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Code No. : 15645 S N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (I.T.) V-Semester Supplementary Examinations, June-2023

Operating Systems

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO																		
1.	List any four functionalities of operating system.	2	1	1	1																		
2.	What is the goal of short term scheduler?	2	2	1	1																		
3.	List any four advantages of non-contiguous memory allocation?	2	2	2	1																		
4.	What is thrashing? Give the reasons for thrashing.	2	3	2	1																		
5.	Define race condition and explain with an example.	2	1	3	1																		
6.	What are the necessary conditions for the occurrence of deadlock?	2	1	3	1																		
7.	Give different methods for directory implementation.	2	2	4	1																		
8.	List different RAID Levels.	2	1	4	1																		
9.	Give different components of a Linux system.	2	3	5	1																		
10.	How energy efficiency is achieved in Windows 7 System?	2	3	5	1																		
Part-B (5 × 8 = 40 Marks)																							
11. a)	What is the purpose of interrupts? How an interrupt does is different from a trap? How the traps are used by the user programs?	4	3	1	1																		
b)	Given the following set of processes, find the average waiting time, turnaround time and response time for (i) SRTF and (ii) Round Robin CPU scheduling algorithms. (Assume time quantum of 3 units)	4	3	1	2																		
<table border="1"> <thead> <tr> <th>Process</th> <th>Arrival time</th> <th>CPU burst time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>0</td> <td>5</td> </tr> <tr> <td>P2</td> <td>2</td> <td>3</td> </tr> <tr> <td>P3</td> <td>3</td> <td>4</td> </tr> <tr> <td>P4</td> <td>5</td> <td>8</td> </tr> <tr> <td>P5</td> <td>6</td> <td>6</td> </tr> </tbody> </table>						Process	Arrival time	CPU burst time	P1	0	5	P2	2	3	P3	3	4	P4	5	8	P5	6	6
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12. a)	Explain about the working of paging system for main memory management with a neat diagram. Derive an expression for effective memory access time for a paging system with TLB. (No virtual memory)	5	1	2	1																		
b)	Given the following page reference string 3 4 2 1 5 3 2 5 7 4 6 5 3 2 3 4 and given four empty frames, find the number of page faults that can occur for each of the (i) FIFO (ii) Optimal and (iii) LRU page replacement algorithms.	3	3	2	2																		

13. a)	Describe dining philosophers' problem and provide a deadlock free solution using semaphores. Prove the correctness of the solution.	4	3	3	1																																																																					
b)	Given the following snapshot of the system determine whether the system is in safe state or not. If process P1 generates a request <1, 2, 0> for the resources, can this request be granted immediately?	4	3	3	2																																																																					
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Process</th> <th colspan="3">Allocation</th> <th colspan="3">Max</th> <th colspan="3">Available</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>A</th> <th>B</th> <th>C</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>2</td> <td>3</td> <td>2</td> <td>3</td> <td>5</td> <td>3</td> <td>2</td> <td>2</td> <td>0</td> </tr> <tr> <td>P2</td> <td>2</td> <td>1</td> <td>2</td> <td>3</td> <td>2</td> <td>3</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P3</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> <td>2</td> <td>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P4</td> <td>0</td> <td>2</td> <td>2</td> <td>2</td> <td>4</td> <td>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P5</td> <td>1</td> <td>3</td> <td>3</td> <td>2</td> <td>4</td> <td>4</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						Process	Allocation			Max			Available			A	B	C	A	B	C	A	B	C	P1	2	3	2	3	5	3	2	2	0	P2	2	1	2	3	2	3				P3	2	2	2	3	2	2				P4	0	2	2	2	4	2				P5	1	3	3	2	4	4			
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P5	1	3	3	2	4	4																																																																				
14. a)	Give different file allocation methods and explain their relative advantages and disadvantages.	4	2	4	1																																																																					
b)	Consider a file system that uses inodes to represent files. Disk blocks are 8 K.B in size, and a pointer to a disk block requires 4 bytes. This file system has 12 direct disk blocks, as well as single, double, and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system?	4	3	4	2																																																																					
15. a)	Discuss how Inter Process Communication is implemented in Linux.	4	1	5	1																																																																					
b)	Give different synchronization primitives available in a Windows 7 system and explain in detail.	4	2	5	1																																																																					
16. a)	Describe the issues that need to be considered while designing multithreaded programs.	4	1	1	1																																																																					
b)	Describe different LRU approximation page replacement algorithms.	4	2	2	1																																																																					
17.	Answer any <i>two</i> of the following:																																																																									
a)	Describe readers-writers problem and design a fair solution.	4	3	3	2																																																																					
b)	How access matrix model can be used for implementing the protection system?	4	2	4	1																																																																					
c)	Explain about the functionality of clone () system call of Linux in detail.	4	2	5	1																																																																					

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	38%
iii)	Blooms Taxonomy Level - 3 & 4	42%
