COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
Shivaji Nagar, Pune - 411 005

END Semester Examination

(IT-09002)   System Programming and Operating System

Course: B.Tech   Branch: Information Technology

Semester: Sem V

Year: 2014-2015   Max.Marks:60

Duration: 3 Hours   Time:- 2 to 5 pm   **Date:23/11/2014**

Instructions: MIS No. ☐☐☐☐☐☐☐☐☐☐

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Q.1   Describe what are the different attribute a file should consist of?   [3]

Q.2   Consider a system using two-level paging. The inner page table is divided in to [6]
512 pages each of size 2K. The length of logical address is of 34 bits. If physical
address space has 256 frames then what is the length of physical address.

Q.3   How to provide security from unauthorized usage of memory? Assume that a user [8]
program is 100K words and secondary storage device is a fixed head disk with an
average latency of 8ms and a transfer rate of 250,000 words /sec. Calculate the
total swap time to transfer of 100K words to or from memory.

Q.4   Explain Semaphores. Using semaphore write the C code for the given scenario: A [12]
barber shop has 1 barber, 1 barber chair, N chairs for waiting customer to sit. If
there is no customer, the barber goes to sleep. When a customer arrives, he has to
wake up the sleeping barber. If additional customer arrive while the barber is
cutting a customer hair then they sit if chairs are empty else they leave the shop.
Customers are serviced in FCFS order. The problem is to program the barber and
customer without getting in to race condition.

Q.5   Describe tightly coupled systems and differentiate between symmetric and [5]
asymmetric multiprocessing.

Q.6 What are the conditions that must hold simultaneously for an undesirable state of the system to occur? [6]

Q.7 Suppose the following processes arrive for execution at the times indicated. Each process will run for listed amount of time. Draw the Gantt charts and calculate average turnaround time, average waiting time and throughput illustrating the execution of these processes using FCFS, SJF, STRF, HRRN and non preemptive priority algorithm(a smaller priority number implies a high priority). [15]

Process	Arrival Time (milliseconds)	Burst Time (milliseconds)	Priority
P1	0	3	5
P2	2	6	2
P3	4	4	4
P4	6	5	1
P5	8	2	3

Q.8 Consider a system with 5 processes and single instances of resource type R. The maximum peak demand made by each process for the resource type R is shown below: [5]

Process	Maximum peak demand
P1	21
P2	15
P3	18
P4	23
P5	5

I) What is the maximum unit of R which causes deadlock?
II) What is the minimum unit of resource which ensure deadlock free system