

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), November 2017

B. Tech. in Computer Science & Engg.(CSE), (CSE-M.Tech)

Semester V

Roll No.....

CSE 501: Operating System

Time: 3 hours

Max. Marks: 100

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

- i. _____ Operating system pays more attention on the meeting of the time limits.
 - (a) Distributed
 - (b) Network
 - (c) Real time
 - (d) Online
- ii. The removal of process from active contention of CPU and reintroduce them into memory later is known as _____.
 - (a) Interrupt
 - (b) Swapping
 - (c) Signal
 - (d) Thread
- iii. Cache memory is intended to provide memory access
 - (a) Fastest
 - (b) Slow
 - (c) Very Slow
 - (d) Fast
- iv. Set of all logical addresses generated by a program is referred to as a
 - (a) Memory Addresses
 - (b) Physical Addresses
 - (c) Logical address Space
 - (d) Buffer Addresses
- v. To avoid the race condition, the number of processes that may be simultaneously inside their critical section is
 - (a) 8
 - (b) 1
 - (c) 0
 - (d) None of the above

- vi. Memory management is :
 - (a) not used in modern operating system
 - (b) replaced with virtual memory on current systems
 - (c) not used on multiprogramming systems
 - (d) critical for even the simplest operating systems
- vii. Replacement algorithm chooses constraints of
 - (i) Blocks
 - (ii) Cache Size
 - (iii) Mapping Function
 - (iv) Block Size
- viii. The segment base contains the :
 - (a) starting logical address of the process
 - (b) starting physical address of the segment in memory
 - (c) segment length
 - (d) none of the mentioned
- ix. In Network Operating System environment, ... is responsible for communication between the server and clients.
 - (a) Communication Management Software
 - (b) Network management software
 - (c) Redirection software
 - (d) File/Printer and other services
- x. Remote procedure calls is
 - (a) inter-process communication
 - (b) a single process
 - (c) a single thread
 - (d) none of the mentioned

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| Q.2 | Short answer type questions (4 questions @ 2.5 marks) | 10 |
| i. | What are the different functions of an operating system? | |
| ii. | Explain process control block. | |
| iii. | What is an interrupt? Discuss different kinds of interrupts. | |
| iv. | Define a file system. What are various components of a file system? | |
| Q.3A | What is the evolution of operating system? Discuss the basic fundamental idea behind it. | 05 |
| Q.3B | What do you understand by process? Explain various states of a process with suitable diagram. | 05 |
| Q.4A | What do you mean by system calls? How many major categories of the system calls may be possible for all kinds of operating system? | 05 |
| Q.4B | Why is it expensive to switch between processes? Is it less expensive to switch between threads? Justify your answer. | 05 |

Q.5A What are the advantages of multithreading? Explain various multithreading models. 05

Q.5B Explain the differences between preemptive and non-preemptive scheduling. State, why strict non-preemptive scheduling is unlikely to be used in a computer centre. 05

Q.6A Explain the priority scheduling algorithm and its major drawbacks with their solution. Draw the Gantt chart and find average waiting time and response time of the process set given in the following table: 05

Process id	Execution Time	Arrival time	Priority
A	10	0	3
B	2	0	1
C	3	1	3
D	1	2	5
E	4	2	2

Q.6B What do you mean by semaphore? State and solve the readers/writers problem with the help of semaphore. 05

OR

Q.6B Consider a system consisting of processes $P_1, P_2, \dots, P_n$, each of which has a unique priority number. Write a monitor that allocates three identical line printers to these processes, using the priority numbers for deciding the order of allocation. 05

Q.7A 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? 05

Q.7B On a system using simple segmentation, compute the physical address for each of the logical address given the following segment table. If the address generates a segment fault, indicate so. 05

Segment	Base	Length
0	330	124
1	876	124
2	111	99
3	498	302

(i) 099 (ii) 278 (iii) 1265 (iv) 3222 (v) 0111

OR

Q.7B Suppose the moving head disk with 200 tracks is currently serving a request for track 143 and has just finished a request for track 125. If the queue of requests is kept in FIFO order: 86, 147, 91, 177, 94, 150; What is the total head movement for the following scheduling schemes: 05

- (i) SSTF
- (ii) C-SCAN

Q.8A Describe the Banker's algorithm for safe allocation. Consider a system with five processes and three resources types and at time T_0 , the following snapshot of the system has been taken: 10

Process	Allocation			Maximum Allocation			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	0	2	2	7	6	5	7	3	3
P2	2	1	0	3	3	2			
P3	3	0	5	9	0	5			
P4	2	3	1	2	4	2			
P5	1	1	2	5	4	2			

- (i) What is the content of the need matrix?
- (ii) Is the system in safe state? If yes, then what is the safe sequence?

Q.9A Consider the following page reference string A,B,C,D,B,A,E,F,A,B,C,G,F,C,F. How many page faults would occur for the following page replacement algorithm assuming **three** and **four** frames? Remember all frames are initially empty: 10

- (i) FIFO
- (ii) Optimal algorithm
- (iii) LRU

Q.9B Consider the following set of processes having their burst time mentioned in milliseconds. CPU burst time indicates that for how much time, the process needs the CPU. Arrival time of all processes are zero. 10

Process	Burst Time (in ms)
P1	20
P2	7
P3	5

Calculate the average turnaround time, average waiting time, and average response time with the FCFS scheduling algorithm. if the processes arrive in the order of:

- (i) P1, P2, P3
- (ii) P2, P3, P1
- (iii) P3, P1, P2
- (iv) P3, P2, P1

Q.9B Consider the set of processes given in the table and the following scheduling algorithm:

10

(i) Shortest job first (SJF)

(ii) Shortest remaining time first (SRTF)

Process id	Execution Time	Arrival time
A	7	0
B	5	1
C	3	2
D	2	6
E	3	12

If there is a tie within the processes, the tie is broken in the favour of the oldest processes. Draw the Gantt chart and find the average waiting time and turnaround time for the two algorithms. Comment on your result which one is better and why.