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

PAPER ID : 2164   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2012–13

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.

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

(a)   Differentiate between the following :

(i)   Process and Program

(ii)   Busy wait and Blocking wait

(iii)   Process switch and Mode switch

(iv)   User-level thread and Kernel-level thread.

(b)   (i)   Whether it is possible to construct a secure operating system without having dual mode of operation in the system ? Give arguments in favour of your answer.

(ii)   Discuss essential properties of Time-sharing operating system, Real-time operating system and Distributed operating system.

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(c) (i) What do you understand by system call ? List and explain three system calls used for process management.

(ii) What are the advantages of the layered approach to the design of operating system ?

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

(a) State the Readers/Writers Problem with readers having priority. Give solution of the problem using semaphores.

(b) (i) Define Semaphore. Give a scheme for implementation of semaphore primitives.

(ii) Write and explain Peterson solution to the critical section problem.

(c) Discuss message-passing systems. Explain how message passing can be used to solve to buffer Producer/Consumer problem with infinite buffer.

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

(a) Write an algorithm for detection of deadlock in a system having several instances of multiple resource types.

(b) (i) What is process control block ? Discuss the difference among short-term, medium-term and long-term scheduling.

(ii) Define deadlock. List four necessary conditions for occurrence of deadlock. A system contains 6 units of resource, and n processes that use the resource. What is the maximum value of n for which the system will be deadlock free if the maximum requirement of each process is 3 ?

(c) (i) What is the difference between preemptive and non-preemptive scheduling ? Discuss the Multilevel Feedback Queue scheduling algorithm.

(ii) Consider a variant of Round-robin scheduling algorithm where the entries in the ready queue are pointers to the processes. What would be the effect of putting two pointers to the same process in the ready queue ? What would be advantages and disadvantages of this scheme ?

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

(a) (i) Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order). How would each of the first-fit, 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 ?

(ii) When do page faults occur ? Describe in detail the actions taken by the operating system when a page faults occur.

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

(ii) Consider a demand paged system. Page tables are held in registers. It takes 8 miliseconds to service a page fault if an empty page is available or the replaced is not modified, and 20 miliseconds if the replaced page is modified. Memory access time is 100 nanoseconds. Assume that the page to be replaced is modified 70 percent of the time. What is the maximum acceptable page fault rate for an effective access time of no more than 200 nanoseconds ?

(c) Discuss the paged segmentation scheme of memory management and explain how logical address is translated to physical address in such a scheme.

5. Write short notes on any **two** of the following :
   (a) Disk scheduling policies
   (b) RAID
   (c) Implementation of Access Matrix.