

**Code No: 862AB****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****MCA II Semester Examinations, July/August - 2021****OPERATING SYSTEMS****Time: 3 Hours****Max.Marks:75****Answer any five questions  
All questions carry equal marks**

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- 1.a) Describe how operating systems evolved from simple batch to multi-programmed and time sharing systems.
- b) State and explain the various types of system calls in detail. [9+6]
- 2.a) Explain the differences among short-term, medium-term, and long term scheduling.
- b) Consider the following set of processes, with the length of the CPU burst given in milliseconds: [5+10]

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

- i) Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum= 1).
- ii) What is the turnaround time of each process for each of the scheduling algorithms?
- iii) What is the waiting time of each process for each of these scheduling algorithms?
- iv) Which of the algorithms results in the minimum average waiting time (over all processes)?
- 3.a) Describe how the Swap() instruction can be used to provide mutual exclusion that satisfies the bounded-waiting requirement.
- b) Consider the following snapshot of a system: [5+10]

	Allocation	Max	Available
	A B C D	A B C D	A B 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	

Answer the following questions using the banker's algorithm:

- i) What is the content of the 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?



- 4.a) Explain the following allocation algorithms,  
i) First fit      ii) Best fit      iii) Worst fit
- b) What is paging? Explain the basic method for implementing paging. [9+6]
- 5.a) Explain the following two directory structures with diagrams:  
i) Tree structured      ii) Acyclic graph
- b) State and explain four approaches to free space management. [8+7]
- 6.a) What is distributed system? List out the differences between distributed systems and conventional operating system.
- b) Write short notes on operating system structure. [7+8]
- 7.a) What are two differences between user-level threads and kernel-level threads? Under what circumstances is one type better than the other?
- b) Describe the attributes of the process. Describe the typical elements of process control block. [7+8]
- 8.a) Explain how semaphores can be used to control access to a given resource consisting of finite number of instances.
- b) Explain page replacement algorithms with example. [7+8]

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