First Semester M.Tech. Degree Examination, Dec.09/Jan.10
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Distinguish between the client-server and peer-to-peer models of distributed systems. **(04 Marks)**

   b. Discuss the various approaches employed in designing an operating system structure. Bring out the advantages of using virtual machine architecture approach compared to other approaches. **(10 Marks)**

   c. The services and functions provided by an operating system can be divided into two main categories. Briefly describe the two categories and discuss how they differ. **(06 Marks)**

2 a. Discuss the two fundamental mechanisms used for inter process communication. **(06 Marks)**

   b. Describe the actions taken by a kernel to context-switch between processes. **(04 Marks)**

   c. Explain the following threading issues considered in multithreaded program:
      i)   Thread cancellation
      ii) Signal handling. **(04 Marks)**

   d. Mention two different approaches to multiple-processor scheduling. Discuss any two issues concerning symmetric multiprocessing (SMP) systems. **(06 Marks)**

3 a. Explain signal and wait premitive structures for counting a semaphore variable. **(04 Marks)**

   b. Compare and contrast the use of monitor and semaphore operations in process synchronization. **(06 Marks)**

   c. Implement dining philosopher's problem using monitors. Discuss its use. **(10 Marks)**

4 a. Describer how the TestAndSet( ) instruction can be used to provide mutual exclusion that satisfies the bounded waiting requirement. **(05 Marks)**

   b. Discuss deadlock recovery mechanisms. **(05 Marks)**

   c. Consider the following snapshot of system:

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
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			

   Answer the following questions using Banker's algorithm:
      i)   What is the content of the matrix need?
      ii) Is the system in a safe state?
      iii) Suppose a process P_1 requests one additional instance of resource type A and two instances of resource type C. What is the content of vector REQUEST$_1$?

main memory organization schemes of contiguous memory allocation, pure
and pure paging with respect to the following issues:

External fragmentation
Internal fragmentation
Ability to share code across processes. **(09 Marks)**

paging with segmentation with respect to the amount of memory required by the
translation structures in order to convert virtual addresses to physical addresses.
(04 Marks)

the thrashing phenomena. Explain how working set model greatly helps to recover
thrashing. **(07 Marks)**

Demand paging can significantly affect the performance of computer
(05 Marks)

following directory structures used in file system:
Two-level directory
Tree-structured directories
Acyclic-graph directories. **(09 Marks)**

following with respect to disk management:
Boot block
Bad blocks. **(06 Marks)**

various approaches used in free space management. **(08 Marks)**

the strengths and weaknesses of several methods of implementing an access matrix.
(08 Marks)

any two advantages and disadvantages of implementing a directory using hash
(04 Marks)

the Linux kernel modules. **(06 Marks)**

interprocess communication (IPC) mechanism in unix environment. **(06 Marks)**

the following capability based protection system:
Hydra
Cambridge CAP system. **(08 Marks)**

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