Code No: 135CV

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, December - 2019

OPERATING SYSTEMS

(Common to CE, EEE, ME, ECE)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is Bootstrap program?	[2]
b)	Differentiate hard and soft real time systems.	[3]
c)	Define Process Control Block.	[2]
d)	What is starvation? Name the scheduling algorithms which cause the starvation.	[3]
e)	What is demand paging?	[2]
f)	What is segmentation?	[3]
g)	A unix-style I-node has 10 direct pointers and one single, one double and one triple indirect pointer. Disk block size is 1Kbytes, disk block address is 32 bits are used. What is the maximum possible file size in bytes?	[2]
h)	Explain briefly the basic file attributes.	[3]
i)	What are all the data structures (tables) used in Banker's Algorithm?	[2]
j)	Differentiate access-matrix facility and the role-based access-control facility.	[3]

PART – B

(50 Marks)

2.a) What are the uses of having two modes of operation in CPU?

b) Which services of operating system are helpful to user and which are helpful to the system itself? Explain in detail. [5+5]

OR

3.a) Differentiate message passing model and shared memory model.

b) Describe some distributed systems that would be appropriate for peer-to-peer system. [5+5]

4.a) What is the need of Inter process communication? Mention few mechanisms of IPC.

b) For the following scheduling algorithms draw the Gantt chart and calculate average waiting time and turnaround time in each of the following algorithms. [5+5]

i) First-come, First-Served : Process: P1 P2 P3
Burst Time: 24 3 3

ii) Shortest-Job-First : Process: P1 P2 P3 P4
Burst Time: 6 8 7 3

OR

5.a) How monitor differs from semaphore? Explain the functionality of both.

b) Consider the following set of processes, with the length of the CPU burst time given in milli seconds. The processes are assumed to have arrived in the following times.

Process Name	Arrival Time (milli.sec)	Burst Time (mill.sec)	Priority
P1	0	8	3
P2	1	4	1
P3	2	9	3
P4	3	5	2

Show that the Preemptive SJF algorithm has minimal average waiting time and turnaround time over Priority and Round Robin scheduling algorithms. The Time quantum for RR algorithm is 4 milli.sec. [5+5]

6.a) A process has been allocated 3 page frames. Assume that none of the pages of the process are available in the memory initially. The process makes the following sequence of page references (reference string): 1, 2, 1, 3, 7, 4, 5, 6, 3,1
Find the number of page faults which would occur for the following page replacement techniques.
i) FIFO
ii) Optimal page replacement policy
iii) LRU algorithm

b) How Paging concept permits the physical address space of a process to be non contiguous? [5+5]

OR

7.a) Consider a job queue with 5 processes P1, P2, P3, P4 and P5, the memory requirements of each process as 600K, 1000K, 300K, 700K, 500K respectively for a total of 2560K memory available. From this memory, an operating system resides in 400K. Calculate memory fragmentation in each of the following algorithms.
i) First fit
ii) Best fit
iii) Worst fit

b) What is thrashing? Discuss the causes of thrashing. [5+5]

8.a) Describe File-system structure and its implementation.

b) Why rotational latency usually not considered in disk scheduling? How would you modify SSTF, SCAN, and C-SCAN to include latency optimization? [5+5]

OR

9.a) Explain the concepts and techniques of free space management.

b) Suppose that a disk drive has 5000 cylinders numbered from 0 to 4999.The drive is currently serving a request at cylinder 143 and moving towards 4999th end. The queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750 and 130. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms: C-SCAN and LOOK? [5+5]

10.a) Consider the deadlock situation that could occur in the dining- philosophers problem when the philosophers obtain the chopsticks one at a time. Discuss how the four necessary conditions for deadlock indeed hold in this setting. Discuss how deadlocks could be avoided by eliminating any one of the four conditions.

b) Write about goals of protection. [5+5]

OR

11.a) Consider the following snap shot of a system:

Process	Allocation Matrix				Max Matrix				Available Matrix			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	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	3	2	1	1

Using Banker's algorithm, answer the following questions.

i) How many resources of type A, B, C, and D are there?

ii) What are the contents of the Need matrix?

iii) Is the system in a safe state? Why

iv) If a request from process P4 arrives for additional resources of (1, 2, 0, 0,), can the Banker's algorithm grants the request immediately? Show the new system state and other criteria

b) Explain the system and network threats. [5+5]

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