USN

CS/IS42/16CS/IS42

Fourth Semester B.E. Semester End Examination, May / June 2018

OPERATING SYSTEM

Time: 3 Hours **Max. Marks: 100**

Instructions: *1. Unit I and III are compulsory.*
2. Answer any one question from remaining Units.

UNIT – I

1 a. List and explain the different services provided by an operating system. **08 M**
(Level [1, 2], CO [1], PO [1])

b. List a sequence of system calls to transfer contents from one file to another. **06 M**
(Level [1], CO [1], PO [1,2])

c. What is a Virtual Machine? With a neat diagram explain its working and benefits. **06 M**
(Level [2], CO [1], PO [1,2])

UNIT – II

2 a. With a neat process state diagram explain the different states of a process. **06 M**
(Level [3,2], CO [1], PO [1])

b. Consider the following set of Processes and CPU Burst time in ms **08 M**

Process	Burst time
P1	6
P2	8
P3	7
P4	3

Apply SJF and FCFS algorithms and compute average waiting time in both the cases.
(Level [3], CO [2], PO [2])

c. Explain the benefits of multithreaded programming. **06 M**
(Level [2], CO [2], PO [1])

OR

a. Consider the following set of Processes and CPU Burst time in milliseconds and time quantum of 4ms **08 M**

Process	Burst time
P1	24
P2	3
P3	3

Apply SJF and Round robin scheduling algorithm and compute average waiting time.
(Level [3], CO [2], PO [2])

What is critical section of a process? Explain the requirements to satisfy critical-section problem. **06 M**
(Level [2,3], CO [2], PO [1])

What is semaphore? Write the definition of wait() and signal() operations. **06 M**
(Level [1,3], CO [2], PO [1])

UNIT – III

What are deadlocks and what are its necessary conditions. **04 M**
(Level [1], CO [3], PO [1])

c. Consider the system with Five processes (P0 to P4) and Three resource types A,B,C(10,5,7) instances. **08 M**

	Allocation	Max	Available
P0	0 1 0	7 5 3	3 3 2
P1	2 0 0	3 2 2	
P2	3 0 2	9 0 2	
P3	2 1 1	2 2 2	
P4	0 0 2		

Check whether a system is in safe state and find the safe sequence of processes.

(Level [4], CO [2], PO [ ])

UNIT – IV

5 a. Define page fault. Illustrate, with a neat diagram the steps in handling a page faults. **10 M**

(Level [2], CO [3], PO [1, 2])

b. For the following reference string, determine the page faults that occur using FIFO and LRU page replacement algorithms for 3 and 4 page frames. **10 M**
Reference string: 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5

(Level [5], CO [4], PO [1,4])

OR

6 a. Explain the hardware support for segmentation, with a neat diagram. **06 M**

(Level [2], CO [4], PO [1])

b. For the following reference string, determine the page faults that occur using LRU and Optimal page replacement algorithms for 3 and 4 page frames. **10 M**
Reference string: 7, 0, 1, 2, 0, 3, 0, 4 , 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

(Level [5], CO [4], PO [1, 4])

c. Explain thrashing and the causes of its occurrence. **04 M**

(Level [2], CO [4], PO [1])

UNIT – V

7 a. List and explain the attributes of file. **06 M**

(Level [1,2], CO [3], PO [12])

b. Explain the following file Access methods **08 M**
a) Sequential access b) Direct access

(Level [2], CO [3], PO [1])

c. Explain common file types. **06 M**

(Level [2], CO [3], PO [12])

OR

a. Explain the following **10 M**
a) File system mounting b) File protection

(Level [1], CO [3], PO [1])

b. With a diagram explain the schematic view of virtual file system **10 M**

(Level [2], CO [3], PO [1])

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2. Answer any one question from remaining Units.

UNIT – I

1 a. List and explain the different services provided by an operating system. **08 M**
(Level [1, 2], CO [1], PO [1])

b. List a sequence of system calls to transfer contents from one file to another. **06 M**
(Level [1], CO [1], PO [1,2])

c. What is a Virtual Machine? With a neat diagram explain its working and benefits. **06 M**
(Level [2], CO [1], PO [1,2])

UNIT – II

2 a. With a neat process state diagram explain the different states of a process. **06 M**
(Level [3,2], CO [1], PO [1])

b. Consider the following set of Processes and CPU Burst time in ms **08 M**

Process	Burst time
P1	6
P2	8
P3	7
P4	3

Apply SJF and FCFS algorithms and compute average waiting time in both the cases.
(Level [3], CO [2], PO [2])

c. Explain the benefits of multithreaded programming. **06 M**
(Level [2], CO [2], PO [1])

OR

a. Consider the following set of Processes and CPU Burst time in milliseconds and time quantum of 4ms **08 M**

Process	Burst time
P1	24
P2	3
P3	3

Apply SJF and Round robin scheduling algorithm and compute average waiting time.
(Level [3], CO [2], PO [2])

What is critical section of a process? Explain the requirements to satisfy critical-section problem. **06 M**
(Level [2,3], CO [2], PO [1])

What is semaphore? Write the definition of wait() and signal() operations. **06 M**
(Level [1,3], CO [2], PO [1])

UNIT – III

What are deadlocks and what are its necessary conditions. **04 M**
(Level [1], CO [3], PO [1])

b. A system consists of five processes and three resource types (A, B, C). Resource type A has 10 instances, B has 5 instances and C has 7 instances. The following snapshot of the system has been taken: **10 M**

	Allocation			Max			Available		
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Find the Need matrix, and Analyze the system for the safe sequence by using Banker's algorithm. Mention whether the above system is safe or not.

(Level [4], CO [3], PO [1,4])

c. Briefly explain the methods for deadlock prevention. **06 M**

(Level [2], CO [3], PO [1])

UNIT – IV

5 a. With a block diagram explain the process of swapping of two processes in memory. **07 M**

(Level [2], CO [3], PO [1])

b. What is paging? With a block diagram explain hardware support for paging. **08 M**

(Level [1,2], CO [3], PO [1])

c. Explain hashed paged tables. **05 M**

(Level [2], CO [3], PO [1])

OR

6 a. With Diagram explain the procedure for handling page fault. **10 M**

(Level [2], CO [4], PO [1])

b. Consider reference string **10 M**
7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1 and 3 frames.
Apply optimal page replacement algorithm and find the number of page faults.

(Level [3], CO [3], PO [2])

UNIT –V

7 a. Explain the file attributes and file operations, briefly. **10 M**

(Level [2], CO [5], PO [1])

b. Explain the different types of directory structures, with examples and mention their advantages and disadvantages. **10 M**

(Level [2], CO [5], PO [1])

OR

a. List and explain the different file access methods. **10 M**

(Level [2], CO [5], PO [1])

b. Explain the file system mounting with the help of a neat sketch and discuss the issues of file sharing and protection. **10 M**

(Level [2], CO [5], PO [1])

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16CS/IS42

Fourth Semester B.E. Semester End Examination, May/June 2018-19

OPERATING SYSTEM

Time: 3 Hours Max. Marks: 100

Instructions: 1. *Unit -I and Unit-III are compulsory*
2. *Answer any one full question from each of the remaining units*

UNIT – I (Compulsory)

			L	CO	PO	M
1	a.	Define an Operating system? List and explain the different services provided by an operating system	(2)	(1)	(1)	(10)
	b.	Construct a sequence of system calls to transfer contents from one file to another. Explain layered approach with a neat diagram	(2)	(1)	(2)	(10)

UNIT – II

			L	CO	PO	M
2	a.	With a neat process state transition diagram, explain the different states of a process.	(3)	(1)	(1)	(07)
	b.	Consider the following set of processes with Arrival Time and CPU Burst Time in milliseconds.				

Process	Arrival Time	Burst Time
P1	0	10
P2	1	5
P3	2	7
P4	3	6

Apply SJF and Round Robin algorithms. Consider time quantum for Round Robin algorithm is 4 milliseconds. Draw Gantt Chart. Compute and compare the Average Waiting Time and Average Turn Around Time. (4) (2) (4) (10)

c. Explain three requirements for critical section problem. (2) (2) (1) (03)

OR

3 a. Explain any four Scheduling Criteria for CPU Scheduling Algorithms. (2) (2) (1) (04)

b. What is PCB? Explain its components. (2) (2) (1) (08)

c. Illustrate the Readers-Writers problem and provide a solution using semaphores. (2) (2) (1) (08)

UNIT – III (Compulsory)

			L	CO	PO	M
4	a.	Define deadlock. What are the necessary conditions for deadlock to occur? Indicate how many of these should occur for deadlock to happen?	(2)	(3)	(1)	(10)
	b.	Solve the following snapshot using Banker's algorithm.				

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	0	2	0	0	4	1	0	2
P_1	1	0	0	2	0	1			
P_2	1	3	5	1	3	7			
P_3	6	3	2	8	4	2			
P_4	1	4	3	1	5	7			

i) Is the system in safe state?
ii) If a request from process P_2 arrives for (0,0,2), can the request be granted immediately? (3) (3) (2) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

Find the need matrix, and analyze the system for the safe sequence by using Banker's algorithms. Mention whether the above system is safe or not.

(3) (3) (4) (08)

c. Draw the resource allocation graph for the following system.

Resource Instances :

- One instance of resource type R1
- Two instances of resource type R2
- One instance of resource type R3
- Three instances

Process states:

- Process P1 is holding an instances of resource type R2 and is waiting for an instance of resource type R1.
- Process P2 is holding an instance of R1 and an instance of R2 and is waiting for an instance of R3.
- Process P3 is holding an instance of R3.

Check whether deadlock occurred or not.

(3) (2) (2) (06)
L CO PO M

UNIT - IV

5 a. Explain the difference between internal fragmentation and external fragmentation. Discuss the solutions for external fragmentation.

(2) (3) (1) (04)

b. Explain with diagram the Compile time, Load time, and Execution time address binding for multistep processing of a user program.

(2) (3) (1) (06)

c. Consider the following reference string.
7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 3 for a memory with three frames. How many page faults occur for FIFO and Optimal page replacement algorithms.? Compare and comment on the efficiency of algorithm.

(4) (4) (1) (10)

OR

6 a. Discuss multistep processing of a user program.

(2) (3) (1) (10)

b. What is Paging? Discuss with diagram paging hardware.

(2) (3) (1) (10)
L CO PO M

UNIT - V

7 a. Discuss file access methods.

(2) (1) (2) (10)

b. Explain the layered design of a file system.

(2) (3) (1) (10)

OR

8 a. What is a file? List and explain the various File Attributes and file operations.

(2) (3) (1) (10)

b. Discuss different ways of protecting files in the system.

(2) (3) (1) (10)