

B3.4-R4 : OPERATING SYSTEMS

NOTE :

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time : 3 Hours

Total Marks : 100

1. (a) What is an operating system and also explain the various functions of operating system ?
 (b) Define the term process and explain the attributes of the process.
 (c) Elaborate the concept of system call (or supervision call) with the help of a suitable example.
 (d) Why are threads sometimes called "lightweight processes" ?
 (e) Differentiate between internal fragmentation and external fragmentation.
 (f) What is the critical section problem ? How is it handled ?
 (g) How much memory would be used by a full page table on a system with a virtual address space of 64-bits and pages of size 16K bytes (2^{14} bytes), and where each page table entry is 16 bytes long ? Show your working. (7x4)

2. (a) Why disk scheduling is important ? Explain two Disk Scheduling techniques in detail and using examples.
 (b) Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the 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 ?
 (c) Discuss the swapping in brief. (9+6+3)

3. (a) Consider the following set of processes, with the length of the CPU burst time given in milliseconds. Calculate average waiting time and turn-around time using given scheduling algorithm. Draw Gantt Chart for Scheduling algorithms :
 (i) RR (time slice = 2ms) (ii) SRTF

Process	Burst Time	Arrival Time
P1	5	0
P2	3	2
P3	4	4
P4	1	5
P5	2	7

(b) What is the use of file system ? Describe what is meant when a distributed file system is called stateful and stateless file system.

(c) Given page reference string :

1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

What is page Fault ? Compare the number of page faults for the LRU (Least Recently Used) and Optimal page replacement algorithm with 4 frames ?

(6+6+6)

4. (a) Consider a virtual address space of eight pages with 1024 bytes each, mapped onto a physical memory of 32 frames. How many bits are used in the virtual address ? How many bits are used in the physical address ?

(b) How does encryption protect misuse of data from an unauthorized user ?

(c) Explain the protection domain protection mechanism in detail.

(6+6+6)

5. (a) Consider the following snapshot of a system :

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Using Banker's algorithm,

(i) Determine whether the system is in a safe state or not.

(ii) Decide whether a request from process P1 for resources A B C D (0, 4, 2, 0) should be granted immediately or not.

(b) Make a list of six security concerns for a bank's computer system. For each item on your list, state whether this concern relates to physical, human, or operating-system security.

(c) What is the cause of thrashing ? How does the system detect thrashing ? Once it detects thrashing, what can the system do to eliminate this problem ?

(6+6+6)

6. (a) Consider a system that supports 6,000 users. Suppose that you want to allow 5,990 of these users to be able to access one file.
- (i) How could you specify this protection scheme in UNIX ?
 - (ii) Can you suggest another protection scheme that can be used more effectively for this purpose than the scheme provided by UNIX ?
- (b) Describe the following term with respect to security in Operating System :
- (i) One Time Passwords
 - (ii) Symmetric Encryption
 - (iii) Asymmetric Encryption
- (c) How Deadlock Detection is different for a distributed system ? Explain any one algorithm of Distributed Deadlock Detection.

(6+6+6)

7. (a) Consider the following segment table :

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) 0, 430
 - (ii) 1, 10
 - (iii) 2, 500
 - (iv) 3, 400
 - (v) 4, 112
- (b) Explain the different types of attributes of a file and also define the various methods to access the information from the file.
- (c) What are the major functionalities of a Network operating system ?

(6+6+6)

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