

Comp

31/12/16

Regular

**COMP 5 – 6 (RC)**

T.E. (Computer) (Semester – V) (RC)
Examination, November/December 2016
OPERATING SYSTEMS

Duration : 3 Hours

Total Marks : 100

Instructions: 1) Answer **any five** questions selecting atleast **one** question from **each** Module.

2) **Each** question carries **equal** marks.

MODULE – I

1. a) Provide a detailed description of special purpose operating systems used with rigid time constraints. 5
- b) What are scheduling queues ? With the help of a queuing diagram explain the concept of scheduling processes. 5
- c) How can a new process be created ? Provide a suitable Pseudo code and explain the function of fork () system call used to create a new process. 5
- d) Consider the following set of processes

Process	Arrival time	CPU time	Priority
P ₁	6	1	1
P ₂	1	2	7
P ₃	2	3	3
P ₄	1	5	3
P ₅	4	5	2

Determine the average waiting time and average turnaround time using a time slice = 1 unit and Round Robin scheduling algorithm.

Draw the Gantt Chart.

5

2. a) What are the actions taken by the Kernel to switch context between processes ? Provide a suitable diagram to support your answer. 4
- b) Compare swap with test and set instruction with the help of a pseudo code. Explain how test and set satisfies the criteria of a good solution to the critical section problem for n processes. 6
- c) Discuss the various multithreading models with respect to thread implementation. 4

P.T.O.



d) Consider the following set of processes

Process	Arrival time	CPU time
A_1	0.0	6
A_2	0.5	4
A_3	1.0	2
A_4	1.0	2
A_5	2	4

- Using the method of shortest remaining time next determine the average waiting time and average turn around time. Draw the Gantt chart.
- Schedule the processes using the non preemptive implementation of shortest remaining time next.

6

MODULE – II

- With the help of an example explain the hierarchical paging scheme for structuring the page table.
 - What are the causes of thrashing ? How can the effects of thrashing be reduced ?
 - A snapshot of resources of a system allocated to different processes is given below :

4

5

Total instances available of each resource type are :

$$R_1 = 10, R_2 = 5, R_3 = 7$$

Process	Allocated			Max.		
	R_1	R_2	R_3	R_1	R_2	R_3
P_0	0	1	0	7	5	3
P_1	2	0	0	3	2	2
P_2	3	0	2	9	0	2
P_3	2	1	1	2	2	2
P_4	0	0	2	4	3	3



- i) Compute the NEED matrix.
- ii) Is the system is a safe state ? If yes determine the safe sequence.
- iii) Can a request of resources (1, 0, 2) by P_1 be granted immediately ? Justify your answer. Also check if the system is in a safe state after granting the request. 8
- d) Consider a logical address space of 12 pages of 1024 bytes each mapped onto a physical memory of 64 frames. What would be the minimum number of bits in the logical address and physical address ? What would be the size of the physical memory ? 3
- 4. a) Describe the hashed page table structure. 4
- b) Consider the following logical addresses generated by a process with a page size of 100 bytes and 3 page frames.
0100, 0432, 0101, 0612, 0102, 0103, 0104, 0101, 0611, 0102, 0103, 0104, 0101, 0610, 0102, 0103, 0104, 0101, 0609, 0102, 0105.
Determine the number of page faults generated using
 - i) Least recently used algorithm.
 - ii) Optimal page replacement algorithm. 8
- c) A process has a reference string of length p with n distinct page numbers. If the number of page frames is m (initially empty). What will be lower bound and upper bound of the page faults ? Justify your answer. 4
- d) How is demand paging different from pure demand paging ? 4

MODULE – III

- 5. a) Does shortest seek time first cause starvation of requests ? Justify your answer with a suitable example. 3
- b) Explain the implementation of open and close operations in a UNIX environment. 4
- c) Describe the elevation algorithm with a suitable example. 4
- d) How does the UNIX operating system translate an applications request for an I/O operation to network devices or disk sectors ? Explain in detail. 5
- e) List the common file types and the functions associated with each type. How are file types implemented by various operating systems ? 4



6. a) Write a short note on Unix file management. 4
- b) Suppose a disk drive has 2500 cylinders numbered from 0 to 2499. The drive is currently serving a request at cylinder 143 and the previous request was at cylinder 125. The queue of pending request in FIFO order is 80, 400, 2300, 1500, 1050, 2411, 100, 1888, 1580, 1700 starting from the current head position. What is the total distance that the disk arm moves to satisfy all pending requests for each of the following algorithms ? 10
- i) C-SCAN
 - ii) LOOK
 - iii) C-LOOK
 - iv) SSTF
 - v) SCAN
- Draw the arm movement chart.
- c) Discuss the various issues of allowing an operating system to support multiple file structures. 4
- d) Define the following in context to hard disks : 2
- i) CLV
 - ii) CAV

MODULE – IV

7. a) What are the various types of threats that result in misuse of operating system resources and user files ? Explain in detail. 6
- b) Explain the following commands with examples : 4
- i) Chmod
 - ii) ls ? at
- c) Write a shell script to determine if a given file exists or not, the file name is supplied as a command line argument. 5
- d) What are internal and external commands ? How are they different ? Provide examples of each type. 5
8. a) What is an access matrix ? With the help of suitable examples explain the various rights associated with domains and objects in an access matrix. 6
- b) Explain the following Linux commands. 4
- i) grep
 - ii) tee
- c) Write a shell script to carry out sorting of a set of integers. 4
- d) Compare the features of Windows and Linux operating system. 3
- e) What are the UNIX finger and send mail utilities ? 3