processes may complete. Otherwise, illustrate why the state is unsafe.

(i) Available = (0, 3, 0, 1)

(ii) Available = (1, 0, 0, 2) (8)

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END SEMESTER EXAMINATION : APRIL-MAY, 2019

OPERATING SYSTEM

Time : 3 Hrs. *Maximum Marks : 70*

Note: ***Attempt questions from all sections as directed. Use of simple calculator is allowed.***

SECTION – A (30 Marks)

Attempt any **five** *questions out of* **six**.
Each question carries **06** *marks.*

1. Explain the requirement of system call with an example. List various types of system calls.

2. Differentiate between the following :

   (i) Multiprogramming, multitasking and multiprocessing

   (ii) Program and process

3. Given five memory partitions of 100 Kb, 500 Kb, 200 Kb, 300 Kb, 600 Kb (in order), how would the

P.T.O.

first-fit, best-fit, and worst-fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb, and 426 Kb (in order)? Which algorithm makes the most efficient use of memory?

4. (a) Describe various steps involved in a DMA transfer. (4)

(b) Some DMA controllers support direct virtual memory access, where the targets of I/O operations are specified as virtual addresses and a translation from virtual to physical address is performed during the DMA. How does this design complicate the design of the DMA controller? What are the advantages of providing such a functionality? (2)

5. Consider the following set of processes, with the length of CPU burst given in milliseconds:

Process	Burst Time	Priority	Arrival Time
P1	10	3	0
P2	1	1	1
P3	2	4	2
P4	1	5	3
P5	5	2	4

(iii) A disk drive containing user files

(iv) A graphics card with direct bus connection, accessible through memory-mapped I/O

For each of these I/O scenarios, would you design the operating system to use buffering, spooling, caching, or a combination? Would you use polled I/O, or interrupt- driven I/O? Give reasons for your choices. (8)

(c) Consider the following snapshot of a system:

	Allocation	**Max**
	A B C D	A B C D
P0	3 0 1 4	5 1 1 7
P1	2 2 1 0	3 2 1 1
P2	3 1 2 1	3 3 2 1
P3	0 5 1 0	4 6 1 2
P4	4 2 1 2	6 3 2 5

Using the banker's algorithm, determine whether or not each of the following states is unsafe. If the state is safe, illustrate the order in which the

P.T.O.

The Processes will arrive according to their arrival time. Compute Average Waiting Time and Average Turnaround Time by using Round Robin Scheduling (Time quantum = 4) and preemptive Priority Scheduling (a smaller number implies higher priority).

6. Draw the diagrams showing the concepts of context switching and interrupt-driven I/O cycle.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three**.
Each question carries **10** *marks.*

7. What are the different attributes of a file? Describe the three different file allocation methods in the hard disk and discuss their relative advantages and disadvantages.

8. Consider a program that consists of 8 pages (from 0 to 7) and we have 3 page frames in the physical memory for the pages.

The page reference string is : 7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0,1

P.T.O.

Calculate the number of page faults in FIFO, Optimal and LRU page replacement algorithms.

9. Define the term Directory. List and explain various operations and structures that can be used on a directory.

SECTION – C (20 Marks)

(Compulsory)

10. (a) When multiple interrupts from different devices appear at about the same time, a priority scheme could be used to determine the order in which the interrupts would be serviced. Discuss what issues need to be considered in assigning priorities to different interrupts. (4)

(b) Consider the following I/O scenarios on a single-user PC.

(i) A mouse used with a graphical user interface

(ii) A tape drive on a multitasking operating system (assume no device preallocation is available)