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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.C.A. (First Semester) Regular Examinations, January – 2025

MCA23102 – Operating Systems

(MCA)

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. Give the role of "Kernel" and "Shell" in UNIX operating system.	CO1	K2
b. List the various file attributes.	CO5	K1
c. Define inter process communication (IPC).	CO2	K2
d. Explain "cat" command in Unix operating system.	CO6	K3
e. What are the requirements that a solution to the critical section problem must satisfy?	CO3	K2

PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Illustrate the LRU page-replacement algorithms & LRU-Approximation Page Replacement use the reference string 7, 0,1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2,1, 2, 0, 1, 7, 0,1 for a memory with three frames.	5	CO3	K3
b. Explain the various types of system calls with examples.	5	CO1	K1
(OR)			
c. Write briefly about file attributes, operations, types and structure	5	CO5	K2
d. 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

3.a. Write in detail about Segmentation.	5	CO3	K2
b. Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock.	5	CO4	K3
(OR)			
c. What are files and explain the access methods for files?	5	CO5	K2
d. "Operating system is resource manager"-Justify this statement with suitable functionality of OS.	5	CO1	K3
4.a. Write briefly about file attributes, operations and types.	5	CO5	K2
b. Discuss the essential properties of the following types of systems: i) Time sharing systems ii) Multi-processor systems	5	CO1	K3
(OR)			
c. Describe the differences among short- term, medium-term and long-term scheduling with suitable example	5	CO2	K2

d. 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 CO4 K2

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?

5.a. Write in detail about Deadlock Avoidance. 5 CO4 K2

b. 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 CO3 K3

(OR)

c. Show how wait() and signal() semaphore operations could be implemented in multiprocessor environments. 5 CO3 K3

d. Illustrate how operating system has been evolved from serial processing to multiprogramming systems. 5 CO1 K2

6.a. State critical section problem. Discuss solutions to solve the critical section problem. 5 CO3 K3

b. Write a shell program to input basic salary (BS). Find the TA=10% of BS, DA=15% of BS, HRA=20% of BS. Find total salary. 5 CO6 K4

(OR)

c. State the Operating system structure. 5 CO1 K2

d. 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.

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