Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (CSE/IT) (Sem.–4th)
OPERATING SYSTEM
Subject Code : CS-202
Paper ID : [A0458]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write Briefly :

a. Describe diagrammatically the actions taken by a kernel to switch context between processes.

b. Write program in C to create a new child process successfully and to replace the process's memory space with a new program.

c. Give two advantages of layered approach to system design.

d. Differentiate between a short term scheduler and a long term scheduler.

e. What resources are used when a thread is created?

f. Define the terms: Multitasking and Multithreading.

g. Differentiate between deadlock avoidance and deadlock prevention.

h. Does deadlock prevention often result in poor resource utilization?

i. What is the impact of page size on the overall system performance?

j. Consider the following page reference string: 1, 2, 3,4, 5, 6, 2,1, 2, 3, 5, 6, 3, 2, 4, 2, 3, 6, 7, 4

If the process is allocated four physical frames, how many page faults would occur if the page replacements are done using FIFO.

SECTION-B

2) Suppose that you have a multithreaded application process. One of those threads executes a **fork** to create a new process. Will the new process be an exact replica of the parent process and have the same number of threads? Justify your answer.

3) a. Consider the following resources allocation state involving five processes and five resources. Total[j] specifies the total number of instances of resource j (including both the allocated and free instances) Alloc[i, j] denotes the number of instances of resources j currently allocated to process i. Req[i, j] denotes the number of instances of resource j that process i is currently requesting. Determine which processes if any are deadlocked.

   Total = [11,10, 6, 9, 6]

   Alloc = [[1, 0, 2, 4, 1], [0, 1, 0, 2, 3], [0, 0, 1, 0, 0], [0, 1, 0, 1, 0], [1, 0, 0, 1, 2]]

   Req = [[1, 5, 4, 2, 2], [1, 0, 0, 7, 2], [8, 8, 2, 0, 0], [6, 6, 6, 6, 6], [7, 3, 0, 1, 0]]

   b. If we ran the processes sequentially, would we ever have deadlocks in the system? Justify.

4) Compare paging with segmentation with respect to the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses.

5) Give some means by which the managers of the system connected to Internet could have designed their systems to limit or eliminate the damage done by the worms.

6) Discuss the design issues of a Distributed OS.

SECTION-C

7) Consider the following scheduling scheme. When a process is created or it has become ready after a wait, it is added to the end of ready queue. When the scheduler runs it selects a ready process with highest priority (ties are broken using FCFS ordering) and gives the CPU to this process

for a maximum of 5 ms. At the end of 5ms (or earlier if the process wants to do I/O), the scheduler runs again. If the process is preempted, it is added to the end of ready queue. The priority of the process is calculated using the following rules (the lower the number the lower the priority)

a. Initial priority of all the processes is 5.

b. At the end of a CPU burst, the priority of the process that was running is updated using the following formula:

New priority = old priority +2*(5 - duration of CPU burst just completed)

c. Processes PI, P2, P3 and P4 are created simultaneously in the said order. Their CPU and I/O burst times are give in the following table. Assume that all the I/O requests are for different devices.

Process	CPU	I/O	CPU	I/O	CPU
P1	2	1	2		
P2	7	3	4		
P3	2	3	5	4	8
P4	6	1	4	2	1

a) Draw the Gantt chart for the processes. Also show the changes to the ready queue at each stage.

b) Calculate the cumulative waiting time and response time for each process.

8) Linux source code is freely and widely available over the Internet or from CD-ROM vendors. What are the implications of this availability for the security of Linux system?

9) Suppose that you have a system that gives you the choice of selecting one of these file allocation schemes; contiguous, linked and indexed allocation. Explain the criteria you will use in deciding on a file allocation scheme.