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

Total Number of Pages: 03 **B.Tech**
/Integrated Dual Degree (B.Tech and M.Tech)
RCS5C003

5th Semester Regular/Back Examination: 2024-25
Operating System
CST, CSEAI, CSEDS, CSE, CSIT, CSEAIME, ELECTRICAL & C.E, ELECTRONICS & C.E, IT, CSE
Time: 3 Hour
Max Marks: 100
Q.Code: R075
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) Define an Operating System and list its main functions.
b) What are system calls? Provide two examples.
c) Differentiate between a process and a thread.
d) What is a virtual machine in the context of Operating Systems?
e) Briefly explain the concept of multithreading.
f) What are semaphores? Provide one use case.
g) What is a file system? Mention its key purpose.
h) What is demand paging in virtual memory management?
i) State the significance of system protection in an OS.
j) Define contiguous memory allocation.

Part-II

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

a) Explain the fork() system call. Explain its functionality with the code: main(){fork(); print("Hello");}
b) Explain the abstract view of an Operating System with a neat diagram.
c) Discuss the role and significance of threads in a modern OS.
d) What are monitors, and how are they used in process synchronization?
e) Explain hardware synchronization techniques for process coordination.
f) Discuss the key methods for handling deadlocks in detail.
g) Compare and contrast contiguous and non-contiguous memory allocation techniques.
h) Explain system protection and its role in ensuring security.
i) Explain the working of the Least Recently Used (LRU) page replacement policy.
j) Discuss various disk scheduling algorithms with an example for each.
k) What are distributed file systems? Provide an example and its use case.

I) Consider three concurrent processes P1, P2 and P3 as shown below, which access a shared variable D that has been initialized to 555.

P1	P2	P3
. .	. .	. .
D = D - 55	D = D + 66	D = D - 44
. .	. .	. .

The processes are executed on a uniprocessor system running a time-shared operating system. Find out the minimum and maximum possible values of D after the three processes have completed execution.

Part-III

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

Q3 Consider the following CPU processes with arrival times (in milliseconds) and length of CPU bursts (in milliseconds) as given below: **(16)**

Process	Arrival Time	Burst Time
P1	0	5
P2	1	1
P3	3	3
P4	4	2

a. What will be the Average Waiting Times and Turn Around Time if non-preemptive SJF scheduling is adopted?

b. What will be the respective Average Waiting Times and Turn Around Time if SRTF scheduling is adopted?

Q4 A system uses FIFO policy for page replacement. It has 4-page frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then access the same 100 pages but now in the reverse order. How many page faults will occur? **(16)**

Q5 A system has three resource types of namely A, B, and C. The number of instances from each type are 8, 6, and 4, respectively. At a particular timestamp, the system has the following resource allotment status: **(16)**

Process	MAX			ALLOCATION		
	A	B	C	A	B	C
P1	6	3	2	1	0	1
P2	5	2	1	1	2	0
P3	2	1	1	2	1	0
P4	2	2	1	1	1	1

Whether the system is in safe state? Whether a new request of <1, 1, 0> from P4 can be granted?

Q6 Consider the request queue (0-199) i.e. 200 tracks and the order of request are 82, 170, 43, 140, 24, 16, 190 and current position of Read/Write head is 50. What is the total seek time of using the FCFS, SSTF, SCAN and LOOK disk scheduling algorithm. **(16)**