

## C0-R4.B2: OPERATING SYSTEM

### 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 CPU Scheduling? Write down the scenario in which a running process may be preemptive?
- b) Consider two programmers who are working on a joint project and want to store related files in a directory for easy search. Briefly explain the suitable directory structure.
- c) Define race condition. Why is it necessary to avoid race condition?
- d) What are advantages and disadvantages of providing mandatory locks instead of advisory locks whose usage is left to user's discretion.
- e) Why is virtual memory concept used? Explain by giving one example.
- f) What is file system? Name one file system each for windows and Linux Operating System.
- g) Define network operating system?. Write down its two main functionalities over a stand-alone system.

(7x4)

2.

- a) What is multiprocessors scheduling? Why is it complicated to implement than single CPU scheduling?
- b) Consider the following set of processes:

Process	Burst time(ms)	Arrival time(ms)
P1	5	0
P2	3	2
P3	4	4
P4	1	5
P5	2	7

- i) Draw Gantt Chart illustrating the execution of the given processes using Round robin policy (time slice = 2ms) and shortest remaining time scheduling algorithms.
- ii) Compute turnaround and total waiting time for each process for both algorithms and find the algorithm with best performance w.r.t. average waiting time.

(6+12)

3.

- a) Consider the following types of operating system:

- i) Soft real time
- ii) Hard real time
- iii) Time Sharing System

Which of the above given Operating System would you prefer in the following application environment and Why?

- i) Multi-media application
- ii) Online Railway ticket reservation system
- iii) Missile control application

- b) What is operating system? Why is it necessary to have atleast two modes of operation i.e. user mode and kernel mode in a computer system? Explain briefly.

**(9+9)**

**4.**

- a) Distinguish between the following terms:  
i) Logical and physical address  
ii) Multiprogramming and multitasking
- b) What is thrashing? When does it occur in system? How does an operating system eliminate thrashing in the system?

**(12+6)**

**5.**

- a) Consider a logical address space of 8 pages with 1024 words per page, mapped onto a physical memory of 16 frames.  
i) How many bits are there in the logical address?  
ii) How many bits are there in the physical address?
- b) Define external fragmentation. Which type of contiguous memory allocation techniques suffer from external fragmentation? Explain by giving one example.
- c) List the steps for handling page fault in implementing virtual memory through demand paging. Draw figure for the same.

**(6+6+6)**

**6.**

- a) What is consistency semantics? Write down UNIX consistency semantics. How UNIX consistency semantics is different from Immutable shared files semantics?
- b) What information is contained in on-disk structure to implement a file system?
- c) Suppose that a disk has 1,000 cylinders numbered 0 to 999. The disk head is currently at cylinder 943 and previous request was at 125. The queue of pending requests in FIFO order is:  
470, 913, 77, 948, 509, 130, 500
- Calculate and show total head movements for the following disk scheduling algorithms:  
i) FCFS  
ii) SCAN

**(6+6+6)**

**7.**

- a) Why are system threats more dangerous to system security than program threats? Briefly explain about denial of service threat.
- b) "In distributed environment, ensuring atomicity of a transaction is difficult". Comment. Which module of the distributed operating system ensures atomicity of a transaction? Write down its basic responsibilities.
- c) Given two sets Process set (P) and Resources set (R)  
 $P = \{P_1, P_2, P_3, P_4\}$   
 $R = \{R_1, R_2\}$   
Two instances of resource type  $R_1$  and  $R_2$  each exist in the system.  
 $E = \{P_1 \rightarrow R_1, R_1 \rightarrow P_2, R_1 \rightarrow P_3, R_2 \rightarrow P_1, P_3 \rightarrow R_2, R_2 \rightarrow P_4\}$   
Using the process requests for resources and allocated resources to the processes given in set E, draw a resource allocation graph and describe whether the system can go into a deadlock state or not?

**(6+6+6)**