

(3 hours)

[80 marks]

NOTE: Question No 1 is compulsory. Attempt any three questions from remaining.

Assume suitable data if necessary.

Draw neat labelled diagrams wherever needed.

- Q.1. a) Explain the two main categories of services and functions of operating system. **10M**  
Compare and contrast them.
- b) What is context-switch? Describe the actions taken by a kernel to context-switch between processes. **10M**
- Q.2. a) Explain the differences in how much the following scheduling algorithms discriminate in favor of short processes: **10M**  
a. FCFS  
b. RR  
c. Multilevel feedback queues
- b) Describe the differences among short-term, medium-term, and long-term scheduling. **10M**
- Q.3. a) Explain the timestamp based protocols to ensure serializability with the help of example. **10M**
- b) Consider the following set of processes, with the length of the CPU burst given in milli seconds. The processes are assumed to have arrived in order P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>, P<sub>4</sub>, P<sub>5</sub> all at time 0. **10M**

<i>Process</i>	<i>Burst Time</i>	<i>Priority</i>
P <sub>1</sub>	10	3
P <sub>2</sub>	1	1
P <sub>3</sub>	2	3
P <sub>4</sub>	1	4
P <sub>5</sub>	5	2

Calculate the average turnaround time and maximum waiting time for pre-emptive priority scheduling algorithm.

- Q.4. a) Compare and contrast paging and segmentation. **10M**
- b) What is address translation? Consider a logical address space of 32 pages with 1,024 words per page, mapped onto a physical memory of 16 frames. **10M**  
a. How many bits are required in the logical address?  
b. How many bits are required in the physical address?
- Q.5. a) Describe how the Swap () instruction can be used to provide mutual exclusion that satisfies the bounded-waiting requirement. **10M**
- b) What is deadlock? What are the essential conditions for deadlock to occur? **10M**
- Q.6. Write Short Notes on: (**Any four**) **20M**  
a) Linked Allocation.  
b) Memory segmentation  
c) Deadlock detection.  
d) Translation Lookaside Buffer  
e) Open() and Close () operations.  
f) Page replacement algorithms

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