JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

M.Tech-2nd Semester (CSE/IT)

COURSE CODE (CREDITS): 10M11CI212 (3)　　　　　　　MAX. MARKS: 35

COURSE NAME: ADVANCED OPERATING SYSTEMS

COURSE INSTRUCTORS: Dr. Pankaj Dhiman　　　　　　MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	Assume FCFS scheduling and that the process resumes CPU only after I/O finishes. Calculate the average waiting time and average turnaround time.	2	6
Q2	Consider a single level paging scheme. The virtual address space is 4 MB and page size is 4 KB. What is the maximum page table entry size possible such that the entire page table fits well in one page?	3	6
Q3	Discuss centralized, hierarchical, and distributed approaches to deadlock detection in a distributed system. Compare them based on: Communication overhead, Detection latency and Fault tolerance.	4	4
Q4	Describe in detail how a process transitions through the states in a multitasking OS.	1	4
Q5	A system is having 3 user processes P1, P2 and P3 where P1 requires 2 units of resource R, P2 requires 3 units of resource R, P3 requires 4 units of resource R. The minimum number of units of R that ensures no deadlock is ?	3	6

Table in Q1:

Process	Arrival Time	CPU Burst 1	I/O Time	CPU Burst 2
P1	0 ms	4 ms	3 ms	5 ms
P2	2 ms	3 ms	2 ms	2 ms
P3	3 ms	2 ms	4 ms	3 ms

Q6	Which page replacement algorithm (LRU, LFU, FIFO, and Random) is best suited for 1) Temporal locality. and 2) Frequency of access.	4	4
Q7	A certain computer system has the segmented paging architecture for virtual memory. The memory is byte addressable. Both virtual and physical address spaces contain 2^{16} bytes each. The virtual address space is divided into 8 non-overlapping equal size segments. The memory management unit (MMU) has a hardware segment table, each entry of which contains the physical address of the page table for the segment. Page tables are stored in the main memory and consists of 2 byte page table entries.. Assume that each page table entry contains (besides other information) 1 valid bit, 3 bits for page protection and 1 dirty bit. How many bits are available in page table entry for storing the aging information for the page? Assume that page size is 512 bytes.	3	5