(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2164 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. V) THEORY EXAMINATION 2011-12

OPERATING SYSTEM

Time : 3 Hours *Total Marks : 100*

Note :– (i) Attempt **all** questions.

(ii) All questions carry equal marks.

(iii) Notations/Symbols/Abbreviations used have usual meaning.

(iv) Make suitable assumptions, wherever required.

1. Attempt any **two** parts of the following :

(a) Explain the following terms clearly :

(i) Process

(ii) Busy Waiting

(iii) Multiprogramming

(iv) Multithreading.

(b) Differentiate between the following :

(i) Shell and Kernel

(ii) Deadlock and Starvation

(iii) Monolithic kernel and Microkernel

(iv) Concurrent execution and Parallel execution.

(c) (i) What do you understand by system call ? How is a system call made ? How is a system call handled by the system ? Choose suitable examples for explanation.

(ii) What is the reason behind dual-mode operation of processors ?

2. Attempt any **two** parts of the following :

(a) What do you understand by critical section ? What are the requirements of a solution to the critical section problem ? Discuss mutual exclusion implementation with the help of Test-and-Set machine instruction.

(b) State the finite buffer Producer-Consumer Problem. Give solution of the problem using semaphores.

(c) Write a short note on interprocess communication.

3. Attempt any **two** parts of the following :

(a) (i) Draw and explain the Process State Transition diagram.

(ii) In a system, **n** processes share **m** resource units that can be reserved and released only one at a time. The

maximum need of each process does not exceed **m** and sum of all maximum need is less than **m+n**. Show that a deadlock cannot occur.

(b) List various performance criteria for scheduling algorithms. Five processes A, B, C, D, E require CPU burst of 3, 5, 2, 5 and 5 units respectively. Their arrival times in the system are 0,1, 3, 9 and 12 respectively. Draw Gantt Chart and compute the average turn around time and average waiting time of these processes for the Shortest Job First (SJF) and Shortest Remaining Time First (SRTF) scheduling algorithms.

(c) Write and explain Banker's algorithm for avoidance of deadlock.

4. Attempt any **two** parts of the following :

(a) What is paging ? Describe how logical address is translated to physical address in a paged system. Further give reasons as to why page sizes are always kept in powers of 2.

(b) Consider a demand paged system. Page tables are stored in main memory which has an access time of 100 nanoseconds. The TLB can hold 8 page table entries and has an access time of 10 nanoseconds. During the execution of a process, it is found that 80% of the time, a required page table entry exists in TLB and only 2% of the

references cause page faults. The average time to service page fault is 2 milliseconds. Compute the effective memory access time.

(c) Discuss the LRU page replacement policy. Prove that this policy do not suffer from Belady's anomaly. How many page faults would occur with LRU policy for the following reference string :

1, 2, 3, 3, 4, 1, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 8, 7, 8, 9, 5, 4, 5, 4, 2

Assume that there are four frames which are initially empty.

5. Attempt any **two** parts of the following :

(a) Explain the SSTF and SCAN disk scheduling policies. Obtain the total number of head movements needed to satisfy the following sequence of track requests for each of the two policies :

27, 129, 110, 186, 147, 41, 10, 64, 120

Assume that the disk head is initially positioned over track 100 and is moving in the direction of decreasing track number.

(b) Describe the various file allocation methods with their relative advantages and disadvantages.

(c) Write short note on File System Protection.