

(3 hours)

[80 marks]

NOTE: Question No 1 is compulsory
Attempt any three questions from remaining.
Assume suitable data if necessary.



- Q.1. a) What are the major activities of an Operating system with regard to file management and memory management? 10M
b) Compare and contrast stateless and stateful service with the help of an example. 10M
- Q.2. a) Explain with the help of an example, which of the following scheduling algorithms could result in starvation? 10M
a. First-come, first-served
b. Shortest job first
c. Round robin
d. Priority
- b) What resources are used when a thread is created? How do they differ from those used when a process is created? 10M
- Q.3. a) Show that, if the wait () and signal () semaphore operations are not executed atomically, then mutual exclusion may be violated. 10M
b) Consider the following snapshot of a system: 10M

	<u>Allocation</u>	<u>Max</u>	<u>Available</u>
	<u>ABCD</u>	<u>ABCD</u>	<u>ABCD</u>
P ₀	0012	0012	1520
p ₁	1000	1750	
p ₂	1354	2356	
p ₃	0632	0652	
p ₄	0014	0656	

Answer the following questions using the banker's algorithm:

- a. What is the content of the matrix *Need*?
b. Is the system in a safe state?
c. If a request from process P₁ arrives for (0,4,2,0), can the request be granted immediately?
- Q.4. a) With the help of a neat labeled diagram, explain the hardware support with TLB for paging. 10M
b) Consider the following page reference string: 10M
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 one, two, three, four, five, six, and seven frames?
Remember that all frames are initially empty, so your first unique pages will cost one fault each.
- LRU replacement
 - FIFO replacement
 - Optimal replacement
- Q.5. a) Justify the statement: Demand paging can significantly affect the performance of computer system. 10M
b) Compare and contrast given allocation methods: Contiguous allocation, Linked allocation, Indexed allocation. 10M
- Q.6. Write Short Notes on: (Any four) 20M
a) Just-in-time compiler.
b) Memory segmentation
c) Deadlock avoidance in distributed system.
d) Operating System Schedulers
e) File system organization
f) Two-phase locking protocol