[Total No. of Questions - 9] [Total No. of Printed Pages - 4] (2125)

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B. Tech 6th Semester Examination

Operating System (OS)

EC-6005

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one from each of the Sections A, B, C & D. Section E is compulsory.

SECTION - A

1. (a) Define multiprogramming. Discuss the advantages and disadvantages of having a large degree of multiprogramming. (10)

   (b) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds.

Process	CPU Burst	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0.

(i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum=1) scheduling.

[P.T.O.]

(ii) Fill the entries of the following table with waiting time and average waiting time for each indicated scheduling policy. Ignore context switching overhead.

Scheduling Policy	Waiting Time					Average Waiting Time
	P_1	P_2	P_3	P_4	P_5	
FCFS						
SJF						
Priority (nonpreemptive)						
RR (time quantum=1)						

(10)

2. (a) Operating systems frequently exploit locality to improve performance. Briefly describe two examples where operating systems do so, and state how locality is exploited. (10)

   (b) Define the essential properties of the following types of operating systems:

   (i) Timesharing

   (ii) Real time

   (iii) Network

   (iv) Distributed

   (v) Mobile. (10)

SECTION - B

3. (a) What is the purpose of Banker's algorithm? Write the algorithm and explain its working with suitable examples. (10)

   (b) Describe mutual exclusion with suitable example. Explain how mutual exclusion and synchronization are supported with message passing. (10)

4. (a) A System contains 6 units of resource, and 3 processes that use this resource. Can deadlocks arise in the system if the maximum resource requirement of each process is 3 units? If the system had 7 units of resource, would the system be free of deadlocks for all time? Explain clearly. (10)

   (b) Instead of using a deadlock detection algorithm that exchanges messages, we may be able to handle deadlocks simply by using timeouts, where a process that has waited for a specified period for a resource declares that it is deadlocked (and begin to resolve the deadlock). What are the potential problem(s) in using this method? For each potential problem, give a concrete example that illustrates the problem. (10)

SECTION - C

5. (a) Explain fragmentation, memory partitioning, protection and swapping related to memory management system. (10)

   (b) Suppose there are 12 virtual pages and 4 page frames. Determine the number of page faults that will occur with the reference string 0 1 2 3 4 4 2 3 5 6 7 4 6, if the page frames are initially empty, using each of the following page replacement algorithms: (i) LRU (ii) Optimal. (10)

6. (a) When are caches useful? What problems do they solve? What problems do they cause? (10)

   (b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.

   (i) How many bits are there in the logical address?

   (ii) How many bits are there in the physical address? (10)

[P.T.O.]

SECTION - D

7. (a) Given memory partitions of 200 KB, 300 KB, 400 KB, and 500 KB (in order). How would each of the best-fit and worst-fit algorithms place processes of 200 KB, 296 KB, 50 KB, and 390 KB (in order)? (10)

   (b) Define external and internal fragments. Which memory management scheme does not have external fragment? Why? (10)

8. (a) Disk requests come into the disk driver for cylinders 10, 22, 20, 2, 40, 6, and 38, in that order. Assume that the disk has 100 cylinders. A seek takes 6msec per cylinder moved. Compute the average seek time for the request sequence given above for First-come, First-served. (10)

   (b) A worst fit allocator always splits the largest free memory area while making an allocation. Compare its advantages and drawbacks with the first fit and best fit allocators. (10)

SECTION - E

9. (a) What are threads?

   (b) What are overheads of swapping?

   (c) What is a virus?

   (d) Differentiate between user mode and kernel mode.

   (e) How non-relocatable programs are different from relocatable programs?

   (f) What is a shell?

   (g) Why authentication is important for file protection?

   (h) Define Direct Memory Access.

   (i) What are advantages of encrypting data stored in computer system?

   (j) What is the difference between absolute and relative path name of a file? (2×10=20)