# CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
### Fourth Semester of B. Tech (CE) Examination
### June 2017
### CE221/CE221.01 Operating System

| Date: 05.06.2017, Monday | Time: 10.00 a.m. To 01.00 p.m. | Maximum Marks: 70 |
|---|---|---|

*Instructions:*
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make and Mention suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

## SECTION – I

**Q - 1**  **Do as Directed.**                                                        **[09]**

**[A]**  **Answer the following questions.**                                          [05]

**1.**  Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB, and 250 KB, where KB refers to kilobyte. These partitions need to be allotted to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. If the best fit algorithm is used, which memory partitions are NOT allotted to any process?

**2.**  In Disk there are 10 Disk Blocks (from 1 to 10). The Disk Blocks 1, 2, 5, 6, 7, 9 are Free. If Bit Vector free space management technique is used then give the Bit Vector representation for above data.

**3.**  A shared variable x, initialized to zero, is operated by four process w, x, y, z. Process w and x increment x by one, while process y, z decrement x by two. Each process before reading perform 'wait' on semaphore 's' and signal on 's' after store. If semaphore 's' initialized to two, find what is the maximum possible value of x if all processes complete execution?

**4.**  To solve the problem of _____ fragmentation, compaction needs to be done periodically.

**5.**  Inverted page table contains which information?

**[B]**  **Answer the following questions.**                                          [04]

**1.**  Define: Operating System. What is Hard real-time system?

**2.**  Which are the information stored in PCB (Process Control Block)?

**Q - 2   Answer the following questions. (Attempt Any Three)                [12]**

**[A]**   Suppose a disk has 1000 cylinders, numbered 0 to 999.

The drive is currently serving a request at cylinder 100, and the previous request was at cylinder 102. The queue of pending request in FIFO order is:  86, 470, 913, 774, 948, 509, 22, 150 and 30.

Find total head movement using SSTF and C-Look disk scheduling algorithm.

**[B]**   Explain Non-contiguous (Linked) file allocation method with proper diagram.

Give its advantages and disadvantages.

**[C]**   Files store information. When it is used, this information must be accessed and read into computer memory.

The information in the file can be accessed in several ways. List and explain basic two access methods.

**[D]**   A system with a 32 bits virtual address, Each page size is 8 KB. Physical memory is 1 GB.

How many pages and frames are in Logical and Physical address space respectively?

How many bits are required for the page offset?

What is the size of each entry in the page table and what is the size of page table?

**[E]**   What is network operating system? Give advantages and disadvantages of it.

**Q - 3   Answer the following questions. (Attempt Any Two)                [14]**

**[A]**   What is the length of the given reference string?

How many Page Fault occur for the FIFO (First in First out), MRU (Most Recently Used) and LFU (Least Frequently Used) page replacement algorithm with 3 frames? (Pure Demand Paging)

Reference String: 1, 2, 3, 2, 1, 5, 3, 2, 6, 3, 1, 6, 2, 5, 6, 3, 1

**[B]**   What is Directory?

Explain Single level and Two level directory structure with advantages and disadvantages.

**[C]**   What is the advantage of multilevel paging over single level paging? Justify your answer.

Describe address translation (Logical to Physical) in two level paging with proper diagram.

**SECTION – II**

**Q - 4**  **Answer the following questions.**                                    **[09]**

**[A]**    Which kind of device a USB Stick is?

**[B]**    A counting semaphore was initialized to 10. Then 6 down (P/Wait) operations and 4 up (V/Signal) operations were completed on this semaphore. What is the resulting value of the semaphore?

**[C]**    RAID level _____ is also known as block interleaved parity organization and uses block level striping and keeps a parity block on a separate disk.

**[D]**    Which Algorithm is used to allocate inode for the new file?

**[E]**    State TRUE/FALSE: Clock is a block device.

**[F]**    If my file extension is .dll then which type of file it is?

**[G]**    Define: Seek Time.

**[H]**    What is System Call?

**[I]**    Define: File.

**Q - 5**  **Answer the following questions. (Attempt Any Three)**            **[12]**

**[A]**    What is critical section? Which are the three requirements the solution of critical section should satisfy? Give brief about each.

**[B]**    Explain operation of DMA transfer with proper diagram.

**[C]**    What is buffer header? Draw block diagram of buffer header with proper labels.

**[D]**    Draw Resource Allocation Graph for following scenario. Is system a deadlock free? Justify your answer.

Total number of resources of each type are given below.

Resource1 = 2, Resource2 = 2, Resource3 = 1, Resource4 = 3. No of processes are 3.

P1 Request R2, P2 Request R1, P2 Request R2, P3 Request R3, P2 Request R3, P3 Request R2, P1 Request R1. These are the all request for resources which are required by the processes.

**[E]**    Write down differences between Process and Thread.

**Q - 6    Answer the following questions. (Attempt Any Two)                    [14]**

**[A]**    What is Reader-Writer problem in IPC? Write and explain solution of Reader-Writer Problem using semaphore.

**[B]**    Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed here:

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 6            | 3          |
| P2      | 5            | 6          |
| P3      | 1            | 9          |
| P4      | 3            | 4          |

Suppose a system uses Round Robin (RR) scheduling with a quantum of 2 and Shortest Remaining Time First (SRTF) then answer the following questions for each scheduling algorithm.

1. Create a Gantt chart illustrating the execution of these processes.
2. What is the turnaround time and wait time for process P3?

**[C]**    Write a Banker's Algorithm (Resource request and safety algorithm) and explain it with a simple example.

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