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Roll No. _____

19/1564

B.C.A. (Fourth Semester) Examination, 2019

Second Paper

(Operating System)

Time : Three Hours ***Maximum Marks : 75***

Note: Attempt any **five** questions. **All** questions carry equal marks.

Note : The answers to short answer type questions should not exceed 200 words and the answers to long answer type questions should not exceed 500 words.

1. (a) Write briefly about the following:

(i) Parallel systems. 2×4=8

(ii) Distributed systems.

(iii) Real Time systems.

P.T.O.

(iv) Time sharing systems.

(b) Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would the first-fit, best-fit and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB and 426 KB (in order)? Which algorithm makes the most efficient use of memory? 7

2. (a) Consider a logical address space of 64 pages of 1024 words each, mapped onto a physical memory of 32 frames. 2

(i) How many bits are there in the logical address?

(ii) How many bits are there in the physical address?

(b) Compare the memory organization schemes of contiguous memory allo-

cation, pure segmentation and pure paging with respect to external fragmentation, internal fragmentation and ability to share code across processes. 6

(c) What is an operating system? Can we work upon a computer system without an operating system? Explain briefly. 7

3. (a) How does the signal ( ) operation associated with monitor differ from the corresponding operation defined for semaphores? 4

(b) What is Producer-consumer problem? Explain. 3

(c) Define the following terms: 2×4=8

(i) Dispatcher.

(ii) Thrashing.

(iii) Multilevel Queue scheduling.

(iv) CPU Scheduler.

4. (a) Consider the following set of processes with the length of the CPU burst given

in milli seconds: 4+8=12

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0.

(i) Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority and RR (quantum = 1).

(ii) What is the turnaround and waiting time of each process for each of the scheduling algorithms in part (i)?

(b) What is the critical section problem? Explain. 3

5. (a) Define Deadlock. 2

(b) Consider the following snapshot of a system: 1+4+1=6

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following questions using the Banker's algorithms:

(i) What is the content of the matrix Need?

(ii) Is the system in a safe state?

(iii) If a request from process P_1 arrives for (0, 4, 3, 0) can the request be granted immediately?

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(c) What is Deadlock prevention and how it can be achieved? Explain by giving example. 7

6. (a) Suppose that a disk drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The Queue of pending request in FIFO order is: 9

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.

Starting from the current head position. What is the total distance that the disk arms moves to satisfy all the pending requests for FCFS disk-scheduling algorithms?

(b) What are dedicated devices, shared devices and virtual devices? 6

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7. (a) What are different File allocation methods? Explain each of them in brief. 8

(b) Consider a file system that used an inodes to represent files. Disk blocks are 8KB in size, and a pointer to a disk block requires 4 bytes. This file system has 12 direct disk blocks, as well as single, double and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system? 7

8. (a) Consider the following page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. 9

How many page faults would occur for the following replacement algorithms? Assume three frames and all frames are initially empty.

(i) LRU replacement.

(ii) FIFO replacement.

(iii) Optimal replacement.

(b) Consider a system that allocates pages of different sizes to its processes. What are the advantages of such a paging scheme? 6