**IA Test Portion:**

1. **MODULE-1** 8 Hours(Full)

Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments.

Operating System Services: User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System debugging, Operating System generation; System boot.

Textbook 1: Chapter – 1 (1.1-1.12), 2 (2.2-2.11)

1. **MODULE-2** 8 Hours

Process Management: Process concept; Process scheduling; Operations on processes; Inter process communication

Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms

Textbook 1: Chapter – 3 (3.1-3.4), 5 (5.1 -5.3)

**Question Bank**

**Module1**

1. Define Operating System. Explain briefly multiprogramming and time sharing system (8 marks)
2. Explain various OS Services(5 marks)
3. What are system calls? Briefly explain types of system call(7 marks)
4. Explain scheduler in a process execution(5 marks)
5. With a neat diagram, explain the concept of non virtual machine, virtual machine and VMware architecture(10 marks)
6. With a neat diagram, explain:
   1. Operating System
   2. Dual mode operation in OS (8marks)
7. Explain the Operating system services with respect to programs and users (6marks)
8. Distinguish between the following
   1. Multiprogramming and multitasking
   2. Multiprocessor and Clustered System
9. Explain the layered approach of operating system with a supporting diagram
10. Describe the difference between symmetric and asymmetric multiprocessing
11. Explain microkernel approach. What are its benefits
12. Explain the graceful degradation and fault tolerant in multiprocessor system.

**Module2:**

1. What is a process? Explain the different state of a process with a neat diagram (7 marks)
2. Explain direct and indirect communication through message passing system
3. Define
   1. Context Switching
   2. Indirect and direct communication
   3. Automatic and Explicit buffering
4. Explain five different scheduling criteria used in the computing scheduling mechanism.
5. What is inter-process communication? Discuss message passing and the shared memory concept of IPC.
6. With a neat diagram, explain the states of a process with a transition diagram and process control block.
7. Explain the non preemptive and preemptive scheduling
8. Explain RR,FCFS,SJF and priority scheduling algorithms
9. Explain multilevel queue scheduling and multilevel feedback queue scheduling
10. Compare and contrast short term, medium term and long term scheduler
11. Calculate average waiting and turnaround times by drawing the Gantt chart using FCFS and RR (q=2ms).

|  |  |  |  |
| --- | --- | --- | --- |
| Processes | Arrival Time | Burst Time |  |
| P1 | 0 | 9 |  |
| P2 | 1 | 4 |  |
| P3 | 2 | 9 |  |
| P4 | 3 | 5 |  |

1. Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using SRTF and the Priority scheduling algorithm.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Processes | Arrival Time | Burst Time | Priority |  |
| P1 | 0 | 8 | 3 |  |
| P2 | 1 | 4 | 2 |  |
| P3 | 2 | 9 | 1 |  |
| P4 | 3 | 5 | 4 |  |

1. 4 batch jobs P1,P2,P3,P4 arrive at computer center at most the same order .The estimated running times are 10,8,2,4 ms. The priorities are 3,4,1,2. Time quantum is 2 ms. Draw gantt chart and compute average waiting time and average turnaround time to following algorithm

1)FCFS 2)SJF(non preemptive ),3)priority 4)Round robin

1. For the following set of processes find the average waiting time and average turnaround time using gantt chart for 1)SJF 2)Priority scheduling(Smaller number implies higher priority)

Process burst time priority

P1 5 5

P2 3 4

P3 8 3

P4 2 1

P5 1 2

1. Consider following process with CPU burst time given in milliseconds:

| Process | Burst Time | Priority |
| --- | --- | --- |
| P1 | 10 | 3 |
| P2 | 1 | 1 |
| P3 | 2 | 3 |
| P4 | 1 | 4 |
| P5 | 5 | 2 |

Processes are arrived in P1, P2, P3, P4, P5 order, all at time 0.

* Draw Gantt charts to show execution using FCFS, SJF, non-preemptive priority (smaller number implies higher priority), and round-robin (quantum = 1) scheduling.
* Also calculate turnaround time for each scheduling algorithm.
* What is the waiting time of each process for each one of the above scheduling algorithms?

1. Consider the following set of four processes with length of CPU burst given in MS:

| Process | Burst Time |
| --- | --- |
| P1 | 24 |
| P2 | 3 |
| P3 | 3 |

* Compute the waiting time and average turnaround time for the above processes using FCFS scheduling algorithm.

1. Consider the set of processes with arrival time, CPU burst time (in milliseconds), and priority shown below (lower number represents higher priority):

| Process | Arrival Time | Burst Time | Priority |
| --- | --- | --- | --- |
| P1 | 0 | 10 | 3 |
| P2 | 1 | 1 | 1 |
| P3 | 2 | 2 | 4 |
| P4 | 3 | 1 | 5 |
| P5 | 4 | 5 | 2 |

* Write the Gantt chart and solve the average waiting time and average turnaround time for:

i) SJF Scheduling (Preemptive)  
ii) Priority Scheduling (Preemptive)

(NOTE: Consider Arrival Time for both algorithms).

**Assignment Questions:**

Module1: 1,5,6,7,8

Module2: 3,4,6,7,13