GIET UNIVERSITY, GUNUPUR – 765022

M.C.A(First Semester) Regular Examinations, January – 2024

MCA23102 – Operating System

Time: 3hrs Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Outline about virtual memory.	CO3	K2
b.	Discuss the difference between symmetric and asymmetric multiprocessing	CO1	K2
c.	Are there any conditions necessary for a system to reach a deadlock?	CO4	K2
d.	Define the term dispatch latency.	CO2	K1
e.	How does OS handle file management?	CO5	K2

PART – B **(10 x5=50 Marks)**

		Marks	CO #	Blooms Level
	Answer ***ALL*** questions			
2. a.	List the various services provided by operating systems.	5	CO1	K2
b.	Consider the following page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 How many page faults would occur for the optimal page replacement algorithm, assuming three frames and all frames are initially empty.	5	CO3	K4
	(OR)			
c.	What is a Critical Section problem? Give the conditions that a solution to the critical section problem must satisfy.	5	CO3	K3
d.	Describe the contents of a process control block(PCB)	5	CO2	K3
3.a.	What are the advantages of inter-process communication (IPC)? How communication takes place in a shared-memory environment?	5	CO1	K2
b.	What is Deadlock? Explain Deadlock prevention & Avoidance.	5	CO4	K2
	(OR)			
c.	Discuss the services provided by the operating system for efficient system operation.	5	CO1	K2
d.	Consider following set of processes with arrival time in milliseconds, CPU burst time (in milliseconds) and priority (0 is the highest priority) shown below.	5	CO2	K4

Process ID	Arrival Time (AT)	Burst Time(BT)	Priority
P1	0	11	2
P2	5	28	0
P3	12	2	3
P4	2	10	1
P5	9	16	4

Find Avg. waiting time using preemptive priority scheduling algorithm.

4.a. Discuss in detail about file allocation methods. 5 CO5 K2

b. Explain about the difference between internal fragmentation and external fragmentation. 5 CO3 K3

(OR)

c. Explain file attributes and file operation in brief. 5 CO5 K2

d. Consider the following page reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5. How many page faults would occur for the FIFO page replacement algorithms assuming three & four frames? 5 CO3 K4

5.a. Discuss Mutual-exclusion implementation with test and set () instruction. 5 CO3 K2

b. Consider the following system snapshot using data structures in the Banker's algorithm with resources X=10, Y=5, Z=7 and process P0 to P4: 5 CO4 K4

Process	Allocation	Max	Available	Need
	X Y Z	X Y Z	X Y Z	X Y Z
P0	0 1 0	7 5 3		
P1	2 0 0	3 2 2		
P2	3 0 2	9 0 2		
P3	2 1 1	4 2 2		
P4	0 2 2	5 3 3		

Using Banker's algorithm, answer the following questions:

(i) Calculate content of need matrix.

(ii) Is the system in a safe state or not?

(OR)

c. Describe an indexed file system and an indexed sequential file system. In what cases is an indexed file system superior, and in what cases is an indexed sequential file system superior? 5 CO4 K2

d.	Explain evolution of operating systems.	5	CO1	K2
6.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, 4, 5, 3 How many page faults would occur for the LRU replacement algorithms, assuming three & four frames? Remembering all frames are initially empty.	5	CO3	K4
b.	What is resource allocation graph explain with example?	5	CO4	K3
	(OR)			
c.	Consider the following set of processes with the length of the CPU-burst time in given ms:	5	CO2	K4

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 SJF scheduling. Also calculate waiting time and turnaround time.

d.	Explain free space management with neat example.	5	CO5	K3

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