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18CS654

Sixth Semester B.E. Degree Examination, July/August 2022
Introduction to Operating System

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define an Operating System. Explain the role of an operating system from different viewpoints. **(06 Marks)**
   b. What are the eight major activities of an operating system with regard to process management, memory and mass storage management? **(08 Marks)**
   c. Describe the services provided by an operating system which are helpful to the user. **(06 Marks)**

OR

2 a. Explain Dual-mode operation with a neat diagram. **(04 Marks)**
   b. Define simple, layered and micro kernels approach for structuring the operating system along with relevant diagrams. **(12 Marks)**
   c. Explain the "graceful degradation" and "fault tolerant" in a multiprocessor systems. **(04 Marks)**

Module-2

3 a. What is a process? Describe the different states of a process with a neat diagram. **(06 Marks)**
   b. Briefly explain co-operating processes and mechanisms of IPC using shared memory and message passing with relevant diagrams. **(12 Marks)**
   c. Explain the need for context switching between processes. **(02 Marks)**

OR

4 a. What is a thread? Explain the different multi threading models. **(06 Marks)**
   b. What information is kept in process control block? Explain with a neat diagram. **(08 Marks)**
   c. Demonstrate the operations of process creation and process termination. **(06 Marks)**

Module-3

5 a. Describe the scheduling criteria that must be kept in mind while choosing different scheduling algorithms. **(06 Marks)**
   b. Give the differences between short-term, medium-term and long-term scheduling. **(06 Marks)**
   c. Briefly describe the FCFS and SJF scheduling algorithms with examples. **(08 Marks)**

OR

6 a. Consider the following set of processes, with the length of the cpu burst given in milliseconds.

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. Draw 4 Gantt charts that illustrates the execution of these processes using the following scheduling algorithms: FCFS, SJF non preemptive priority (smaller priority number implies a higher priority) and RR (quantum = 1). What is the average turnaround time and waiting time for each of these scheduling algorithms? **(14 Marks)**

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   b. Differentiate the following with examples:
      i) Preemptive and non-preemptive scheduling.
      ii) I/O bound and cpu bound
      iii) Scheduler and dispatcher. **(06 Marks)**

Module-4

7 a. Define dead lock. Write a note on 4 necessary conditions that arise dead locks. **(06 Marks)**

   b. Assume that there are 5 processes P_0 through P_4 and 4 types of resources. At time T_0 we have the following state.

Process	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				

      Apply Bankers algorithm to answer the following:
      i) What is the content of need matrix?
      ii) Is the system in a safe state?
      iii) If a request from a process $P_1(0, 4, 2, 0)$ arrives, can it be granted? **(08 Marks)**

   c. Write a note on "safe state". **(06 Marks)**

OR

8 a. Write short notes on:
      i) External and Internal fragmentation.
      ii) Dynamic loading and linking. **(06 Marks)**

   b. Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212K, 417K, 112K and 426K (in order) which algorithm makes the most efficient use of memory. **(06 Marks)**

   c. Explain with the help of supporting hardware diagram. How the TLB improves the performance of a demand paging system. **(08 Marks)**

Module-5

9 a. Explain virtual memory and its advantages. **(06 Marks)**

   b. What is the procedure for handling page fault with a neat block diagram? **(08 Marks)**

   c. Write a note on copy-on-write. **(06 Marks)**

OR

10 a. What are the typical attributes of a file? **(06 Marks)**

   b. Define operations that can be performed on files. **(06 Marks)**

   c. Explain various access methods of files. **(08 Marks)**

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