**MID TERM TOPICS**

1. OS definition
2. OS evolution – Batch- Multiprogramming –Time Sharing
3. Computer System evolution
4. Multicore – Multiprocessing –Multithreading
5. CISC vs RISC processors
6. OS Components
7. OS Kernel structures
   1. Monolithic
   2. Microkernel
   3. Modules
   4. Layered approach
8. OS modes
   1. User
   2. Kernel
   3. Privilege Instructions
9. OS start-up/ Shutdown process
   1. Boot process – Linux and Windows
   2. Bootloader
10. OS Services
11. User Interface
    1. CLI
    2. GUI
    3. Shell --Interpreter
    4. Windows Registry and WMI
    5. Shell – Parent/child
12. System calls and programming
    1. Definition
    2. System calls types e.g write(), read(), execvp()…..
    3. Compiler, interpreter , debugger
    4. API and Libraries DLL
13. Process Management
    1. Processes management functions
    2. Processes attributes
    3. Processes and Threads
    4. PCB
    5. Process Resources
    6. Process Types
    7. Process memory address space
    8. Processes and signals
    9. Signals programming and system calls
    10. Process states and queues
    11. Process context -switch
    12. Windows and Linux Process creation and termination
    13. Process communication techniques -IPCs
    14. Parent/ Child process relationship
14. Process programming and system calls
    1. Differences and functions of the system calls fork() (clone), wait() , execvp(),read(),write(), open(),getpid()…
15. Memory Management
    1. Def
    2. Memory Management functions
    3. Memory types (RAM , Cache, NVRAM)
    4. Binding instructions
    5. Process – Memory address space (.text .data .BSS heap stack)
    6. Stack, Heap
    7. Memory protection -Base and Limit registers
    8. Logical vs Physical address space
    9. MMU and TLB
    10. Paging - page structure – page number and offset
    11. Pages vs. Frames
    12. Page tables structure –Intel 32 and 64 bit architectures and ARM architecture
    13. Page table implementation Two or three level- page table structures
    14. Internal and external fragmentation
    15. Private and shared pages
    16. Valid and invalid pages