 5	

(i) Obtain the array 'Need'.
(ii) Is the system in a safe state?
(iii) If a request from process P1 arrives for (0, 4, 2), can the request be immediately granted?

(c) Give solution of Producer Consumer problem using semaphore **6**

Q.4 **(a)** Explain Demand Paging with diagram. What is the purpose of valid/invalid and dirty bit in page table? Write about two types of page table. **6**

(b) Explain segmentation .what is the purpose of segment table? **6**

(c) Consider the following page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2 **6**
There are three frames in the system and initially they all are empty. How many page fault would occur for the following algorithm:
(i) FCFS (ii) Optimal Page Replacement (iii) LRU Page Replacement.

Q. 5 **(a)** What are various I/O services provided by operating System? Write difference between system call and interrupt. **6**

(b) Why protection and security is needed at operating system level nowadays? What are the services provided by operating system for protection and security? **6**

(c) What are various disk scheduling algorithm explain each with example. **6**