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Total Pages : 3

602106

January 2023
MCA - 1st SEMESTER
OPERATING SYSTEM (MCA-20-109)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) What does Program status word comprises? (1.5)

(b) Differentiate between a system call and an interrupt. (1.5)

(c) Differentiate between Reusable and Consumable resources. Give example of each. (1.5)

(d) Differentiate between Multiprogramming and Multitasking operating system. Give an example of the operating system that is both multiprogramming and multitasking in nature. (1.5)

(e) What is the need for swapping the processes in and out of the main memory? (1.5)

(f) What do you understand by Process Spawning? What is the need for the same? (1.5)

(g) Write the four basic operations associated with a change in thread state. (1.5)

(h) Differentiate between absolute address and relocatable address. (1.5)

(i) Differentiate between deadlock and livelock. (1.5)

(j) Can a mutex be locked more than once? (1.5)

PART–B

2. (a) What is a Process Control Block? Explain its typical elements. (10)

(b) Explain the two modes in which the Processor executes. How does Processor get to know as in which mode it is executing and how is the mode changed? (5)

3. (a) What is a resource allocation graph? What is it used for? Draw the resource allocation graph to show its usage. (5)

(b) Consider the following snapshot of a system : (10)

Process	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	3	6				

Answer the following questions using the Banker's algorithm:

(i) Is the system in a safe state?

(ii) If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately?

4. What is a semaphore? What are the two operations that are performed on semaphores. Explain with an example the applications where semaphores are brought to use. (15)

5. (a) What do you understand by buddy system? Explain with the help of a diagram. (5)

(b) What do you understand by Principle of locality? Explain how the address translation from logical address to physical address is done in case of paging? (10)

6. (a) A system uses 3-page frames for storing process pages in main memory. It uses the First in First out (FIFO) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below :

4, 7, 6, 1, 7, 6, 1, 2, 7, 2

Also calculate the hit ratio and miss ratio. (10)

(b) What is thrashing? What is the cause of it? (5)

7. Differentiate between Contiguous File Allocation and Indexed File Allocation. Explain the working of any one. (15)