Reg. No. : | | | | | | | | | | | | |

Question Paper Code: R3H04

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Third Semester

R21USY304- OPERATING SYSTEMS AND SECURITY

CSE(CYBER SECURITY)

(Regulations R2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Differentiate single processor system and multi-processor system.	CO1-U
2.	Is OS a resource Manager? If so justify your answer.	CO2-App
3.	Explain about throughput and turnaround time.	CO1-U
4.	Consider two threads attempt to write to the same file simultaneously. Each thread writes a different string to the file. What issue can arise from this scenario? How can you ensure that the file writes are performed correctly without interleaving the data?	CO2-App
5.	Discuss the advantages and disadvantages of virtual memory.	CO1-U
6.	Define demand paging in memory management. What are the steps required to handle a page fault in demand paging?	CO2-App
7.	What is the primary focus of the Biba Integrity Model?	CO1-U
8.	How does the threat model described differ from the assumptions made by commercial operating systems?	CO1-U
9.	Explain Address Space Layout Randomization (ASLR) and its role in operating system security.	CO1-U
10.	How would you configure Windows Authorization to minimize security risks?	CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) Explain in detail about the Kernel data structures. CO1-U (16)

Or

(b) Write down the functionalities of building and booting of an Operating System. CO1-U (16)

12. (a) Consider the set of 5 processes whose arrival time and burst time are given below. CO2-App (16)

Process Id	Arrival time	Burst time
P1	3	4
P2	5	3
P3	0	2
P4	5	1
P5	4	3

If the CPU scheduling policy is FCFS and priority scheduling, Explain the procedure in steps and also calculate the average waiting and average turnaround time along wth the Gantt chart.

Or

(b) Consider a set of processes with different CPU burst times and priorities. Apply the CPU scheduling algorithms (FCFS, SJF, Priority, or Round Robin) to schedule the processes, and show how the average waiting time and turnaround time will vary for each algorithm CO2-App (16)

13. (a) Consider the following page reference string. 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2 How many page faults would occur for the following replacement algorithm, assuming four and six frames respectively? CO2-App (16)

a. Optimal page replacement. b. FIFO page replacement.

Or

(b) A system uses paging with a page size of 1 KB. A process requires 4200 bytes of memory. Apply the concept of paging and internal fragmentation to calculate how many pages are required and how much memory is wasted. CO2-App (16)

14.	(a)	Apply the concept of lattice policies to create an information flow model for a healthcare system with different levels of data sensitivity and various medical departments.	CO2-App	(16)
		Or		
	(b)	An organization wants to ensure that confidential project files are never read by unauthorized users, even if they gain access to the system. Apply the Bell-LaPadula model to design an access control policy that enforces secrecy. Explain with an example of different security levels (e.g., Top Secret, Secret, Confidential, Public)	CO2-App	(16)
15.	(a)	How would you configure Windows Authorization to ensure that only specific users can access sensitive financial data on a shared network drive?	CO2-App	(16)
		Or		
	(b)	How would you utilize the Security Kernel to prevent unauthorized modifications to critical system files on a Windows server?	CO2-App	(16)