SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

Minor I (Even Semester) – 2017-18

Entry No: | 1 | 6 | B | C | S | 0 | 2 | 9 | |

Total number of pages:[1]

Total number of questions: 4

B.Tech. || CSE || Sem IV

Operating System

Subject Code: CSL2051

Time allowed: 1 Hour Max Marks: 20

Important Instructions:

- **Answer all questions.**

Q1. What do you mean by an operating system? Discuss the various functions of an operating system. [4]

Q2. (a) Describe the difference between *external* and *internal* fragmentation

(b) What is the main purpose of swapping? Can a process be run by an Operating System if some of its pages are swapped out? [2, 3]

Q3. (a) What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

(b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. (i) How many bits are there in the logical address? (ii) How many bits are there in the physical address? [3, 2]

Q4. Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the following replacement algorithms, assuming four frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

(i) LRU replacement (ii) FIFO replacement (iii) Optimal replacement [6]

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

Minor II (Even Semester) – 2017-18

Entry No: | | | | | | | | | |

Total number of pages:[1]

Total number of questions:[4]

B.Tech. || CSE || Sem IV

Operating System

Subject Code: CSL2051

Time allowed: 1 Hour Max Marks: 20

Important Instructions:

- **Answer all questions.**

Q1. (a) Give an example of an application in which data in a file should be accessed in the following order: a. Sequentially b. Randomly

(b) List disadvantages of using a single directory. [2]

Q2. Explain any 3 allocation schemes that exist for allocating secondary storage to files. [5]

Q3. Compare I/O based on polling with interrupt-driven I/O. In what situation would you favour one technique over the other? [5]

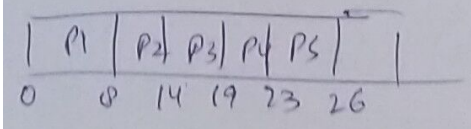
Q4. Assume the following processes arrive for execution at the time indicated and also mentioned with the length of CPU- burst time given in milliseconds.

Job	Burst time (ms)	Arrival Time (ms)	Priority
P1	8	0	2
P2	6	0	1
P3	5	0	0 [Low]
P4	4	1	3
P5	3	2	4 [High]

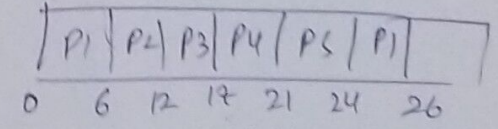
(I) Draw Gantt chart illustrating the execution of these processes using FCFS, Round Robin (quantum=6), SJF and Priority (preemptive) scheduling algorithm.

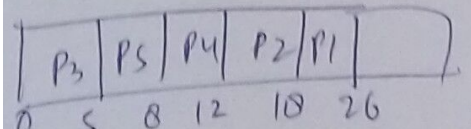
(II) (ii) Calculate the average waiting time and average turn around time for each of the above scheduling algorithm. [8]

FCFS

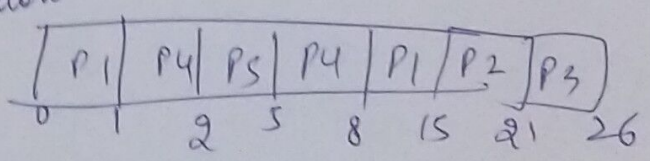


RR





Preemptive



SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Computer Science & Engineering
B. Tech. (CSE) Major Examination (Even) 2017-18

Entry No: 1 6 B C S 0 2 9 | **Total Number of Pages: [01]**
Date:29/04/2018 | **Total Number of Questions: [07]**

Course Title: Operating System
Course Code: CSL2051

Time Allowed: 3.0 Hours **Max Marks: [50]**

Instructions / NOTE

i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume any missing data to suit the case / derivation / answer.
iv. Use of IS Code (IS 456: 2000) is permissible in examination.

Section - A

Q1. (a) List the features of Linux system. [01]

(b) What are the advantages of multiprocessor system? [01]

(c) What is a system call? [01]

(d) What is virtual memory? [01]

(e) Define Cooperating Process. [01]

(f) Differentiate the various file access methods. [01]

Q2. (a) Discuss operating system components and their functionalities. [04]

(b) State the necessary conditions for deadlock avoidance. [04]

Section – B

Q3. (a) State and discuss the implementation of reader's writer's problem using semaphores. [04]
(b) Describe the two common process scheduling policies used in OS design. [04]

Q4. Discuss the problems faced in the design and implementation of an operating system. [06]

Q5. Apply Optimal and LRU page replacement algorithms. Use 3 frames and consider the following reference string. Find the number of page faults.

5, 2, 4, 6, 1, 3, 6, 4, 1, 3, 5, 1. [06]

Q6. Suppose the read/write head is at track 97, moving towards 199(the highest numbered track) and the disk request queue contains read/write requests for sectors on track 84, 155, 103, 96, 197 respectively.

What is the total number of head movements in FCFS, SCAN and LOOK strategies? [06]

Q7. Consider the following snapshot of a system. Execute barker's algorithm

Process	Allocation				Max.				Available			
P0	1	2	0	1	2	3	4	3	2	3	3	2
P1	2	2	0	1	3	4	2	4				
P2	4	5	7	1	5	7	8	5				
P3	1	1	0	0	2	2	0	0				
P4	2	3	4	4	3	4	5	5				

(i) What is the content of need matrix?

(ii) Is the system in a safe state? If it is safe, write the safe sequence.

(iii) If a request from P1 arrives for (1, 2, 1, 0) can the request be immediately granted? If granted, write the sequence of the processes. [1,3,6]

Course Outcomes

After Successful Completion of this Course, students shall be able to;

(1) To learn different types of operating systems along with concept of file management systems and CPU scheduling algorithms used in operating system.

(2) Students will have knowledge of memory management, I/o Devices management, process scheduling, process synchronization and deadlock handling algorithms.

(3) Students will be able to analyze and implement various algorithms used for management, scheduling, allocation and communication in operating system.

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Computer Science & Engineering
B.Tech. (CSE) Minor-I Examination (Even) 2018-19

Entry No: 17BCS0945
Date: 07/02/2019

Total Number of Pages: [01]
Total Number of Questions: [04]

Course Title: Operating System
Course Code: CSL 2051

Time Allowed: 1.5 Hours **Max Marks: [20]**

Instructions / NOTE

i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume an appropriate data / information, wherever necessary / missing.

	Section – A		
Q1.	For each of the following pairs of terms, define each term, also clarify the key differences between the two terms. (i) "process" and "processor" (ii) "C program" and "shell program" (iii) "pre-emptive" and "non-preemptive" (iv) "CPU-bound" and "I/O-bound" (v) "page" and "frame" (vi) "file" and "directory"	[06]	CO1
	Section – B		
Q2.	What is an Operating System? List and briefly describe any five of the typical services provided by an OS.	[02]	CO2
Q3.	(a) In memory management, two different types of fragmentation can occur, namely internal fragmentation and external fragmentation. Clarify the differences between these two types of fragmentation. Which one is solved by the use of fixed-size page frames? (b) In pure on-demand paging, a page replacement policy is used to manage system resources. Suppose that a newly-created process has 3 page frames allocated to it, and then generates the page references indicated below. A B C B A D A B C D A B A C B D (i) How many page faults would occur with FIFO page replacement? (ii) How many page faults would occur with LRU page replacement? (iii) How many page faults would occur with Optimal page replacement?	[04]	CO3
Q4.	Suppose that the following processes arrive as indicated for scheduling and execution on a single CPU. [Highest number represent lowest priority] Job Burst time (ms) Arrival Time (ms) Priority P1 12 0 3	[08]	CO4

	P2	4	2	3		
	P3	2	5	1[High]		
	P4	10	8	3[Low]		
	P5	6	10	2		
	(i) Draw a Gantt chart showing FCFS scheduling for these processes, and calculate the average waiting time.					
	(ii) Draw a Gantt chart showing non-preemptive SJF scheduling for these processes, and calculate the average waiting time.					
	(iii) Draw a Gantt chart showing RR (quantum = 4) scheduling for these processes, and calculate the average waiting time.					
	(iv) Draw a Gantt chart showing (preemptive) PRIORITY scheduling for these processes, and calculate the average waiting time.					

Course Outcomes

CO1. Students will be able to define the operating system related terms.

CO2. Students will learn different types of operating systems along with concept of file management systems and CPU scheduling algorithms used in operating system.

CO3. Students will have knowledge of memory management, I/o Devices management, process scheduling, process synchronization and deadlock handling algorithms.

CO4. Students will be able to analyze and implement various algorithms used for management, scheduling, allocation and communication in operating system.

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	Q1	06	50
CO2	Q2	02	
CO3	Q3(a),(b)	04	
CO4	Q4	08	

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Computer Science & Engineering
B. Tech(CSE) Minor#2Examination (Even) 2018-19

Entry No: 17BCS045 **Total Number of Pages:[01]**
Date: 19/03/2019 **Total Number of Questions: [04]**
Course Title: Operating System/Operating system with Linux
Course Code: CSL 2051/CSL 7055

Time Allowed: 1.5 Hours **Max Marks: [20]**

Instructions / NOTE

i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume an appropriate data / information, wherever necessary / missing.

Q1.	(i)	What is the main limitation of Resource Allocation Graph used for deadlock detection, as compared to Banker's algorithm?	[06]	CO2
	(ii)	Explain, in general, what is a DMA transfer.		
	(iii)	What are the differences between the polling technique and the interrupt technique, when communicating with devices? For which kind of transfers / devices is the polling technique more efficient? Less efficient?		
Q2.	(i)	Describe the elevator disk scheduling algorithm What is the advantage of the elevator algorithm over the shortest-seek time-first algorithm?	[04]	CO3
	(ii)	Compare and contrast among Contiguous, Linked and Indexed file allocation method.		
Q3.	Consider the following resource allocation policy: Requests for and releases of resources are allowed at any time. If a request for resources cannot be satisfied because the resources are not available, then we check any processes that are blocked, waiting for resources. If they have the desired resources, then these resources are taken away from them and are given to the requesting process. The vector of resources for which the waiting process is waiting is increased to include the resources that were taken away. If the resources needed by a blocked process become available, the process is put back on the ready queue. For example, consider a system with three resource types and the vector Available initialized to (4,2,2). • If process P0 asks for (2,2,1), it gets them. • If P1 asks for (1,0,1), it gets them. • Then, if P0 asks for (0,0,1), it is blocked (resource not available). • If P2 now asks for (2,0,0), it gets the available one (1,0,0) and one that was allocated to P0 (since P0 is blocked). P0's Allocation vector goes down to (1,2,1), and its Need vector goes up to (1,0,1). (i) With this resource allocation policy, can deadlock occur? If so, give an example. If not, which necessary condition cannot occur? (ii) Can starvation occur?		[05]	CO4
Q4.	Consider the following snapshot of a system (P=Process, R=Resource):		[05]	CO5

Available			
RA	RB	RC	RD
8	5	9	7

Maximum Demand				
	RA	RB	RC	RD
P0	3	2	1	4
P1	0	2	5	2
P2	5	1	0	5
P3	1	5	3	0
P4	3	0	3	3

Current Allocation				
	RA	RB	RC	RD
P0	1	0	1	1
P1	0	1	2	1
P2	4	0	0	3
P3	1	2	1	0
P4	1	0	3	0

Answer the following questions using banker's algorithm:

(i) Calculate the *Needs* matrix:
(ii) Is the system in a safe state? If so, show a safe order in which the processes can run.
(iii) Can a request of one instance of RA by Process P0 be granted safely according to Banker's algorithm?

Request = RA RB RC RD
P0 1 0 0 0

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Course Outcomes

CO1: Students will be able to define the operating system related terms.
CO2: Students will learn different types of operating system along with concept of file management systems and CPU scheduling algorithms used in operating system.
CO3: Student will have knowledge of memory management, I/O devices management, Process synchronization and deadlock handling algorithms.
CO4: Students will be able to analyze and implement various algorithms used for management, scheduling, allocation and communication in operating system.

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1			54
CO2	Q1,Q2	10	
CO3	Q4	5	
CO4	Q3	5	

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Computer Science & Engineering
B.Tech. (CSE) Major Examination (Even) 2018-19

Entry No: 17BCS045
Date: 13/05/2019

Total Number of Pages: [01]
Total Number of Questions: [08]

Course Title: Operating System
Course Code: CSL 2051

Time Allowed: 3 Hours **Max Marks: [50]**

Instructions / NOTE

i. Attempt All Questions.
ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
iii. Assume an appropriate data / information, wherever necessary / missing.

	Section – A		
Q1.	(i) Which of the following is not a solution to thrashing? A. Running fewer processes B. Increasing the speed of the CPU C. Increasing the size of physical memory D. Rewriting programs to have better locality (ii) Which disk block allocation scheme will require the most I/O operations for random access to a large file? A. Indexed allocation B. Linked allocation C. Contiguous allocation D. I-node allocation E. Each scheme requires approximately the same number of I/O operations (iii) Which of the following are shared between threads in the same process? A. registers B. page table C. stack D. stack pointer E. None of these are shared (iv) Device drivers are implemented to interface A. character devices B. block devices C. network devices D. all of the mentioned	[04]	CO1
Q2.	(a) What is the difference between a process and a thread? Describe some benefits of thread. (b) What is deadlock? What is starvation? How do they differ from each other?	[06]	CO2
	Section – B		
Q3.	The development of operating systems can be seen to be closely associated with the development of computer hardware. Describe the main developments of operating systems that occurred at each computer generation.	[06]	CO2
Q4.	(a) Describe the Producer Consumer problem. (b) Describe the problems associated with producing a software solution to the producer/consumer problem. (c) Show a possible solution to the above problem, stating any assumptions that you make.	[06]	CO3
Q5.	(a) Given memory partitions of 100k, 500k, 200k, 300k and 600k(in order), how would each of first fit, best fit and worst fit algorithms places processes of 212k,417k,112k and 426k(in order)? Which algorithm makes the most efficient use of memory? (b) A machine has 48-bit virtual addresses and 32-bit physical addresses. Pages are 8 KB. How many entries are needed for the page table?	[06]	CO3

	(c) A system has a 32-bit logical address space. Each address refers to a byte in memory. If the page size is 16 KB, and main memory size is 256 MB. What is the minimal size (in bytes) of the page table?		
Q6.	(a) Given a disk with 200 tracks, where track requests are received in the following order 55, 58, 39, 18, 90, 160, 150, 38, 184. The starting position for the arm is at track 100. Calculate the number of tracks crossed when the following algorithms are used • First Come First Serve • Shortest Seek First • The elevator algorithm starting in the direction UP. (b) Describe the following scheduling algorithms • Non-preemptive, First Come First Served (FCFS) • Round Robin (RR) • Multilevel Feedback Queue Scheduling How can RR be made to mimic FCFS? The Shortest Job First (SJF) scheduling algorithm can be proven to produce the minimum average waiting time. However, it is impossible to know the burst time of a process before it runs. Suggest a way that the burst time can be estimated.	[06]	CO3
Q7.	Two processes, P_0 and P_1, are to be run and they update a shared variable. This update is protected by Petersons solution to the mutual exclusion problem (a) Write Petersons algorithm. (b) P_0, attempts to enter its critical region. Show the state of the variables that are created/updated. Will P_0 be allowed to enter its critical region? If not, why not? (c) P_1, attempts to enter its critical region. Show the state of the variables that are created/updated. Will P_1 be allowed to enter its critical region? If not, why not? (d) P_0 leaves its critical region. What effect does this have on the variables? (e) Assume no processes are running and P_0 and P_1 try to enter their critical region at ***exactly*** the same time. What will happen?	[10]	CO4
Q8.	Discuss the problems faced in the design and implementation of an operating system.	[06]	CO4

Course Outcomes

CO1. Students will be able to define the operating system related terms.

CO2. Students will learn different types of operating systems along with concept of file management systems and CPU scheduling algorithms used in operating system.

CO3. Students will have knowledge of memory management, I/o Devices management, process scheduling, process synchronization and deadlock handling algorithms.

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CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	Q1	04	50
CO2	Q2, Q3	12	50
CO3	Q4, Q5, Q6	18	50
CO4	Q7, Q8	16	50