

**M.E. / M.TECH. DEGREE EXAMINATIONS, DEC 2020 (Held during April, 2021)**

First Semester

**NW18101- Advanced OS Internals**

*Computer Science and Engineering (Networks)*

(Regulation 2018 )

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions

**PART A - (8 X 2 = 16 marks)**

1. BIOS is used by\_\_\_\_\_
  - a) Operating system
  - b) Compiler
  - c) Interpreter
  - d) Application software
2. In which one of the following page replacement policies, Belady's anomaly may occur?
  - a) FIFO
  - b) Optimal
  - c)LRU
  - d)MRU
3. How many 32K x 1 RAM chips are needed to provide a memory capacity of 256 Kbytes?
  - a)8
  - b)32
  - c)64
  - d)128
4. When the result of a computation depends on the speed of the processes involved, there is said to be
  - a) Cycle stealing
  - b) Race condition
  - c) A Time lock
  - d) A deadlock
5. Justify how Piping is carried out by the OS for performing ls|more?
6. Illustrate how execve system call is used to handle executable files?
7. Analyse how dentry objects are used in memory management of OS?
8. How Zombie processes affects Process management in OS? Justify.

**PART B - (4 X16 = 64 marks)**

09. (a) (i) How Spin locks are used to avoid Deadlocks? Justify with example. (8)
- (ii) A system uses 5 page frames for storing process pages in main memory. (8)  
It uses the First in First out (FIFO) page, LRU page replacement policy.  
Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below-
- 2, 1, 2, 7, 4, 3, 6, 4, 7, 6, 1, 7, 6, 1, 2, 7, 2
- Also calculate the hit ratio and miss ratio for both FIFO and LRU.

**(OR)**

- (b) (i) Illustrate in detail how Reentrant Kernels plays a vital role in OS with a neat diagram. (8)

- (ii) Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB. These partitions need to be allocated to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. Perform the allocation of processes using-
1. First Fit Algorithm
  2. Best Fit Algorithm
  3. Worst Fit Algorithm

10. (a) Demonstrate in detail about how processes are organized and How Wait Queues are Handled by the Operating System? (16)

(OR)

- (b) (i) Illustrate with a neat sketch how Process Switch/ Context Switch is performed by the Operating System in Detail? (8)
- (ii) Three process P1, P2 and P3 arrive at time zero. The total time spent by the process in the system is 10ms, 20ms, and 30ms respectively. They spent first 20% of their execution time in doing I/O and the rest 80% in CPU processing. What is the percentage utilization of CPU using FCFS scheduling algorithm? (8)

11. (a) Consider a disk system with 100 cylinders. The requests to access the cylinders occur in following sequence- (16)

4, 34, 10, 7, 19, 73, 2, 15, 6, 20

Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1 ms to move from one cylinder to adjacent one and shortest seek time first policy is used?

- a) 95 ms
- b) 119 ms
- c) 233 ms
- d) 276 ms

(OR)

- (b) Elaborate on different phases of Mounting Root file system and Unmounting File system with necessary system calls. (16)

12. (a) Illustrate with necessary data structures how Buddy system Algorithm (16) allocates and frees block of memory during external fragmentation.

(OR)

- (b) (i) Let the page fault service time be 10ms in a computer with average (8) memory access time being 20ns. If one-page fault is generated for every  $10^{16}$  memory access time. What is the effective time for the memory?
- a) 21ns
  - b) 30ns
  - c) 23ns
  - d) 35ns
- (b) (ii) Demonstrate the steps involved in `alloc_pages()` function used by Zone (8) allocator for allocating page frames.