

(3 Hours)

Total Marks: 80

N.B. 1) Question no.1 is compulsory

2) Solve any **Three** questions from remaining five.

3) Assume suitable data wherever required.

Q 1) a) Explain race condition with example. (5)

b) What is thrashing? How is it handled? (5)

c) What is demand paging? What are the advantages? (5)

d) Explain the concept of Virtual memory. (5)

Q 2) a) What is an operating system? What is the need for an operating system? Discuss the

Major functions of an operating system with examples. (10)

b) Consider a system consisting of  $m$  resources of the same type, being shared by  $n$  processes. Resources can be requested and released by processes only one at a time. Show that the system is deadlock-free if the following two conditions hold:a) The maximum need of each process is between 1 and  $m$  resourcesb) The sum of all maximum needs is less than  $m + n$ . (10)

Q 3) a) A variable partition memory system has at some point in time the following hole sizes

in the given order:- 20k,15k,40k,60k,10k,25k. A new process is to be loaded. Which hole size would be filled using best-fit, first-fit and worst fit respectively? (10)

b) What problems could occur if system allowed a file system to be mounted simultaneously at more than one location? (05)

c) Define critical section. What are the requirements to solve critical-section problem? (05)

Q 4) a) In a variable partition scheme, the OS must keep track of allocation and free space.

Suggest a mean to of achieve this. Describe an effect of new allocation and process termination in your suggested scheme. (10)

b) What is the need of Page replacement? Consider the following reference string

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with four free frames which are empty initially. Which algorithm gives the minimum number of page faults? (10)

- Q 5) a) What is paging? How it is different from segmentation? Explain hardware support for paging. (10)
- b) What is the critical section problem? What requirement should a solution to critical section problem satisfy? State Peterson's solution and indicate how it satisfies the above requirements. (10)
- Q 6) a) Compare the following main memory organization schemes: contiguous memory allocation, pure segmentation, and pure paging with respect to the following issues:
- i) External fragmentation ii) Internal fragmentation iii) Ability to share code across processes. (10)
- b) Explain the Distributed Processing in Operating Systems. What are the necessary conditions for deadlock? (10)