GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
OPERATING SYSTEM
MCA20-202

TIME ALLOTTED: 3 HOURS **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

		Marks	CO No.
1. (i)	A process can be terminated due to a) normal exit b) fatal error c) killed by another process d) all of the mentioned	1	CO1
lii)	A Process Control Block (PCB) does not contain which of the following: a) Code b) Stack c) Bootstrap program d) Data	1	CO3
(iii)	Mutual exclusion can be provided by the a) mutex locks b) binary semaphores c) both mutex locks and binary semaphores d) none of the mentioned	1	CO3
(iv)	The child process can: a) be a duplicate of the parent process b) never be a duplicate of the parent process c) cannot have another program loaded into it d) never have another program loaded into it	1	CO3
(v)	Inter process communication: a) allows processes to communicate and synchronize their actions when using the same address space b) allows processes to communicate and synchronize their actions without using the same address space c) allows the processes to only synchronize their actions without communication d) none of the mentioned	1	CO1

(vi)	To differentiate the many network services a system supports _____ are used. a) Variables b) Sockets c) Ports d) Service names	1	CO1
(vii)	DMA is used for : a) High speed devices(disks and communications network) b) Low speed devices c) Utilizing CPU cycles d) All of the mentioned	1	CO1
(viii)	Which module gives control of the CPU to the process selected by the short-term scheduler? a) dispatcher b) interrupt c) scheduler d) none of the mentioned	1	CO4
(ix)	Round robin scheduling falls under the category of : a) Non-preemptive scheduling b) Preemptive scheduling c) All of the mentioned d) None of the mentioned	1	CO4
(x)	The following three conditions must be satisfied to solve the critical section problem: a) Mutual Exclusion b) Progress c) Bounded Waiting d) All of the mentioned	1	CO3
(xi)	Which one of the following is the deadlock avoidance algorithm? a) banker's algorithm b) round-robin algorithm c) elevator algorithm d) karn's algorithm	1	CO4
(xii)	When does page fault occur? a) The page is present in memory. b) The deadlock occurs. c) The page does not present in memory. d) The buffering occurs.	1	CO3

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following) 3 x 5 = 15

			Marks	CO No.
2.	a)	Explain Process Control Block.	2	CO1
	b)	Draw and explain the process state diagram.	3	CO2
3.	a)	What is Context switch?	2	CO3
	b)	Differentiate between Preemptive and Non-preemptive scheduling .	3	CO1
4.		Describe an algorithm to check whether a given state is safe or not?	5	CO3
5.		Explain "Demand Paging" in memory management scheme.	5	CO3
6.		Discuss differences between paging and segmentation.	5	CO3

GROUP – C
(Long Answer Type Questions)
(Answer any *three* of the following) 3 x 15 = 45

			Marks	CO No.
7.	a)	Discuss the dining philosopher problem with its solution.	8	CO4
	b)	What is Race Condition?	2	CO3
	c)	What are the solutions of Critical Section Problem?	5	CO2
8.	a)	What do you mean by CPU scheduling?	4	CO1
	b)	Discuss CPU/IO burst cycle.	4	CO1
	c)	Consider the following process:	7	CO4

PROCESS	ARRIVAL TIME	SERVICE TIME
P1	0	7
P2	2	4
P3	4	1
P4	5	4

Solve the above problem with Shortest Remaining Time First by drawing Gantt chart and also calculate the average waiting time and turnaround time.

9.	a)	What is Deadlock?	3	CO1
	b)	Mention the necessary conditions for a deadlock to occur.	3	CO1
	c)	Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t0 following snapshot of the system has been taken:	10	CO4

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Is the system in a safe state? If Yes, then what is the safe sequence?

10.	a)	Suppose that a disk drive has 200 cylinders, numbered 0 to 199.The work queue is: 23, 89, 132, 42, 187. Determine the total distance for the following disk scheduling algorithms: (i) SCAN (ii) LOOK (iii) C-SCAN (iv) C-LOOK (v) FCFS (vi) SSTF	12	CO4
	b)	What is Spooling?	3	CO1
11.	a)	Explain Belady's anomaly.	3	CO3
	b)	Consider the page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. Assume that the main memory is initially empty.The number of page frame is 3.Calculate the Hit Ratios by the following algorithms. i. FIFO ii. LRU iii. OPTIMAL	12	CO4