

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/ Backlog), November 2018

B. Tech. in Computer Science & Engg.(CSE), (CSE-IS), (CSE-BDA), (CSE-CC)

Semester V

Roll No.....

CSE 501: Operating System

Time: 3 hours

Max. Marks: 80

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

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- i. The software that provides services and resources to users and application programs is called _____.
(a) Utility software (b) Live ware (c) System software (d) None of these
- ii. Apart from information management and memory management, the third service offered by operating system is _____.
(a) Program management (b) Process Management (c) Date Management (d) File Management
- iii. The CPU busy-waits reading the status register of an I/O device in
(a) Interrupt driven I/O (b) DMA (c) Programmed I/O (d) All of these
- iv. Read/Write location information is supplied to the operating system in _____.
(a) System calls (b) Subroutine calls (c) Procedure (d) ISR calls
- v. Mapping of file is managed by
(a) file metadata (b) page table (c) virtual memory (d) file system
- vi. The Seek instruction requires _____ to which R/W head have to be moved.
(a) Target sector number (b) Target track number (c) Target track and target block number (d) Target block and target sector number
- vii. All the pending I/O requests made by devices are queued in _____.
(a) Device management queue (b) Device request queue (c) Request queue (d) Device queue.
- viii. In paging scheme any virtual address consist of _____ and _____ parameters.
(a) Virtual page number, displacement (b) Physical address, virtual address (c) Protection bits, fence register (d) Single queue, multiple queues

- ix. The process of moving the program from disk into main memory is called _____.
(a) Swapping in (b) Swapping out (c) Thrashing (d) Prepaging
- x. The Program which does not have any intension to infect other programs, it only occupies space and brings entire network to a grinding halt is called _____.
(a) Chameleon (b) Rabbit (c) Computer virus (d) Computer worm
- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- When an operating system is called 'software compatible'?
 - Explain in brief the concept of interrupt driven I/O.
 - What is multithreading? Explain various multithreading models.
 - What is the purpose of the cache memory in a computer system? What is meant by L1 and L2 cache memories?
- Q.3A What is an operating system? Explain the evolution of the operating systems from simple batch processing system to today's standard Operating systems. 05
- Q.3B What are the basic models of operating system architecture? Explain each in brief. 05
- Q.4A Comment- 'It is the process that executes not the program'. Also Differentiate between a 'process table' and 'process control block'. 05
- Q.4B Draw the 5-state diagram of a system of resident processes. Explain each state and the state transition in detail. 05
- Q.5A Define critical section problem. Explain the use of semaphore in developing a solution to bounded buffer producer consumer problem. 05
- Q.5B Given memory partitions of 100K, 500K, 200K, 300K and 600K in-order. How would each of the first-fit, Best-fit and worst-fit algorithms place processes of 212K, 417K, 112K and 426K in-order? Which algorithm makes the most efficient use of memory? Show the diagram of memory status in each case. 05
- Q.6A Consider a logical address space of eight pages of 1024nwords each, mapped onto a physical memory of 32 frames. 05
- Calculate the number of bits in the logical address.
 - Calculate the number of bits in the physical address.
- Q.6B Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO order is: 05
- 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms?

- (i) SSTF
- (ii) C-LOOK

OR

Q.6B Consider the following page reference string:

05

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 frames?

- (i) FIFO replacement
- (ii) Optimal replacement

Remember that all frames are initially empty.

Q.7 Consider the following segment table:

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Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

(i) 0430 (ii) 110 (iii) 2500 (iv) 3400 (v) 4112

Note: For the given logical addresses first digit refers to the segment number(s) while remaining digits refers to offset value.

Q.8 Consider the following snapshot of the system:

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Process	Allocation				Maximum Allocation				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	1	2	2	1	0	0
P2	2	0	0	0	2	7	5	0				
P3	0	0	3	4	6	6	5	6				
P4	2	3	5	4	4	3	5	6				
P5	0	3	3	2	0	6	5	2				

Find out the following with the help of banker's algorithm.

- (a) How many resources the system still needs?
- (b) Is the system currently safe? If it is safe state write the safe sequence.
- (c) If a request from process P3 arrives for (0 1 0 0), can it be granted immediately?

OR

- Q.8 Consider five processes P1, P2, P3, P4 and P5 with their burst time, arrival time and priorities as shown in the table: 10

Process	Arrival Time	Burst Time (in ms)	Priority
P1	0	10	4
P2	1	6	4
P3	4	4	1
P4	4	2	2
P5	5	5	4

Assuming that lower priority number means the higher priority. Compute the average waiting time and average turnaround time of process for each of the following scheduling algorithms. Also determine which of the following scheduling algorithms result in minimum waiting time.

- (a) FCFS
- (b) SJF
- (c) Non-preemptive priority-based