5E 5105

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B. Tech. V Semester (Main/Back) Examination, Dec., 2014

COMPUTER SCIENCE & ENGINEERING # 5CS5A

(Common for Computer & IT

# OPERATING SYSTEM

**Time : 3 Hours** **Min. Passing Marks : 24** **Maximum Marks : 80**

***Instruction to Candidates :***

*Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

## Unit-I

1. (*a*) What are the main functions of an operating system? Explain the types of operating systems in brief. [8]

(*b*) How an operating system works as a resource manager and vertical machine? [8]

**OR**

1. (*a*) What is a process? What is the difference between a program and a process? Explain PCB using a suitable example. [8]

(*b*) Explain the following :

(i) Kernel level thread

(ii) Bootstrap loader

(iii) System call

(iv) Multithreading OS [2×4=8]

## Unit-II

2. (*a*) What is critical section problem? Explain the role of lock variable and TSL instruction in busy waiting. [8]

(*b*) Consider the following set of processes with arrival time and CPU burst time given in ms.

| Process | Arrival time | Burst time |
|---|---|---|
| $P_1$ | 0 | 8 |
| $P_2$ | 1 | 4 |
| $P_3$ | 2 | 9 |
| $P_4$ | 3 | 5 |

What is the average waiting time for these processes with preemptive SJF scheduling? [8]

**OR**

2. (*a*) What is dining-philosophers problem? Explain the solution of this problem by using a suitable example. [8]

(*b*) What is the difference between preemptive and non-preemptive scheduling? [4]

(*c*) Explain the turnaround time and response time. [4]

## Unit-III

3. (*a*) Consider the following snapshot of the system.

| | Allocation | | | Max | | | Available | | |
|---|---|---|---|---|---|---|---|---|---|
| Process | 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 | | | |

If a request from process $P_1$ arrives (0, 1, 2) can the request be granted immediately? What is the content of need matrix? [8]

(*b*) What is deadlock? What are the necessary conditions to occur the deadlock? What are the various methods to recover from the deadlock? [8]

**OR**

3. (*a*) Explain free space management using bit map, linked list/free list. [8]

(*b*) Explain the difference between logical and physical address space. Explain fragmentation. What are the various solutions for external fragmentation? [8]

## Unit-IV

4. (*a*) What is the difference between Pager and Swapper? [4]

(*b*) What is demand paging? [4]

(*c*) What is thrashing? [4]

(*d*) Write short note on TLB. [4]

**OR**

4. (*a*) Consider 3 page frames and the following reference string using FIFO page replacement algorithm to calculate the number of page faults in each reference string : [10]

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

(*b*) What is virtual memory? Explain the use of virtual memory using a suitable example. [6]

## Unit-V

5. Suppose a disk drive has 200 cylinders, numbered from 0 to 199. The drive is initially at cylinder 53. The queue with request from I/O to blocks in cylinders: [16]

98 183 37 122 14 124 65 67

Count the total head movements of cylinders in :

(i) SCAN Scheduling

(ii) C-SCAN Scheduling.

**OR**

5. Write short notes on :

(i) Directory structure in Linux

(ii) File Naming

(iii) Acyclic graph

(iv) File organization [4×4=16]