



SEMESTER END EXAMINATIONS – MARCH 2022

Program	: B.E. : Computer Science and Engineering	Semester	: V
Course Name	: Operating Systems	Max. Marks	: 100
Course Code	: CS51/CS51(O)	Duration	: 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

- Differentiate between User view and System view of the operating system. CO1 (06)
 - With a diagram discuss how dual mode of operation protects operating system from errant users. CO1 (08)
 - Describe the Microkernel approach of structuring the operating system including its merits and demerits. CO1 (06)
- List out the benefits of virtual machines and describe about para-virtualization. CO1 (06)
 - List out and explain the services provided by the operating system. CO1 (06)
 - Define system call. Explain the different types of system calls under process management and memory management. CO1 (08)

UNIT - II

- Differentiate between process and thread. CO2 (06)
 - What are the benefits and the disadvantages of each of the following?
Consider both the system level and the programmer level scenario
 - Synchronous and asynchronous communication
 - Automatic and explicit buffering
 - Send by copy and send by reference
 - Fixed-sized and variable-sized messages.
 - Describe how synchronization of hardware helps in process coordination. CO2 (06)
- With a diagram explain how a process is represented by the kernel. CO2 (06)
 - Consider the following set of processes, with the length of the CPU burst given in milliseconds: CO2 (08)

Process	Burst Time	Priority	arrival time
P_1	10	3	0
P_2	1	1	0
P_3	2	3	0
P_4	1	4	0
P_5	5	2	0

Handwritten notes:
 P_1, P_2 (boxed)
 FCFS, SJF
 priority \rightarrow small
 RR = 1

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 , all at time 0.

- Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum= 1).

- ii. What is the turnaround time of each process for each of the scheduling algorithms in part a)?
 iii. What is the waiting time of each process for each of these scheduling algorithms?
 iv. Which of the algorithms results in the minimum average waiting time (over all processes)?

- c) Provide a solution for Producer-Consumer problem of synchronization using semaphore primitives. CO2 (06)

UNIT - III

5. a) Discuss the different methods of handling deadlock by the operating systems. CO3 (08)
 b) Discuss safety and resource request algorithms with examples. CO3 (12)
6. a) Illustrate Belady's problem with an example. CO3 (06)
 b) Consider the following page reference string:
 1, 2, 3, 4, 5, 1, 3, 1, 6, 3, 2, 3
 How many page faults would occur for the following replacement algorithms assuming 3 frames
 i) LRU replacement ii) FIFO replacement iii) Optimal replacement. CO3 (08)
 c) Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock free. CO3 (06)

UNIT - IV

7. a) List and explain the several pieces of information that are associated with an open file. CO4 (06)
 b) Differentiate between linear list and hash table implementations of a file directory. CO4 (08)
 c) Explain tree structured and acyclic graph directories with examples. CO4 (06)
8. a) Explain the different file access methods. CO4 (06)
 b) Suppose that a disk drive has 2000 cylinders numbered from 0-1999. The drive is currently serving a request at cylinder 100, the following is the queue of pending requests in FIFO order
 86,1470,913,1774,948,1509,1022,1750,130
 Starting from the current head position, what is the total distance that the disk arm moves to satisfy the pending requests for each of the following disk-scheduling algorithms?
 i. FCFS 1008
 ii. SSTF 1702
 iii. SCAN
 c) With a neat diagram describe linked allocation of disk space. CO4 (05)

UNIT - V

9. a) Illustrate the Docker basic architecture with a neat diagram. CO5 (06)
 b) Describe the characteristics and use cases of bind mounts. CO5 (08)
 c) Discuss the types of Docker mount with a neat diagram. CO5 (06)
10. a) Illustrate the workflow of the Docker with App Updates / Changes with a suitable diagram. CO5 (06)
 b) Explain Docker Container Life Cycle with a neat diagram. CO5 (06)
 c) Describe the characteristics and use cases of Tempfs mounts. CO5 (08)
