

B.Tech III Year I Semester (R15) Regular & Supplementary Examinations March 2021

OPERATING SYSTEMS

(Common to CSE & EIE)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- With an example justify why some OS services should run only in protected mode.
 - What is symmetric multiprocessing?
 - What is the essential cause of the difference in cost between a context switch for kernel-level threads and a switch that occurs between user-level threads?
 - State the conditions for process synchronization.
 - What is virtual memory? What are the advantages of it?
 - Differentiate between deadlock avoidance and deadlock prevention.
 - What is rotational latency? Give an example.
 - Explain the information associated with a open file.
 - What is principle of least privilege?
 - What are the functions of device drivers?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Describe the three state process model. Describe what transitions are valid between the three states, and describe an event that might cause such a transition.
- (b) Analyze and compare Modular Kernel Approach to Layered Approach with a neat sketch.

OR

- 3 (a) Describe the sequence of steps that occur when a timer interrupt occurs that results in a context switch to another application.
- (b) Explain about the various services provided by the operating system.

UNIT – II

- 4 (a) Assume that wait and signal are implemented as below:

```
void Wait (Semaphore S) {
while (S.count <= 0) {}
S.count = S.count - 1;
}
void Signal (Semaphore S) {
S.count = S.count + 1;
}
```

Describe a scenario of context switches where two threads, T1 and T2, can both enter a critical section guarded by a single mutex semaphore as a result of a lack of atomicity.

- (b) Name some advantages and disadvantages of user-level threads.

OR

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- 5 (a) Consider the following set of processes with arrival time and CPU execution time given in milliseconds. A process with a larger priority number has a higher priority.

Process	Arivel Time	Execution Time	Priority
P1	0	09	1
P2	2	06	2
P3	3	04	3
P4	3	03	4
P5	6	04	5

Calculate the average turnaround time for priority scheduling.

- (b) What is a test-and-set instruction? How can it be used to implement mutual exclusion? Explain with example.

UNIT – III

- 6 (a) Operating systems frequently exploit locality to improve performance. Briefly describe an example where operating systems do so, and state how locality is exploited.
 (b) Explain with an example least recently used page replacement policy.

OR

- 7 (a) Consider the following snapshot of a system:

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P ₀	0 0 1 2	0 0 1 2	1 5 2 0
P ₁	1 0 0 0	1 7 5 0	
P ₂	1 3 5 4	2 3 5 6	
P ₃	0 6 3 2	0 6 5 2	
P ₄	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

- (i) What is the content of the matrix Need?
 (ii) Is the system in a safe state? Justify your answer.
 (b) How are segmentation and paging different?

UNIT – IV

- 8 (a) What is file allocation table? Explain the different types of file allocation tables.
 (b) Explain disk file management using indexed allocation.

OR

- 9 (a) Describe in detail the directory structure of a file system.
 (b) Compare and contrast any four disk-arm scheduling algorithms.

UNIT – V

- 10 (a) Explain in detail about Application I/O interface.
 (b) State and explain the importance of user authentication.

OR

- 11 (a) How are access matrix applied? Explain with example.
 (b) Explain the functioning of Daisy chain.

B.Tech III Year I Semester (R15) Supplementary Examinations October 2020

OPERATING SYSTEMS

(Common to CSE & EIE)

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PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- What is importance of Spooling concept in operating system?
 - What is inter process communication?
 - Differentiate between process and thread.
 - What is highest response ratio with reference to scheduling algorithms?
 - Differentiate between internal and external fragmentation.
 - What is mutual exclusion?
 - Mention the advantages of two-level directory over single-level directory.
 - Which disk scheduling algorithm would be best to optimize the performance of a RAM disk? Why?
 - What do you mean by cryptography?
 - Define Trojan Horse.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) What are system calls? Explain various categories of system calls.
 (b) List out various services provided by the operating system with respect to process management and memory management.

OR

- 3 (a) What is an operating system? Write a short note on the following operating systems:
 (i) Distributed operating systems.
 (ii) Embedded operating systems.
 (iii) Real time operating systems.
 (b) Explain the terms "Graceful Degradation" and "Fault Tolerant" in a multiprocessor system.

UNIT – II

- 4 (a) Consider the following four processes, with the length of the CPU burst time given in milliseconds.

Process	Arrival Time (ms)	Burst Time (ms)
P1	1	6
P2	1	5
P3	2	5
P4	3	3

Draw the Gantt charts and find the average waiting time and turnaround time for given process using RR algorithm? (Assume Quantum value as 2)

- (b) Define thread. Discuss the advantages and disadvantages of various types of threads. Also explain various thread models with neat sketches.

OR

- 5 (a) Explain the role of various types of schedulers in operating system.
 (b) Write and explain the solution for reader-writer classical synchronization problem using monitors.

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UNIT – III

- 6 (a) Consider the page reference string 1, 2, 3, 4, 2, 1, 5, 6, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Compare the number of page faults that occur in FIFO and LRU page replacement algorithm with frame size 4.
(b) "Thrashing reduces the performance of the system" - Justify this statement with proper explanation on Thrashing. Also discuss on working Set model that is used to handle thrashing.

OR

- 7 (a) What is paging? Discuss different techniques that are involved in structuring the page table.
(b) Explain Banker's deadlock-avoidance algorithm with illustration.

UNIT – IV

- 8 (a) Compare the performance of FCFS, SSTF, C-SCAN and C-LOOK disk scheduling algorithms.
(b) Enumerate the concept of various free space management approaches in detail.

OR

- 9 (a) Explain linked list and indexed file allocation methods with neat diagram.
(b) Discuss in detail the concept of disk structure.

UNIT – V

- 10 (a) Explain the following terms:
(i) Authentication.
(ii) Phishing.
(iii) Hacker.
(b) What is a firewall? Explain how firewall protects system and networks from the external world.

OR

- 11 (a) Write a brief note on various system and network threats.
(b) Write a detailed note on kernel I/O subsystem.
