

9. (a) Discuss the following algorithms for implementing mutual exclusion in distributed environment : **10**
- (i) Centralized approach
 - (ii) Fully distributed approach
 - (iii) Token-passing approach.
- (b) Discuss the fully distributed approach of deadlock detection. **5**

Roll No.

Total Pages : 04

MCAE/D-23 24022
OPERATING SYSTEM
MCA-20-13

Time : Three Hours]

[Maximum Marks : 75

Note : Question No. 1 is compulsory. In addition to that, attempt *four* more questions, selecting *one* question from each Unit. All questions carry equal marks.

(Compulsory Question)

1. (a) What is the purpose of system calls and system programs ? **4**
- (b) What is critical section ? What are the requirements for critical section solution ? **4**
- (c) Discuss the following : **3**
- (i) First fit
 - (ii) Best fit
 - (ii) Worst fit.
- (d) Contrast various network topologies in terms of reliability. **4**

Unit I

2. (a) Discuss the activities of an operating system in regard to process management, memory management, file management, secondary-storage management and networking. **9**
- (b) What are the need and functions of an operating system ? Explain. **6**
3. What are different levels of scheduling ? Explain various CPU-Scheduling algorithms using suitable examples. **15**

Unit II

4. What is a semaphore ? How Bounded-Buffer, Reader-Writer and Dining-philosopher classical synchronization problems can be solved using semaphores ? **15**
5. (a) What is the difference between deadlock avoidance and detection ? Discuss deadlock detection algorithm for single instance and multiple instances of resource type. **10**
- (b) What are the approaches for recovery from deadlock ? Explain. **5**

Unit III

6. (a) Consider the following page-reference string :
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6
How many page faults would occur for the following replacement algorithms, assuming three and four frames ? Remember that all frames are initially empty, so your first unique pages will cost one fault each. **7**
- (i) LRU replacement
- (ii) FIFO replacement
- (iii) Optimal replacement.
- (b) What is segmentation ? Discuss segmentation hardware with the help of diagram. What type of fragmentation can be caused by segmentation ? **8**
7. (a) Discuss various file access and allocation methods. **9**
- (b) Discuss the directory structures and directory protection mechanisms in brief. **6**

Unit IV

8. Discuss the access matrix and several methods of implementing the access matrix along with the comparison of these methods. **15**