Model Question Paper- I

CBCS SCHEME

Sixth Semester B.E Degree Examination_____

Fundamentals of Operating Systems (BCS654B)

TIME: 03 Hours **Max.Marks:100**

1. Note: *Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE***
2. *M: Marks, L: Bloom's level, C: Course outcomes.*

			M	L	C
		Module - 1			
Q.1	**a**	Define Operating System. Explain how a modern computer system works.	**5**	**L2**	**CO1**
	b	Explain different types of computer system architecture.	**7**	**L2**	**CO1**
	c	Explain briefly process management and memory management.	**8**	**L2**	**CO1**
		OR			
Q.2	**a**	Explain different types of system calls supported by operating system.	**7**	**L2**	**CO1**
	b	Explain the operating system services that are helpful to the user and system.	**10**	**L2**	**CO1**
	c	Write a short note on Application Program Interface (API).	**3**	**L2**	**CO1**
		Module - 2	**M**	**L**	**C**
Q.3	**a**	Define Process. Discuss the layout of a process in memory.	**6**	**L2**	**CO2**
	b	Define Process State. Explain the states of a process with a transition diagram and process control block.	**10**	**L2**	**CO2**
	c	Explain the two fundamental models of interprocess communication.	**4**	**L2**	**CO2**
		OR			
Q.4	**a**	Discuss the benefits of multithreaded programming.	**4**	**L2**	**CO2**
	b	Define thread. Discuss the three main thread libraries supported directly by the operating system.	**7**	**L2**	**CO2**
	c	Explain different types of multithreading models.	**9**	**L2**	**CO2**
		Module - 3	**M**	**L**	**C**
Q.5	**a**	Calculate average waiting and turnaround times by drawing the Gantt chart using FCFS and RR (q=3ms).	**10**	**L3**	**CO3**
	b	Explain the five scheduling criteria for comparing CPU-scheduling algorithms.	**5**	**L1**	**CO3**
	c	Write a short note on Contention Scope and Pthread Scheduling.	**5**	**L2**	**CO3**
		OR			

Processes	**Arrival Time**	**Burst Time**
P1	0	4
P2	1	5
P3	3	9
P4	5	3

Model Question Paper- I

<table>
<tr><td>Q.6</td><td>a</td><td>Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using SRTF and the Priority scheduling algorithm.
<table>
<tr><th>Processes</th><th>Arrival Time</th><th>Burst Time</th><th>Priority</th></tr>
<tr><td>P1</td><td>0</td><td>9</td><td>2</td></tr>
<tr><td>P2</td><td>1</td><td>5</td><td>1</td></tr>
<tr><td>P3</td><td>3</td><td>6</td><td>4</td></tr>
<tr><td>P4</td><td>5</td><td>3</td><td>3</td></tr>
</table></td><td>10</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>b</td><td>Define Critical Section problem. Explain the three requirements must satisfy the solution to the critical-section problem.</td><td>4</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>c</td><td>Define Semaphore. Discuss the usage and implementation of Semaphore.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td colspan="2">Module - 4</td><td>M</td><td>L</td><td>C</td></tr>
<tr><td>Q.7</td><td>a</td><td>Discuss the issues of memory protection in contiguous memory allocation.</td><td>5</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b</td><td>Define Deadlock. Explain different methods to recover from deadlock.</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c</td><td>Explain Resource-Allocation Graph with examples.</td><td>8</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td colspan="2">OR</td><td></td><td></td><td></td></tr>
<tr><td>Q.8</td><td>a</td><td>Consider the following snapshot of the system:
Answer the following questions using Banker’s algorithm:
a. What is the content of the need matrix?
b. Is the system in a safe state?
If yes, mention the safe sequence. If a request from process P1 arrives for (0,4,2,0) can the request be granted immediately?
<table>
<tr><th>Process</th><th colspan="4">Allocation</th><th colspan="4">Max</th><th colspan="4">Available</th></tr>
<tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td></tr>
<tr><td>P_0</td><td>0</td><td>0</td><td>1</td><td>2</td><td>0</td><td>0</td><td>1</td><td>2</td><td>1</td><td>5</td><td>2</td><td>0</td></tr>
<tr><td>P_1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>7</td><td>5</td><td>0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P_2</td><td>1</td><td>3</td><td>5</td><td>4</td><td>2</td><td>3</td><td>5</td><td>6</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P_3</td><td>0</td><td>6</td><td>3</td><td>2</td><td>0</td><td>6</td><td>5</td><td>2</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P_4</td><td>0</td><td>0</td><td>1</td><td>4</td><td>0</td><td>6</td><td>5</td><td>6</td><td></td><td></td><td></td><td></td></tr>
</table></td><td>10</td><td>L3</td><td>CO4</td></tr>
<tr><td></td><td>b</td><td>Explain in detail how deadlocks can be prevented.</td><td>10</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td colspan="2">Module - 5</td><td>M</td><td>L</td><td>C</td></tr>
<tr><td>Q.9</td><td>a</td><td>Consider the page reference string: 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,7,1 ,1,0 for a memory with three page frames. Determine the number of page faults using the FIFO, Optimal, and LRU replacement algorithms. Which algorithm is most efficient?</td><td>8</td><td>L3</td><td>CO5</td></tr>
<tr><td></td><td>b</td><td>Define Paging. Explain the structure of the page table with a suitable diagram.</td><td>8</td><td>L2</td><td>CO5</td></tr>
<tr><td></td><td>c</td><td>Write a short note on Copy-on-Write technique.</td><td>4</td><td>L2</td><td>CO5</td></tr>
<tr><td></td><td colspan="2">OR</td><td></td><td></td><td></td></tr>
<tr><td>Q.10</td><td>a</td><td>Discuss the file attributes and file operations supported in operating system.</td><td>10</td><td>L2</td><td>CO5</td></tr>
<tr><td></td><td>b</td><td>Explain the file access methods used to access information</td><td>6</td><td>L2</td><td>CO5</td></tr>
<tr><td></td><td>c</td><td>Write a short note on demand paging.</td><td>4</td><td>L2</td><td>CO5</td></tr>
</table>