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 file and file system with respect to Operating system? Enumerate different types of the files in operating system.
b) Why an Operating System is known as Resource Manager. Explain their function in detail.
c) Compare paging with segmentation with respect to the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses?
d) Differentiate stateful and stateless service in distributed file systems.
e) Explain Process Control Block in detail.
f) Differentiate Monolithic-kernel and Microkernel Architecture.
g) When memory is assigned dynamically, how Operating System manages memory? Explain any one scheme in detailed.

(7x4)

2.

a) Suppose a disk has 500 cylinders, numbered 0 to 499. The drive is currently serving a request at cylinder 400, and previous request was at cylinder 410. The queue of pending requests, in first in first out order is:

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13, 470, 375, 75, 440, 445, 30, 5
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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 FCFS and LOOK disk-scheduling algorithms?

i) FCFS
ii) LOOK
iii) C-SCAN

b) Differentiate between Short Term, Medium Term and Long Term Scheduling.
c) What do you mean by process context?

(9+6+3)

3.

a) Explain secret-key and public-key cryptography. State relative advantages of each scheme.
b) What are computer worms and viruses? What are the safeguards used against worms and viruses?
c) Discuss the importance of distributed operating system?

(6+6+6)

4.

a) Consider the following set of processes M, N, P, Q and R 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: (1) Priority (Pre-emptive) (2) Round Robin (TQ=3)

Process	Priority	Arrival Time	Burst Time
M	2	1	9
N	5	5	4
P	1	2	5
Q	6	0	6
R	4	4	4

b) 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, Is the system in a safe state? If yes, show safe sequence.

(9+9)

5.

a) There are four processes: P, Q, R and S make up the set of runnable processes. Initial pages and their age are given in the table.

P1	P2	P3	P4	P5	P6	Q1	Q2	Q3	R1	R2	R3	R4	S1	S2
8	6	4	5	3	4	7	9	11	13	1	10	6	4	2

Suppose process P and Q get a page fault. Apply local and global allocation policies individually for page replacement.

b) Define the difference between preemptive and non-preemptive scheduling. What advantage is there in having different time-quantum size on different level of a multilevel queuing system?

c) In Distributed System, what is the need of Election Algorithm? What is the goal of Election Algorithm?

(6+6+6)

6.

a) When is a set of processes said to be deadlocked? What are the four conditions that must hold for deadlock to occur?

b) Consider the following page reference string:

`5, 7, 2, 1, 3, 4, 7, 2, 1, 3, 2, 1, 4, 5, 7`

How many page faults would occur for least-recently-used and FIFO page replacement algorithms, assuming 5 frames? Initially pages 7, 5 and 1 are loaded in the main memory.

c) How to ensure the availability of a DFS namespace?

(6+6+6)

7.

a) List and explain the three events concerning resource allocation. Define the following:

i) Deadlocks

ii) Resource request and allocation graph (RRAG)

iii) Wait for graph (WFG)

b) What is an I/O buffer? What is the advantage of buffering? Is buffering always effective? Justify your answer with help of an example

c) Differentiate between protection and security. Explain the techniques used for protection of user files.

(6+6+6)