Registration No: | | | | | | | | | | |

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Course: B.Tech
Sub_Code: RCS5C003

5th Semester Regular/Back Examination: 2023-24
SUBJECT: Operating Systems
BRANCH(S): CSE,CSEAI,CSEAIME,CSIT,CST,ELECTRICAL & C.E,ELECTRONICS & C.E,IT
Time: 3 Hour
Max Marks: 100
Q.Code: N244

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is the function of system calls in operating systems?
b) Define a Virtual Machine in the context of an OS.
c) What are threads in operating systems?
d) Explain the concept of Process Coordination.
e) Describe the role of Semaphores in synchronization.
f) What is a deadlock, and how can it affect a system?
g) Define contiguous memory allocation.
h) What is demand paging?
i) Explain the concept of Disk Scheduling.
j) What is the significance of system protection in an OS?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Discuss the various types of operating systems and their functions.
b) Describe the process scheduling mechanisms in OS.
c) Elaborate on the different synchronization techniques used in OS.
d) Explain the methods for handling deadlocks in an OS.
e) Describe the memory management strategies in OS.
f) Discuss the page placement and replacement policies in virtual memory.
g) Explain the basic concepts of file system design and implementation.
h) Discuss the case study of Linux file systems as mentioned in the syllabus.
i) Describe the structure of Mass Storage in an OS.
j) Explain I/O systems in the context of operating systems.
k) Detail the concepts of Distributed Systems in an OS.
l) Explain the synchronization mechanisms in distributed operating systems.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Consider the following set of processes with the length of the CPU burst given in milliseconds: **(16)**

Process	Arrival Time	Burst Time	Priority
P1	0 ms	10 ms	3
P2	1 ms	1 ms	1
P3	2 ms	2 ms	3
P4	3 ms	1 ms	4
P5	4 ms	5 ms	2

a. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms:
FCFS, Preemptive SJF, Preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 2 ms).

b. What is the turnaround time of each process for each of the scheduling algorithms in part (a)?

c. What is the waiting time of each process for each of these scheduling algorithms?

Which of the algorithms results in the minimum average waiting time (over all processes)?

Q4 Explain the design, implementation, and security concerns in file systems, with a case study on Linux file systems. **(16)**

Q5 Discuss in detail the memory management strategies, including contiguous and non-contiguous allocation, and virtual memory management. **(16)**

Q6 Consider the following snapshot of a system: **(16)**

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 4 3 0
P1	1 1 0 0	1 7 5 0	
P2	1 3 4 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

a. What is the content of the maximum Need?

b. Is the system in a safe state?

If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately?