



Printed Pages : 4

TCS - 601

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1077

Roll No.

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B. Tech.

(SEM. VI) EXAMINATION, 2007-08

OPERATING SYSTEMS

Time : 3 Hours]

[Total Marks : 100

- Notes :
- (1) Attempt *all* questions.
 - (2) All questions carry *equal* marks.
 - (3) Use *suitable* diagram wherever *necessary*.

1 Attempt any **four** of the following : 5×4=20

- (a) Enumerate various OS components and give their function in brief.
- (b) Differentiate between Smart Card OS and Personal Computer OS.
- (c) Differentiate between (with one suitable example):
 - (i) Interactive and Batch Processing System
 - (ii) Multiprogramming and Multitasking.
- (d) List Various Operating System Structures and explain virtual machine architecture in detail.
- (e) One of the major functions of OS is to act as a resource manager. Is it true or false? Give reason in support of your answer.
- (f) Differentiate between
 - (i) System Software and Application Software
 - (ii) General Purpose OS and Real-Time OS.



2. Attempt any **two** of the following : **10×23=20**

- (a) Consider a system consisting of processes P_1, P_2, \dots, P_n , each of which has a unique priority number. Write a monitor that allocates three identical line printers to these processes, using the priority numbers for deciding the order of allocation.
- (b) Define Mutual Exclusion and its need. One solution to the critical section problem or mutual exclusion implementation is with TestAndSet instruction (Test and lock). Explain this approach in detail and give its relative advantages and disadvantages.
- (c) It is said Inter Process Communication is best provided by a message passing system. Explain the implementation issues in massive passing system for Inter Process Communication.

3. Attempt any **two** of the following : **10×2=20**

- (a) Explain the priority scheduling algorithm and its major drawbacks with their solution. Draw the Gantt chart and find average waiting time and response time of the process set given in the following table:

Process id	Arrival time	Execution Time	Priority
A	0	10	3
B	0	2	1
C	1	3	3
D	2	1	5
E	2	4	2

- (b) Discuss in brief any two evaluation methods which can be used for scheduling algorithms.
- (c) Write short notes on :
 - (i) Resource allocation graph and resource allocation graph algorithm.
 - (ii) Recovery from deadlock.



4 Attempt any **two** of the following : 10×2=20

- (a) What do you understand by Belady's anomaly. Which popular page replacement algorithm suffers from the Belady's anomaly? Also give the name of the class of algorithms, which can never suffer from Belady's anomaly and why?

A system using demand-paged memory, takes 250 ns to satisfy a memory request if the page is in memory. If the page is not in memory, the request takes on an average 5 ms if a free frame is available or the page to be swapped out has not been modified or 12 ms if the page to be swapped out has been modified. What is the effective access time if the page fault rate is 2%, and 40% of the time the page to be replaced has been modified? Assume the system is running only a single process and the CPU is idle during page swaps.

- (b) (i) Describe the First Fit, Best Fit and Worst Fit memory allocation algorithms.
- (ii) On a system using a disk cache, the mean access time is 41.2 ms, the mean cache access time is 2 ms, the mean disk access time is 100 ms, and the system has 8 MB of cache memory. For each doubling of the amount of memory, the miss rate is halved. How much memory must be added to reduce the mean access time to 20 ms? Assume the amount of memory may only increase by doubling.
- (c) Differentiate between paging and segmentation. On a system using paging and segmentation, the virtual address space consists of up to 8 segments where each segment can be up to 2^{29}



bytes long. The hardware pages each segment into 256-byte pages. Determine the bits needed in the virtual address to specify the:

- (i) Segment number
- (ii) Page number
- (iii) Offset within page
- (iv) Entire virtual address.

5 Attempt any **two** of the following : **10×2=20**

- (a) Differentiate between :
 - (i) Block and character devices.
 - (ii) Blocking and non-blocking I/O.
 - (iii) Link list and bit map approach for free space memory management.
 - (iv) double buffering and single buffering.
- (b) Discuss the following with respect to file system:
 - (i) Consistency checking
 - (ii) Common file attributes and file operations.
- (c) None of the disk scheduling discipline, except FCFS, are truly fair (starvation may occur).
 - (i) Explain why this assertion is true.
 - (ii) Describe a way to modify algorithms such as SCAN to ensure fairness.
 - (iii) Explain why fairness is an important goal in a time-sharing system.
 - (iv) Give two examples of circumstances in which it is important that the operating system be unfair in serving I/O requests.

