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

Total No. of Questions : 09

B.Tech.(CSE/IT) (2011 Onwards) (Sem.–4)
OPERATING SYSTEMS
Subject Code : BTCS-401
Paper ID : [A1183]

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 have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

    a. What is the difference between dynamic and static linking?

    b. What are the differences between load-time and run-time dynamic linking?

    c. What is software trap and how is it used in operating system design?

    d. What is difference between preemptive and non-preemptive scheduling?

    e. Describe terms long-term, medium-term and short-term thread scheduling.

    f. Describe the terms : internal and external fragmentation.

    g. What are consequences of choosing large page sizes, and what of small page sizes?

    h. Why the page size has to be a power of two?

    i. What is page replacement? List all page replacement policies you know.

    j. What is disk formatting and what basic information is stored with each disk sector.

SECTION- B

2. Five jobs are in the ready queue waiting to be processed. Their estimated CPU cycles are as follows : 10,3,5,6 and 2. Using SJF, in what order they should be processed to minimize average waiting time?   (5)

3. a) Provide the solution for Reader/Writer problem using semaphores with no busy waiting. (3)

   b) Describe bit map approach in free space management : Use block diagrams. List advantages and disadvantages. (2)

4. a) What is disk scheduling?

   b) When is it used?

   c) Why is it used?

   d) Who is performing the disk scheduling?

   e) What disk scheduling algorithms do you know? (5)

5. Given the following information :

Job Number	Arrival time	CPU Cycle	Priority
1	0	75	3
2	10	40	1
3	10	25	4
4	80	20	5
5	85	45	2

Draw a timeline for each of the following scheduling algorithms and determine which one gives the best results.

   1) FCFS

   2) SJF

   3) Round Robin (using a time quantum of 15)

   4) Priority scheduling.

   Assume a small integer means higher priority. (5)

6. a) What causes a process/thread to change the state?

   i. From running to ready?

   ii. From ready to running?

   iii. From running to blocked?

   iv. From blocked to ready? (3)

   b) Describe dynamic partitioning. What is the main problem in dynamic partitioning? How is it solved? (2)

SECTION-C

7. Consider a system consisting of m resources of the same type, being shared by n processes. Resources can be requested and released by processes only one at a time. Show that the system is deadlock-free if the following two conditions hold :

   a) The maximum need of each process is between 1 and m resources

   b) The sum of all maximum needs is less than $m + n$ (10)

8. a) Consider the following snapshot of a system :

	Allocation A B C D	Max A B C D	Available A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

   Answer the following question using the banker's algorithm :

   a) What is the content of the matrix *Need*? (5)

   b) Why are segmentation and paging sometimes combined into one scheme? (5)

9. a) Discuss Peterson's solution for critical section problem. What are the limitations of this solution and how it can be resolved? (5)

   b) Consider the following segment table :

Segment	Base	Length
0	219	600
1	230	014
2	90	100
3	1327	580
4	1952	96

   What are the physical addresses for the following logical addresses? Explain :

   a. 0,430

   b. 1,10

   c. 2,500

   d. 3,400

   e. 4,112 (5)

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