

B022315(022)

B. Tech. (Third Semester) Examination,

Nov.-Dec. 2020

(CSE Branch)

(Specialization : CSE)

OPERATING SYSTEMS

Time Allowed : Three hours

Maximum Marks : 100

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d).

Unit-I.

1. (a) Explain how operating system acts as a Resource Manager? 4

(b) The services and functions provided by an operating

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system can be divided into different components. Briefly explain all the components of Operating System.

8

- (c) Analyze different types of operating systems with an example. Which type of operating system is most suitable for the modern computer system and why? 8
- (d) Name and discuss the range of system calls that may be supplied by an operating system under various circumstances. List the sequence of system call required to copy content of a file to another file. 8

Unit-II

2. (a) Give Five State model of process state transition. 4
- (b) What are the two models of inter-process communication? What are the strengths and weakness of the two approaches? 8
- (c) Discuss critical section problem and how this can be overcome using semaphores. Write the solution for achieving mutual exclusion requirement in a producer consumer problem. 8

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- (d) What is CPU scheduling? If the different jobs and their arrival time and burst time are given below :

P. No.	Arrival time	Burst time
1	0	6
2	1	4
3	2	3
4	3	1
5	4	2
6	5	1

Find the average turnaround time, average waiting time and throughput using Round Robin (with time quantum = 2) and SRTF. 8

Unit-III

3. (a) What is Deadlock? Give characteristics of deadlock. 4
- (b) What are the four necessary conditions for characterizing deadlock? What is the only reasonable condition that can be used to prevent deadlocks from occurring? 8
- (c) Explain Banker's algorithm and safety algorithm with pseudo code. 8

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PTO

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- (d) Write an algorithm to determine whether a given system is in a deadlock and explain. Consider resource A has total 7 instances, B has 2 instances and C has 6 instances the following snapshot of a system :

Process	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P ₀	0	1	0	0	0	0	0	0	0
P ₁	2	0	0	2	0	2			
P ₂	3	0	3	0	0	0			
P ₃	2	1	1	1	0	0			
P ₄	0	0	2	0	0	2			

Answer the following using Banker's algorithm :

- Is the system in a safe state?
- If Yes, mention the safe sequence.
- If a process P₂ makes a request of one additional request for an instance of type C, will the system lead to deadlock state then.

8

Unit-IV

4. (a) What is virtual memory?

4

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- (b) What is the need of page replacement? Consider the following page references string :
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.
Find out the no. of page fault by LRU, OPT replacement, FIFO algorithm. Assume there are four page frames.

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- (c) Explain the difference between internal and external fragmentation :

Given five variable sized memory partitions of 100 kb, 500 kb, 200 kb, 300 kb, 600 kb (in order), how would each of the first fit, best fit and worst fit algorithm place processes of 212 kb, 417 kb, 112 kb and 426 kb (in order)? Which algorithm makes most efficient use of memory?

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- (d) Why are segmentation and paging sometimes combined into one scheme? Explain the paged segmentation.

8

Unit-V

5. (a) What are the different files allocation methods? 4
(b) Considering SCAN disk scheduling algorithm. How

is it possible to reduce the time required to finish off?
Explain with an example.

8

(c) Describe various file accessing methods with its advantages and disadvantages.

8

(d) Suppose that the head of a moving head disk with 200 tracks, 0 to 199, is currently serving a request at 143 and has just finished a request at track 125. The queue of request is kept in FIFO order 86, 147, 91, 177, 94 150, 102, 175, 130. What is the total number of head movement needed to specify these request for the following disk scheduling algorithms?

(i) SSTF scheduling

(ii) SCAN scheduling

8