Tribhuvan University
Institute of Science and Technology
2068
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Bachelor Level/ Second Year/ Third Semester/Science   Full Marks: 60
Computer Science and Information Technology (CSc 203)   Pass Marks: 24
(Operating System)   Time: 3 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Section A

Attempt any two questions: **(2x10=20)**

1. List the essential properties for the Batch-Oriented and Interactive operating system. For each of the following application which system (batch or Interactive) is more suitable? State the reason.
    (a) Word processing
    (b) Generating monthly bank statements
    (c) Computing pi to million decimal places
    (d) A flight simulator
    (e) Generating mark statement by university

OR

"Using semaphore is very critical for programmer" Do you support this statement? If yes, prove the statement with some fact. If not, put your view with some logical facts against the statement.

2. Round-robin scheduling behaves differently depending on its time quantum. Can the time quantum be set to make round robin behave the same as any of the following algorithms? If so how? Proof the assertion with an example.
    (a) FCFS
    (b) SJF
    (c) SRTN

3. A disk has 8 sector track and spins at 600 rpm. It takes the controller time 10ms from the end of one I/O operation before it can issue a subsequent one. How long does it take to read all 8 sectors using the following interleaving system?
    (a) No interleaving
    (b) Single interleaving
    (c) Double interleaving

Section B

Attempt any eight questions: (8x5=40)

4. What is critical section problem? Why executing critical selection must be mutual exclusive? Explain.

5. What must user programs be prohibited from writing to the memory locations containing the interrupt vector?

6. What are the differences between the trap and interrupt? What is the use of each function?

7. What is deadlock? State the conditions necessary for deadlock to exist. Give reason, why all conditions are necessary.

8. A computer with 32 bit address uses a two level page table. Virtual addresses are split into a 9 bit top level page table field, 11-bit second level page table field and offset. How large the pages? How much maximum space required when page tables loaded into memory if each entry required when page tables loaded into memory if each entry required when page tables loaded into memory if each entry required 4 bytes.

9. What do you mean by memory fragmentation? Distinguish between the internal and external fragmentation.

10. Under what circumstances do page fault occur? Describe the action taken by the operating system when a page fault occurs.

11. How many bits would be needed to store the free-space list under the following conditions if a bit map were used to implement?
    (a) 500,000 blocks total and 200,000 free blocks
    (b) 1,000,000 blocks total and 0 free blocks.
    Also find how much space is required if it need to be stored in memory.

12. Which one suited, polling/interrupt, for the following types of system? Give reason.
    (a) A system dedicated to controlling single I/O devices.
    (b) A work station running as heavily used web server.