QP Code: R253E001

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Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B.C.A. (Third Semester – Regular & Supplementary) Examinations, November – 2025

BCA23301 – Operating Systems

Time: 3 hrs | Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. "Embedded systems always run on real-time operating system"-Justify this statement	CO1	K3
b. Define: Belady's anomaly?	CO3	K1
c. Distinguish file from dictionary.	CO5	K2
d. Give the condition necessary for a deadlock situation to arise?	CO4	K2
e. List two differences between logical and physical addresses.	CO2	K2

PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Describe the difference between symmetric and asymmetric multiprocessing.	5	CO1	K2
b. Apply your understanding of process states to illustrate how a process moves from creation to termination.	5	CO1	K3
(OR)			
c. List the various services provided by operating systems.	5	CO1	K2
d. Illustrate with a diagram how the PCB supports process creation, execution, and termination within the OS.	5	CO1	K3
3.a. An operating system uses SJF algorithm for preemptive scheduling of processes. Consider following set of processes with arrival time (AT) & burst time (BT) as given below. Calculate the average waiting time.	5	CO2	K3

Process ID	Arrival Time (AT)	Burst Time(BT)
P1	0	12
P2	2	4
P3	3	6
P4	8	5

b. Explain the Critical Section Problem and the conditions required for its solution.	5	CO2	K2
(OR)			
c. Consider the following set of processes with the length of the CPU-burst time in given ms:	5	CO2	K3

Process ID	Arrival Time (AT)	Burst Time(BT)
P1	0	8
P2	1	4
P3	2	9
P4	3	5
P5	4	3

Draw four Gantt charts illustrating the execution of these processes using RR (quantum=2) scheduling. Also calculate waiting time and turnaround time.

d. Describe the roles of long-term, medium-term, and short-term schedulers in an Operating System. 5 CO2 K2

4.a. Discuss various methods for handling deadlocks in an Operating System. 5 CO3 K2

b. Consider the following system snapshot using data structures in the Banker's algorithm with resources A,B,C and D and process P0 to P4: 5 CO3 K3

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

Using Banker's algorithm, answer the following questions:
(i) How many resources of type A, B, C and D are there?
(ii) Is the system in a safe state?

(OR)

c. Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock. 5 CO3 K2

d. Analyse how the hold and wait and circular wait conditions can be avoided in an OS. 5 CO3 K3

5.a. Explain the difference between logical and physical address spaces with an example. 5 CO4 K2

b. Given the reference string: {1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5} and 4 page frames, Calculate page faults for Optimal, FIFO, and LRU algorithms and identify which performs best. 5 CO4 K3

(OR)

c. Explain FIFO (First in First out) page replacement algorithm for reference string 7,0,1,2,0,3,0,4,2,3,1,0,3 for a memory with three & four frames. 5 CO4 K3

d. Discuss the concept of paging and the role of the page table. 5 CO4 K2

6.a. What are files and explain the access methods for files? 5 CO5 K2

b. The head is currently at track 53. Disk queue: {98, 183, 37, 122, 14, 124, 65, 67}. Calculate the total head movement using FCFS, SSTF. 5 CO5 K3

(OR)

c. Describe with a neat sketch about the various directory structure. 5 CO5 K2

d. The head is currently at track 140. Disk queue: {130, 10, 115, 190, 25, 135, 75, 65}. Calculate the total head movement using SSTF and SCAN (Elevator). 5 CO5 K3

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