Code No: T1221 **R07** SET - 1

II B. Tech II Semester, Supplementary Examinations, April/May – 2013
OPERATING SYSTEMS
(Information Technology)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Briefly discuss Network OS, Multiprocessor OS, and Distributed OS?
   b) How do system calls differ from ordinary library routines, as both are supplied by the language? (8M+8M)

2. The following Snapshot is given

Process	Arrival Time (ms	CPU Burst Time (ms)
P1	0	10
P2	1	29
P3	2	3
P4	3	7

   Draw the Gantt chart and calculate the turnaround time and waiting time of the jobs for FCFS (First Come First Served), SJF (Shortest Job First), SRTF (Shortest Remaining Time First) and RR (Round Robin with time quantum 10) scheduling algorithms. Arrival Time is only applicable to SRTF algorithm. (16M)

3. a) What is Semaphore? Write the code for Producer-Consumer problem using Semaphore.
   b) How are critical section and the principle of mutual exclusion related to each other? (9M+7M)

4. In a paged segmented system, a virtual address consists of 32 bits of which 12 bits are a displacement, 11 bits are a segment number and 9 bits are a page number. Calculate
   i) page size ii) maximum segment size iii) maximum number of pages
   iv) maximum v) number of segments. (16M)

5. Consider a system consisting of 'm' resources of the same type being shared by 'n' processes. Resources can be requested and released by processes only one at a time. Show that the system is deadlock free if the two conditions hold
   i) The maximum need of each process is between 1 & m resources.
   ii) The sum of all maximum needs is less than m+n. (8M+8M)

6. a) Discuss file storage in WINDOWS. Calculate the number of entries required in the FAT table given these parameters: Disk capacity-30Mbyte, Block size-512 bytes, Blocks/cluster2.
   b) Calculate the number of disk accesses needed to read 20 consecutive logical blocks of a file in a system with i) contiguous allocation ii) linked allocation iii) indexed allocation (7M+9M)

7. Suppose that a disk drive has 5000 cylinders, 0 to 4999. 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 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Calculate the total distance (in terms of cylinder), starting from current head position, for the following disk scheduling algorithms a) FCFS b) SSTF c) SCAN d) CSCAN. (16 M)

8. Explain the user authentication process governed by an operating system (16M)
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Code No: T1221 **R07** SET - 2

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OPERATING SYSTEMS
(Information Technology)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
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1. To provide a single image of the OS, distributed OS has to address number of transparency issues. Briefly discuss few important transparency issues in distributed OS. (16M)

2. Round robin schedulers normally maintain a list of all runnable processes, with each process occurring exactly once in the list. What would happen if a process occurred twice in the list? Can you think of any reason for allowing this? (16M)

3. Describe critical section problem in detail with suitable example. Also explain semaphore and its use. (16M)

4. Describe using a diagram how a logical address consisting of 24 bits could be converted to a segment address supporting up to 256 segments. What would be the maximum size of each segment? (16M)

5. A system is in an unsafe state. Is it possible for the processes to complete their execution without entering deadlock? If yes, show how? (16M)

6. Using a diagram, show how an indexed allocation of a file may be done for a disk based system with the following characteristics?
   i) A System has a disk of 30 blocks each of 1024 bytes (may be modelled as a 6×5 matrix).
   ii) File f1 of 11 logical records of 112 bytes
   iii) File f2 of 890 logical records of 13 bytes
   iv) File f3 of 510 bytes of binary data stream
   v) File f4 of 4 logical records of 95 (16M)

7. Calculate the number of disk accesses needed to read 20 consecutive logical blocks of a file in a system with i) contiguous allocation ii) linked allocation iii) indexed allocation. (16M)

8. Explain how protection is provided for the hardware resources by the operating system (16M)
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Code No: T1221 **R07** SET - 3

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OPERATING SYSTEMS
(Information Technology)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
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1. a) What are the system calls that are executed by a command interpreter or shell in order to start a new process?
   b) To build a robust distributed system, discuss its three possible types of failure. Which of failures are also applicable to a centralized system? (8M+8M)

2. For three processes following parameter values are given below:

Process	Arrival Time	Burst Time
P1	0.0	8
P2	0.4	4
P3	1.0	1

   Using non pre-emptive scheduling, find average turnaround time for each process using
   i) FCFS ii) SJF iii) If CPU is left idle for the first 1 unit and then SJF scheduling is used. (16M)

3. What do you mean by critical section? Using semaphores, write a solution to the readers and writers problem that gives priority to readers. (The readers and writers problem: any number of readers may simultaneously be reading from a file, and no reader can be reading while a writer is writing). (16M)

4. At some point in time, the following holes (in the order) are created by a variable partition memory. 20K, 15K, 40K, 60K, 10K, 25K. For a new process of 25 K, which hole would be filled using best fit, first fit, and worst fit? . (16M)

5. a) List three examples of deadlocks that are not related to a computer system environment.
   b) Write Banker's safety algorithm and prove that the Banker's safety algorithm requires an order of $M \times N^2$ operations. (16M)

6. Some systems automatically delete all user files when a user logs off or a job terminates, unless the user explicitly requests to keep them; other systems keep all files unless the user explicitly deletes them. Discuss the relative merits of each approach. (16M)

7. Analyze Disk arm movement reduced when/which one is effective for given Queue=87, 170, 40, 150, 36, 72, 66, 15 Starting point of current head is 60. (16M)

8. Why is file protection necessary? Explain the techniques used for the file protection. (16M)
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Code No: T1221 **R07** SET - 4

II B. Tech II Semester, Supplementary Examinations, April/May – 2013
OPERATING SYSTEMS
(Information Technology)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
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1. a) What type of operating system is Windows XP? Describe two of its major features.
   b) With a neat sketch explain Operating System Structures? (8M+8M)

2. a) Explain how short term, medium term, and long term scheduler work giving suitable example(s)
   b) What are the different modes in which processes are executed? (16M)

3. a) What is a critical-section problem? What are the three requirements that a solution to the critical-section problem must satisfy?
   b) What are semaphores? How do they implement mutual exclusion? (8M+8M)

4. Assume that we have a paging system with page table stored in memory. If a memory reference takes 200 ns, how long does a paged memory reference take? If we add associative registers and 75% of all page table references are found in the associative registers, what is the effective memory reference time? Assume that finding a page table entry in the associative registers takes zero time if the entry is there. (16M)

5. Consider the following resource-allocation state involving five processes and five resources. Total[j] specifies the total number of instances of resource j (including both allocated and free instances). Alloc[i, j] denotes the number of instances of resource j currently allocated to process i. Req[i, j] denotes the number of instances of resource j that process i is currently requesting. Determine which processes (if any) are deadlocked.
   Total = [11, 10, 6, 9, 6]
   Alloc = [[1, 0, 2, 4, 1], [0, 1, 0, 2, 3], [0, 0, 1, 0, 0], [0, 1, 0, 1, 0], [1, 0, 0, 1, 2]]
   Req = [[1, 5, 4, 2, 2], [1, 0, 0, 7, 2], [8, 8, 2, 0, 0], [6, 6, 6, 6, 6], [7, 3, 0, 1, 0]] (16M)

6. Given memory partitions of 100k, 500k, 200k, 300k, and 600k (in order), apply first fit and best fit algorithms to place processes with the space requirement of 212k, 417k, 112k and 426k (in order)? Which algorithm makes the most effective use of memory? (16M)

7. A hard-disk drive reads “120 GB HDD 7200 rpm 3 GB/sec transfer rate”. If the drive has a sector size of 512 bytes, what is the average rotational latency and transfer time to read one disk sector? (16M)

8. a) Explain various types of programming threats and system threats
   b) What is the need-to-know principle? Why is it important for a protection system to adhere to this principle? (8M+8M)
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