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18CS654

Sixth Semester B.E. Degree Examination, June/July 2023
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 operating system. Explain the systems and users view of an operating system.
   (10 Marks)
   b. Explain the essential properties of batch, real time and distributed operating systems.
   (10 Marks)

OR

2 a. List and explain services provided by an operating system that are designed to make using computer systems more convenient for users. **(10 Marks)**
   b. With a neat diagram of VM-Ware architecture, explain the concept of virtual machine and the main advantage of using VM architecture. **(10 Marks)**

Module-2

3 a. What is process control block? List the information stored in process control block. Explain the different states of a process during its life cycle. **(10 Marks)**
   b. Explain shared memory and message passing technique for Inter-process communication between co-operating processes. **(10 Marks)**

OR

4 a. Explain multithreading models with examples. **(10 Marks)**
   b. Explain operations on process. **(10 Marks)**

Module-3

5 a. Consider the following set of processes with arrival time:

Process	Arrival time	Burst time
P_1	0	10
P_2	0	1
P_3	1	2
P_4	2	4
P_5	2	3

   i) Draw Gantt charts using FCFS, SJF preemptive and non-preemptive scheduling.
   ii) Calculate the average waiting time for each of the scheduling algorithm. **(10 Marks)**
   b. What are Semaphores? Using wait( ) and signal( ) semaphore operations for implementation, explain binary and counting semaphore with an example. **(10 Marks)**

OR

6 a. Explain how monitors can solve dining philosophers problem. **(10 Marks)**
   b. Explain critical section problem. List the requirements that critical section problem must satisfy. Explain Peterson's solution to critical section problem. **(10 Marks)**

Module-4

7 a. Define deadlock. What are the necessary conditions for deadlock to occur? Describe resource allocation graph: i) With deadlock   ii) With a cycle but no deadlock.   **(10 Marks)**

b. Consider the following snapshot of a system and answer the following questions using Banker's algorithm.
   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 (1, 0, 2), can the request be granted immediately?

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

(10 Marks)

OR

8 a. What is swapping? Does this increase the operating systems overhead? Justify your answer.   **(10 Marks)**

b. What are the drawbacks of contiguous memory allocation? Given five 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, 426K in order? Which algorithm makes the most efficient use of memory?   **(10 Marks)**

Module-5

9 a. A hypothetical main memory can store only 3 frames simultaneously. The sequence in which the pages will be required is given below:
   7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 (20 operations)
   Indicate the sequence in which the three frames will be filled in.
   i)   FIFO
   ii) Optimal page replacement
   iii) Least recently used methods of page replacement indicate number of page faults in each case.
   Which is the most efficient among them?   **(10 Marks)**

b. Discuss on performance of demand paging. Explain copy-on-write process in virtual memory.   **(10 Marks)**

OR

10 a. List any five typical file attributes and any five file operations indicating their purpose in one line each.   **(10 Marks)**

b. What are directories? Describe various directory structures.   **(10 Marks)**

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