Bapuji Educational Association ®
Bapuji Institute of Engineering and Technology, Davangere–577 004
An Autonomous Institute Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka.
Department of Computer Science & Engineering
Operating Systems (BCSPCC304)
Question Bank

	Module-1	**COs**
1.	What is an operating system? What is the main purpose of an operating system? What are the different operating systems?	CO1
2.	Explain dual mode operations in OS with a neat schematic diagram.	CO1
3.	Explain the following Terms i)Interrupts and Traps ii) Graceful Degradation and Fault Tolerant system iii) Interrupt Driven I/O and Direct Memory Access (DMA)	CO1
4.	What are the services of OS? Discuss them with respect to Users' and Designers' perspective.	CO1
5.	Illustrate the working of Virtual Machine [VM] concept with a neat diagram and mention its complexities and benefits.	CO1
6.	Differentiate between the following i) Multiprocessing, Multiprogramming and Multitasking. ii)Symmetric multiprocessing and Asymmetric multiprocessing	CO1
7.	What are system calls and system programs? Illustrate types of system calls with a suitable example.	CO1
8.	With a neat diagram explain simple and layered OS and mention advantages and Disadvantages of both structures. What is the main advantage of the microkernel approach to system design?	CO1
9.	Explain distributed systems and different computing environments.	CO1
10.	What is Virtual machine? Explain with diagram and what is the main advantage for an OS Designer and user by using Virtual Machine architecture? Why is a Just-In-Time Compilers useful for executing the Java Programs.	CO1
11.	List and Explain the different categories of system programs.	CO1
	Module-2	
12.	How do you differentiate thread from process? What are the advantages of threads? Explain different multithread models with necessary diagrams.	CO2
13.	Discuss the Threading issues with multithreading models.	CO2
14.	What is context switching and dispatch latency? Describe the context switching with a neat diagram.	CO2
15.	i) What are the criteria can be used to measure the performance of the CPU-scheduling Algorithms? Explain. ii.) When CPU-scheduling takes place? Discuss the functions of different types of schedulers used during scheduling process.	CO2
16.	What is IPC? What are the benefits of IPC? Discuss IPC different models with suitable diagrams.	CO2
17.	Explain direct and indirect communication with message passing system.	CO2
18.	a) What is a process? With the help of state transition diagram, explain the	CO2

<table>
<tr><td></td><td>various states of Process and explain the process control block (PCB) structure.</td><td></td></tr>
<tr><td>19.</td><td>Explain different types of scheduler in detail with queueing diagram.</td><td>CO2</td></tr>
<tr><td>20.</td><td>What is a Thread? What are the differences between process and thread?</td><td>CO2</td></tr>
<tr><td>21.</td><td>What are the benefits of multithreaded programming?</td><td>CO2</td></tr>
<tr><td>22.</td><td>For the following set of processes:
<table>
<tr><td>Process</td><td>ArrivalTime</td><td>BurstTime</td><td>Priority</td></tr>
<tr><td>P1</td><td>0</td><td>12</td><td>6</td></tr>
<tr><td>P2</td><td>2</td><td>8</td><td>4</td></tr>
<tr><td>P3</td><td>3</td><td>6</td><td>2</td></tr>
<tr><td>P4</td><td>4</td><td>9</td><td>1</td></tr>
<tr><td>P5</td><td>6</td><td>5</td><td>5</td></tr>
</table>
i. Draw the Gantt charts that illustrates the execution of these processes using FCFS, SJF (preemptive and non-preemptive), priority (preemptive and non-preemptive) and Round Robin (quantum time = 2).
ii. Find waiting time of each process and average waiting time for each of the scheduling algorithms.
iii. Find turnaround around time of each process and average turnaround time for each of the scheduling algorithms.
iv. Which algorithm gives minimal average waiting time? Why?</td><td>CO2</td></tr>
<tr><td>23.</td><td>Following is the snapshot of CPU (with CPU burst given in milliseconds)
Draw the Gantt chart and calculate the avg waiting time, avg TAT and avg Execution time for (1)RR scheduling With Time quantum = 1ms
(2) Pre-emptive and Non –Pre-emptive SJF (SRTF scheduling)
<table>
<tr><td></td><td>Arrival time</td><td>Burst time</td></tr>
<tr><td>P1</td><td>0</td><td>1.5</td></tr>
<tr><td>P2</td><td>1.5</td><td>3</td></tr>
<tr><td>P3</td><td>3</td><td>1</td></tr>
<tr><td>P4</td><td>3</td><td>7.5</td></tr>
</table></td><td>CO2</td></tr>
<tr><td>24.</td><td>Consider the following set of processes with the CPU burst time in millisecond.
Arrival time Burst time priority
P1 0 7 3
P2 3 2 2
P3 4 3 1
P4 4 1 1
P5 5 3 3</td><td>CO2</td></tr>
</table>

<table>
<tr><td></td><td>Draw the Gantt chart and calculate the avg waiting time,avg TAT and avg Execution time for (i) FCFS (ii) pre-emptive and non-pre- emptive priority scheduling(where high priority=1)</td><td></td></tr>
<tr><td>25.</td><td>For the below process compute the average waiting time using RR(Q=2), FCFS, SJF scheduling algorithms.
<table>
<tr><td>Process</td><td>Arrival Time</td><td>Burst Time</td></tr>
<tr><td>P1</td><td>0</td><td>9</td></tr>
<tr><td>P2</td><td>0</td><td>5</td></tr>
<tr><td>P3</td><td>2</td><td>6</td></tr>
<tr><td>P4</td><td>3</td><td>7</td></tr>
</table></td><td>CO2</td></tr>
<tr><td>26.</td><td>Calculate the average waiting time by drawing Gantt chart using FCFS (First Come First Serve), SRTF(Shortest Remaining Time First), RR(Round Robin)[q=2ms] algorithms.(8)
<table>
<tr><td>Process</td><td>Arrival Time</td><td>Burst Time</td></tr>
<tr><td>P1</td><td>0</td><td>9</td></tr>
<tr><td>P2</td><td>1</td><td>4</td></tr>
<tr><td>P3</td><td>2</td><td>9</td></tr>
<tr><td>P4</td><td>3</td><td>5</td></tr>
</table></td><td>CO2</td></tr>
<tr><td>27.</td><td>Consider the following set of processes in the table
<table>
<tr><td>Process</td><td>Arrival Time (m sec)</td><td>Burst Time (m sec)</td><td>Priority</td></tr>
<tr><td>P1</td><td>0</td><td>10</td><td>4</td></tr>
<tr><td>P2</td><td>3</td><td>5</td><td>2</td></tr>
<tr><td>P3</td><td>3</td><td>6</td><td>6</td></tr>
<tr><td>P4</td><td>5</td><td>3</td><td>3</td></tr>
</table></td><td>CO2</td></tr>
<tr><td>28.</td><td>Consider the following set of processes with the length of the CPU burst given in milliseconds.
<table>
<tr><td>Process</td><td>Burst Time</td><td>Priority</td></tr>
<tr><td>P1</td><td>10</td><td>3</td></tr>
<tr><td>P2</td><td>1</td><td>1</td></tr>
<tr><td>P3</td><td>2</td><td>3</td></tr>
<tr><td>P4</td><td>1</td><td>4</td></tr>
<tr><td>P5</td><td>5</td><td>2</td></tr>
</table>
The processes are assumed to have arrived in the order P1, P2,P3,P4,P5 all at time 0.
I. Draw four Gantt charts that illustrate the execution of these processing using the following scheduling algorithms: FCFS, SJF, Nonpreemptive priority and RR(quantum=1)</td><td>CO2</td></tr>
</table>

<table>
<tr><td></td><td>II. What is the turnaround time of each process for each of the scheduling algorithms in part a?
III. What is the waiting time of each process for each of the scheduling algorithms in part a?
IV. Which of the algorithms in part a results in the minimum average waiting time?</td><td></td></tr>
<tr><td colspan="2">Module-3</td><td></td></tr>
<tr><td>29.</td><td>Define Semaphores. Explain its usage and implementation.</td><td>CO3</td></tr>
<tr><td>30.</td><td>Explain the critical section problem. List and explain the requirement to be met by a solution to critical section problem.</td><td>CO3</td></tr>
<tr><td>31.</td><td>Describe the Bounded-buffer problem and give a solution for the same using semaphores. Write the structure of producer and consumer processes.</td><td>CO3</td></tr>
<tr><td>32.</td><td>What is race condition? Explain Reader’s writer’s problem with semaphores</td><td>CO3</td></tr>
<tr><td>33.</td><td>What is lock. How TestAndSet() and Swap() instructions help to solve the critical section problem.</td><td>CO3</td></tr>
<tr><td>34.</td><td>Explain Dinning Philosopher problem with solution.</td><td>CO3</td></tr>
<tr><td>35.</td><td>What are deadlocks? What are its characteristics? Explain the necessary conditions for its occurrence.</td><td>CO3</td></tr>
<tr><td>36.</td><td>What is Resource Allocation Graph (RAG)? Explain how RAG is very useful in describing deadly embrace (deadlock) by considering your own example.</td><td>CO3</td></tr>
<tr><td>37.</td><td>With the help of a system model, explain a deadlock and explain the necessary conditions that must hold simultaneously in a system for a deadlock to occur.</td><td>CO3</td></tr>
<tr><td>38.</td><td>Explain how deadlock can be prevented by considering four necessary conditions cannot hold.</td><td>CO3</td></tr>
<tr><td>39.</td><td>Using Banker's algorithm determines whether the system is in a safe state. Consider the following snapshot of a system
<table>
<tr><td>Process</td><td colspan="3">Alloacation</td><td colspan="3">Max</td><td colspan="3">Available</td></tr>
<tr><td></td><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td></tr>
<tr><td>P0</td><td>0</td><td>0</td><td>2</td><td>0</td><td>0</td><td>4</td><td>1</td><td>0</td><td>2</td></tr>
<tr><td>P1</td><td>1</td><td>0</td><td>2</td><td>2</td><td>0</td><td>1</td><td></td><td></td><td></td></tr>
<tr><td>P2</td><td>1</td><td>3</td><td>5</td><td>1</td><td>3</td><td>7</td><td></td><td></td><td></td></tr>
<tr><td>P3</td><td>6</td><td>3</td><td>2</td><td>8</td><td>4</td><td>2</td><td></td><td></td><td></td></tr>
<tr><td>P4</td><td>1</td><td>4</td><td>3</td><td>1</td><td>5</td><td>7</td><td></td><td></td><td></td></tr>
</table>
Find the need matrix and calculate safe sequence using Banker’s algorithm.</td><td>CO3</td></tr>
<tr><td>40.</td><td>How is a system recovered from deadlock? Explain the different methods used to recover from deadlock.</td><td>CO3</td></tr>
<tr><td>41.</td><td>Explain deadlock detection with algorithm and example</td><td>CO3</td></tr>
<tr><td colspan="3">Module4</td></tr>
<tr><td>42.</td><td>Explain segmentation with an example.</td><td>CO4</td></tr>
<tr><td>43.</td><td>Explain with a diagram, how TLB is used to solve the problem of simple paging scheme.</td><td>CO4</td></tr>
</table>

44.	Explain contiguous memory allocation with example.	CO4
45.	Distinguish between: 1.Logical address space and physical address space. 2. Paging and segmentation. 3. Internal fragmentation and external fragmentation.	CO4
46.	What is fragmentation? Explain two types of memory fragmentation	CO4
47.	What is swapping? Explain in detail.	CO4
48.	Discuss demand paging and copy on write with neat diagram.	CO4
49.	Consider the following page reference string 1,2,3,5,2,3,5,7,2,1,2,3,8,6,4,3,2,2,3,6. Assuming there are three memory frames, how many faults would occur in the case of i) LRU ii) Optimal algorithm. iii) FIFO Note that initially all frames are empty.	CO4
	Module5	
50.	Explain various allocation methods in implementing file systems	CO5
51.	Explain briefly the various operations performed on files.	CO5
52.	Describe the various directory structures	CO5
53.	Explain the various access method of files.	CO5
54.	Suppose the position of cylinder is at 53. The disk drive has cylinders numbered from 0-199. The queue of pending requests in FIFO order is: 98,183,37,122,14,124,65,67. Starting from the current head position, what is the total distance traveled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK. Illustrate with figures in each case.	CO5
55.	Explain various file protection mechanisms.	CO5
56.	Explain Access Matrix method of system protection.	CO5