GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT

2020-2021
OPERATING SYSTEMS
CS502

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)	Which one is starvation free algorithm? a) Multilevel queue scheduling b) Shortest Remaining Time First c) Priority Algorithm d) Round Robin	1	CO3
	(ii)	The Mode bit for user mode is- a) 0 b) 1 c) 10 d) 11	1	CO1

	(iii)	main()
		{
		fork();
		fork();
		printf(“Hello”);
		}
		No of Child process will be created-
		a) 3
		b) 4
		c) 5
		d) 2
			1	CO2

	(iv)	Which one is incorrect for waiting time? a) Total time spent in ready queue b) For pre-emptive algorithm it is equal to response time c) Waiting time =Starting time –Arrival time d) Waiting time =Turnaround time –Burst time	1	CO3
	(v)	Basic unit of CPU utilization is called a) Process b) Program c) Thread d) None of the mentioned	1	CO2

(vi)	The Bankers algorithm is used to a) Avoid deadlock b) Prevent deadlock c) Solve deadlock d) Detect deadlock		1	CO4
(vii)	Which one is not the condition for a good solution for critical section problem? a) Mutual Exclusion b) Progress c) Bounded Waiting d) Circular wait		1	CO4
(viii)	Which one is internal fragmentation problem free technique? a) Dynamic multiprogramming technique b) Paging c) First Fit algorithm d) Best Fit algorithm		1	CO3
(ix)	Belady's anomaly related to a) FIFO Page replacement b) LRU c) Optimal Page replacement d) None of the mentioned		1	CO4
(x)	The smallest addressable unit in secondary memory- a) Byte b) Block c) Character d) Page		1	CO1
(xi)	The file system NTFS stands for a) New type file system b) Never terminated file system c) New technology file system d) Non terminated file system		1	CO3
(xii)	Priority and process id- a) Both are same b) Both are completely different. c) Can be same d) None of the mentioned		1	CO2

GROUP – B
(Short Answer Type Questions)

Answer any ***three*** from the following: **3×5=15**

			Marks	**CO No**
2.	(a)	Differentiate between Multiprogramming and Multitasking Operating system.	3	CO1
2.	(b)	What are the advantages of micro-kernel OS structure?	2	CO1
3.		Let *S* and *Q* be two semaphores initialized to 1. Now consider that P0 and P1 are two process running the following code in a multiprogramming system. P_0: *wait*(*S*); *wait*(*Q*); P_1: *wait*(*Q*); *wait*(*S*);	5	CO4

		⋮ ⋮ *signal*(*S*); *signal*(*Q;* *signal*(*Q*) *signal*(*S*); Show that this may lead to deadlock		
4.		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 following replacement algorithms, assuming number of frames equal to 4. (initially all the frames are empty)? a) LRU b) FCFS	5	CO2
5.	(a)	What is critical section?	2	CO4
	(b)	How critical section problem can be solved using semaphore?	3	CO4
6.	(a)	Logical address space=4 GB, Physical address space=64 MB, Page size=4 KB. Calculate- i) No of pages ii) No of frames iii) No of entries in the page table iv) Size of page table (Memory s Byte addressable).	4	CO5
	(b)	What is Boot block?	1	CO2

GROUP – C
(Long Answer Type Questions)

Answer any ***three*** from the following: **3×15=45**

			Marks	**CO No.**
7.	(a)	Write the functions of Long-term and Short-term schedulers.	2	CO3
	(b)	What is bootstrap program? How is it useful?	3	CO2
	(c)		10	CO3

Process No.	**Arrival Time**	**Burst Time**
P1	0	3
P2	1	5
P3	3	4
P4	4	1
P5	5	2

Using **Shortest Remaining Time First** algorithm answer the following questions-

i) Draw the Gantt chart
ii) Calculate throughput of the system.
iii) Calculate Average Turnaround Time
iv) Calculate Average Waiting Time
v) Calculate Average Response Time

8.	(a)	Write a solution for Dining philosopher's problem.	4	CO4
	(b)	What are the significances of Resource allocation graph?	1	CO4

	(c)	Consider the following snapshot of a system:	10	CO4

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

i) What is the content of matrix need?
ii) Is the system in a safe state?
iii) If a request from process P1 arrives for (0, 4, 2, 0) can the request be granted immediately?

9.	(a)	What is seek time and rotational latency?	2	CO3
	(b)	Consider a disk Queue with request for two blocks on cylinder 23, 89, 132, 42, 187. There are 200 cylinders numbered from 0 - 199. The disk head starts at number 100. Find out the total disk head movement for FCFS, SSTF, SCAN, C-SCAN and LOOK scheduling.	10	CO2
	(c)	Explain Programmed I/O	3	CO4
10.	(a)	What is virtual memory concept?	3	CO3
	(b)	What is page fault?	3	CO3
	(c)	Optimal page replacement algorithm is an efficient algorithm but impossible to implement-explain.	3	CO4
	(d)	What is Race condition and busy waiting? What are the benefits of multithreaded programming?	6	CO4
11.		Write short notes (Any Three)		
	(a)	Dual mode operation in Operating systems	5	CO1
	(b)	Context Switching	5	CO2
	(c)	Fragmentation problem	5	CO3
	(d)	Deadlock prevention	5	CO4
	(e)	Multilevel feedback queue scheduling algorithm	5	CO3