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Thapar University Patiala
Computer Science & Engineering Department

B.E 3rd Yr. 1st Semester CSE, CML, CAG, SE
MST, 19th September 2016

Time: 2 Hrs.

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Note: All Questions are Compulsory; Attempt in a **SEQUENTIAL ORDER**; Draw diagrams to support the explanation.

UCS303: Operating System
Maximum Marks: 20

- Q.1 In the code snippet given below consider line no. 1-15 and list the statements that comes under CPU burst and I/O burst: 2

```

1. printf("Enter the three variables x, y, z");
2. scanf("%f%f%f", &x,&y,&z);
3. if(x>y)
4. {
5.     if(x>z)
6.         printf("x is greatest");
7.     else
8.         printf("y is greatest");
9. }
10. else
11. {
12.     if(y>z)
13.         printf("y is greatest");
14.     else
15.         printf("z is greatest");
16. }
17. getch();

```

- Q.2 Consider a simple paging system with virtual address space 2^{32} bytes, page size is 1KB and size of physical memory is 16GB. Assume each page table entry also contains a valid/invalid bit and addressing is at byte level. Calculate the size of page table showing all the steps you take to reach the answer. 2

- Q.3 With a suitable depiction explain the concept of using inverted page table for narrowing the requirement of RAM for storing the page table. 3

- Q.4 Consider the following snapshot of the processes: 3

Process	Burst Time	Arrival Time	Priority
P1	8	0	1 (<i>lowest</i>)
P2	20	1	3
P3	3	2	2
P4	6	3	5 (<i>highest</i>)
P5	12	4	4

Draw the GANTT chart for the execution of the processes showing there start time and end time using FCFS (without considering arrival time and priority number), SJF (pre-emptive, considering arrival time and without considering the priority number), and Priority scheduling (pre-emptive, and considering arrival time with priority number). Also compute the average waiting time for all the three cases.

P.T.O.

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Q.5 There are three jobs running in a system with the following requirements:

Job1: Requires disk after every 2 min (I/O device service time = 2 min). Total processing time = 6 min.

Job2: Requires printer after every 5 min (I/O device service time = 2 min). Total processing time = 7 min.

Job3: Requires disk after every 3 min (I/O device service time = 2 min). Total processing time = 5 min.

Prepare a timing chart showing the CPU and I/O activities of the jobs. Compute the total time for execution using mono-programming and multi-programming. Assume the system with single CPU and single I/O processor.

Q.6 Consider a paging system with 2^{29} byte virtual address space, 512 byte page size and the page table entry of 4 bytes in all page tables. A multilevel page table is used such that each page table is constrained to take size equivalent to one page. Answer the following questions, showing all the intermediate steps.

- Calculate the size of page tables at each level?
- In multilevel paging, combined size of all the tables is greater than single level page table, and it increases the memory overhead as compared to the single level paging. Do you agree with this statement? Justify your answer with a suitable explanation.

Q.7 With a suitable diagram show the translation of the logical address into physical address using TLB. In a paging system with TLB, it takes 30 ns to search the TLB and 90 ns to access the memory. If the TLB hit ratio is 70%, find the effective memory access time.

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