

**Sessional Test II – OCTOBER, 2017**

**Semester 3rd**

ID No: ………………………… [Total No. of Pages: 3]

**Time: 90 minutes**

**Department: Computer Science and Engineering**

**Title of the Course: OS Max. Marks: 40 Course Code: CSL4207**

**Instructions:**

For Section A

* There is one question having five parts. Each part is having four distinct options out of which only one choice will be correct. There is no negative marking for incorrect answers.

For Section B

* There are 6 Questions of 2 marks each. There is a choice to attempt 5 questions out of 6.

For Section C

* There are 4 Questions of 5 marks each. There is a choice to attempt 3 questions out of 4.

For Section D

* There are 2 Questions of 10 marks each. There is a choice to attempt 1 question out of 2.

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**Section-A**

*(All Questions are Compulsory, Each question carries 01 mark)*

1.

1. Which strategy is used in the Banker’s algorithm for dealing with deadlocks?
2. Deadlock Ignorance (ii) Deadlock Detection
3. Deadlock Avoidance (iv) Deadlock Prevention
4. \_\_\_\_\_\_\_\_\_\_ is generally faster than \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_.

(i) First fit, best fit, worst fit (ii) best fit, first fit, worst fit

(iii) Worst fit, best fit, first fit (iv) None of these

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1. A monitor is a type of :

i) semaphore (ii) low level synchronization construct

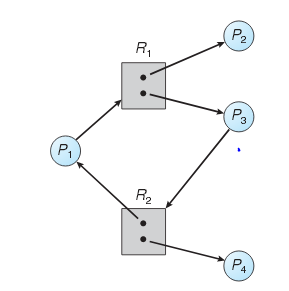
(iii) high level synchronization construct (iv)None of these

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1. A computer system has 6 tape drives with ‘n’ processes competing for them. Each process may need 3 tape drives. The maximum value of ‘n’ for which the system is guaranteed to be deadlock free is:

|  |  |  |  |
| --- | --- | --- | --- |
| (i) | 1 | (ii) | 2 |
| (iii) | 3 | (iv) | 4 |

e) Consider following graph?



1. Cycle but no deadlock ii) Cycle and deadlock

iii) No cycle no deadlock iv) None of these.

**Section-B**

*(Attempt any 5 questions, each question carries 02 marks)*

1. What is Belady’s anomaly? Give two page-replacement algorithms that do not suffer from Belady’s anomaly.
2. Consider the page sequence 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5. If FIFO page replacement algorithm is used and the frame size is 3, then calculate the percentage of page fault.
3. Explain binding of address at compile time, load time and execution time. How these three differs from each other in address generation?
4. According to you how internal fragmentation and External fragmentation affects system’s performance? Give a brief example of each.
5. A system has 12 magnetic tape drives and 3 processes: P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives.

Process P0 P1 P2

Maximum needs (process-wise: P0 through P2 top to bottom) 10 4 9

Currently allocated (process-wise) 5 2 2

What is the safe sequence?

1. What is the cause of thrashing? How does the system detect thrashing?

**Section-C**

*(Attempt any 3 questions, each question carries 5 marks, subparts (if any) carry equal weightage)*

1. P is a set of processes. R is a set of resources. E is a set of request or assignment edges. The sets P, R, and E are as follows:

P = {P1, P2, P3}, R = {R1, R2, R3}

E = {P1 → R1, P1 → R2, P2 → R2, P2 → R3, P3 → R2, P3 → R3, R1 → P2, R2 → P2, R3 → P1}.

R1 has one instance. R2 has two instances. R3 has one instance.

i. Draw the resource-allocation graph.

ii. Is there any deadlock in this situation? Briefly Explain.

1. Consider a paging system with the following parameters: 232 bytes of physical memory, page size of 210 bytes, 216 pages of logical address. Answer the following:
2. How many bits are there in the logical address? (1mark)
3. How many bits are there in a frame? ( 1 mark)
4. How many entries are there in the page table? (1 mark)
5. How many bits are there in each page table entry? Assume each page table entry includes a valid/ invalid bit. (2 marks)
6. Given the following stream of page references by an application, calculate the number of page faults the application would incur with the following (a) FIFO (b) LRU page replacement algorithms. Assume that all the three pages are initially free.

Reference Stream: A B C D A B E A B C D E B A B

1. a) Demonstrate that how can the page tables be structured using different methods? (2 marks)

b) Exhibit the four requirements for deadlock and explain each with help of diagram. (3 marks)

**Section-D**

*(Attempt any one question, each question carries 10 marks, subparts (if any) carry equal weightage)*

1. a) Explain paging in detail. How paging with and demand paging differs from each other? (5 marks)

b) Consider a memory system with a cache access time of 10ns and a memory access time of 200ns. If the effective access time is 10% greater than the cache access time, what is the hit ratio H? (5 marks)

13. An operating system has 3 types of resources with the following quantities of each type:

Resource Type R1 R2 R3

Quantity of that type 13 8 10

There are 5 threads. Each has declared the maximum number of resources of each type it will need, and each has allocated some quantity so far:

R1 R2 R3

Thread 1 Max 2 8 0

Thread 1 Allocated 1 1 0

Thread 2 Max 5 2 2

Thread 2 Allocated 4 1 1

Thread 3 Max 4 3 9

Thread 3 Allocated 1 1 7

Thread 4 Max 2 2 3

Thread 4 Allocated 2 1 1

Thread 5 Max 2 1 3

Thread 5 Allocated 2 0 0

Answer the following questions using Banker’s Algorithm:

1. What is the content of the matrix Need? ( 2 marks)
2. Show the calculations of the Banker’s algorithm to determine whether or not this system is in a safe state. (5 marks)
3. Is the system in a safe state? If so, mention the safe sequence.(3 marks)