INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL
B.Sc. (Applied Sciences) in Engg.
End – Semester Theory Examinations – May 2021
IV SEMESTER-OPERATING SYSTEMS (ICS 243)
(BRANCH: CSE)

Time: 3 Hours   **Date:19 May 2021**   **Max. Marks: 50**

- ✓ **Answer ALL Questions.**
- ✓ **Missing data, if any, may be suitably assume.**

1A. What kind of memory access is used for high-speed I/O devices in order to avoid increasing the CPU's execution load.
i. How does this transfer take place between CPU and the device and understand the completion of this operation?
ii. Can the CPU do other jobs when the transfer happens? Or does this process interfere with the execution of the user programs? Explain. **(5)**

1B. Suggest what are the design changes between a simple and layered structure of the Operating system with a specific example for each. **(5)**

2A. How does cooperating process communicate with each other? Are there different ways to do this communication? Explain them with a typical example for each. **(4)**

2B. Explain the different types of multithreading models with the help of neat sketch of each of them. **(3)**

2C. Explain the CPU-I/O burst cycle. Also, show the curve of frequency and burst duration being characterized as exponential or hyper exponential and provide the reason for the same. **(3)**

3A What are the approaches to solve the critical-section problem? Explain the general approaches taken by the operating system. **(4)**

3B. Explain the hardware-based solution for the critical section problem with the help of hardware instructions. **(3)**

3C. Explain the readers-writers problem and how to solve the same. **(3)**

4A. What is the average waiting time and average turnaround for these processes with the Priority, RR scheduling algorithm? Draw a Gantt chart and show the working for the same. **(6)**

NOTE: For RR, consider the Priority column as Arrival time and time quantum as 2.

Process #	Priority	Burst Time
P1	3	10
P2	1	2
P3	2	5

4B. Explain the difference between preemptive and non-preemptive scheduling with example for each? **(4)**

5A For the given reference string, determine which page replacement algorithm (FIFO, LRU) suits better, having to consider frame size to be 3 and 4 for each respectively. Justify your answer with proper reason and clear working of the same.

Reference String: 2 3 4 5 2 3 6 2 3 4 5 6 **(5)**

5B. Consider the resource allocation graph in the figure below.
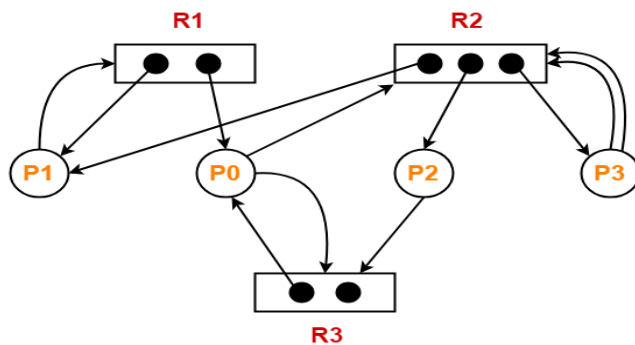
i) Generate the Allocation, Need and Available.
Given: A directed edge Pi → Rj is called a request edge (Need); a directed edge Rj → Pi is called an assignment edge (Allocation).
ii) Find if the system is in a deadlock state otherwise find a safe sequence. **(5)**

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