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

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

B. Tech.

(SEMESTER-V) THEORY EXAMINATION, 2012-13

OPERATING SYSTEM

Time : 3 Hours]   *[Total Marks : 100*

Section – A

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1.   Attempt **all** question parts.   2 × 10 = 20

   (a)   List the various services provided by Operating System.

   (b)   What is the difference between Multiprogramming, Multitasking and Multiuser Operating System ?

   (c)   List the differences between a time sharing system and real time system.

   (d)   Define monolithic kernel and microkernel.

   (e)   List the various conditions for deadlock occurrences.

   (f)   What do you understand by critical section ?

   (g)   What is paging and segmentation ?

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   (h)   What is Access Matrix and how it is used for protection ?

   (i)   Differentiate between 'Ready to run process in Memory Management' and 'Ready to run process Swapped'.

   (j)   Explain system protection in context of Operating System.

Section – B

2. Attempt any **three** question parts. $3 \times 10 = 30$

(a) What is Thrashing ? Explain its advantages and disadvantages. Consider the following pages of a reference string :

1, 2, 0, 3, 5, 1, 5, 7, 2, 0, 3, 5, 4, 1, 2, 5, 3, 7

Implement FCFS, LRU and optimal page replacement algorithm and calculate the number of page fault and hit ratio by considering three frames in a block.

(b) What do you mean by Parallel (Multiprocessor) System ? What are its main types ? Explain.

(c) What is Bounded Buffer problem ? Discuss briefly with the help of Producer and Consumer Process.

(d) Consider the following process :

Process	Arrival Time	Burst Time
P1	0.0	7
P2	2.0	4
P3	4.0	1
P4	5.0	4

Consider Non-Preemptive and Preemptive SJF algorithm, find out average waiting time in both cases.

(e) On a simple paged system, associative registers hold the most active page entries and the full page table is stored in the main memory. If references satisfied by the associative registers take 90 ns and reference through the main memory page table take 220 ns. What is the effective access time if 60% of all memory references find their entries in the associative registers ?

Section – C

Attempt **all** questions. $5 \times 10 = 50$

3.   Attempt any **two** parts. $(2 \times 5 = 10)$

(a)   What are the different techniques to remove fragmentation in case of multiprogramming with fixed partitions and variable partitions ?

(b)   How is System Call made ? How is a system call handled by the system ? Choose suitable example for explanation.

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

4.   Attempt any **two** parts. $(2 \times 5 = 10)$

(a)   What do you mean by concurrent process ? Discuss the inter-process communication in details.

(b)   What is **Banker's** Algorithm of Deadlock Avoidance ? Explain.

(c)   Write an **algorithm** to explain the producer/consumer using semaphores.

5.   Attempt any **two** parts. $(2 \times 5 = 10)$

(a)   Discuss the performance criteria for CPU scheduling.

(b)   Draw and explain the Process State Transition diagram.

(c)   Give the solution to Critical Section problem. Explain its necessary conditions.

6.   Attempt any **one** part. $(1 \times 10 = 10)$

(a)   Suppose we have a processor with a hardware cache memory. Suppose a program is run by the CPU and this produces 500,000 memory references, out of which 475,000 hits the cache memory. Suppose average memory access time is 70 ns and cache access time 20 ns, of which 10 ns are for lookup. Suppose the system follows the write-through policy. (a) What is the hit ratio ? (b) What is the average memory reference time as seen by the CPU if, (i) all the memory references are read, (ii) 80% of the memory references are read, and (iii) 90% of the memory references are read ?

(b) In a segmentation-based system, the main memory has the following holes in this order : 21K, 5K, 90K, 54K, 10K, 25K and 56K; there are three new requests for memory of sizes 10K, 7K and 22K. The system does first come first serve service. Explain what holes will be taken for each of First Fit and Best Fit memory allocation schemes.

7. Attempt any **two** parts. $(2 \times 5 = 10)$

(a) What are the various file access methods ? Explain Sequential access method. How it can be simulated on direct access file ?

(b) What are the different file organizations ? Discuss access mechanisms.

(c) Describe the File System Implementation and Directory System Implementation in detail.