

[4]

- ii. Given page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6  
Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm. **6**
- OR iii. Explain concept of first fit, best fit & worst fit schemes in contiguous memory allocation using a worked out example. **6**
- Q.6 i. Describe at least three file operations. **4**
- ii. Discuss in detail any two free space management schemes. **6**
- OR iii. Explain following disk scheduling algorithms: **6**
- (a) SSTF (b) SCAN (c) C-SCAN

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Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Science  
End Sem (Even) Examination May-2018  
CA3CO12 Operating System  
Programme: BCA Branch/Specialisation: Computer Application

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Operating system manages **1**
- (a) Memory (b) Processes  
(c) Disks and I/O devices (d) All of these
- ii. Time sharing operating system also known as: **1**
- (a) Multiprogramming operating system  
(b) Multitasking operating system  
(c) Batched operating system  
(d) All of these
- iii. If the waiting time for a process is p and there are n processes in the memory then the CPU utilization is given by **1**
- (a)  $p/n$  (b)  $p^n$  (p raised to n)  
(c)  $1-p^n$  (d)  $n-(p^n)$
- iv. What scheduling policy will you use when system's efficiency is measured by the percentage of jobs completed **1**
- (a) FCFS (b) SJF  
(c) FCFS or RR (d) None of these
- v. For Mutual exclusion to prevail in the system : **1**
- (a) At least one resource must be held in a non sharable mode  
(b) There must be at least one resource in a sharable mode  
(c) Both (a) and (b)  
(d) None of these

P.T.O.

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- vi. Deadlock prevention is a set of methods : **1**  
 (a) To ensure that at least one of the necessary conditions cannot hold  
 (b) To ensure that all of the necessary conditions do not hold  
 (c) Both (a) and (b)  
 (d) None of these
- vii. Which of the following is fastest memory allocation policy? **1**  
 (a) First Fit (b) Best Fit (c) Worst Fit (d) Next Fit
- viii. Virtual memory is **1**  
 (a) Large secondary memory (b) Large main memory  
 (c) Illusion of large main memory (d) None of these
- ix. The file structure that redefines its first record at a base of zero uses **1**  
 the term  
 (a) Relative organization (b) Key fielding  
 (c) Dynamic reallocation (d) All of these
- x. Which type of design problem is there in file system? **1**  
 (a) How the file system should look to the user.  
 (b) Algorithm and data structure must be created to map the logical  
 file system onto the secondary storage device.  
 (c) Both (a) and (b)  
 (d) None of these
- Q.2 i. Define shell and kernel. Also explain system calls in detail. **4**  
 ii. What is operating system? Discuss at least three design issues of  
 operating system. **6**
- OR iii. Write short note on following types of OS: **6**  
 (a) Real-time (b) Multitasking (c) Network
- Q.3 i. Suppose a new process in a system arrives at an average of six **4**  
 processes per minute and each such process requires an average of 8  
 seconds of service time. Estimate the fraction of time the CPU is busy  
 in a system with a single processor.
- ii. Assume you have the following jobs to execute with one processor, **6**  
 with the jobs arriving in the order listed here:

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<i>Process</i>	<i>Arrival Time</i>	<i>Burst Time</i> (ms)
P <sub>0</sub>	0	80
P <sub>1</sub>	10	20
P <sub>2</sub>	10	10
P <sub>3</sub>	80	20
P <sub>4</sub>	85	50

Suppose a system uses RR scheduling with a quantum of 15 (ms).

- (a) Create a Gantt chart illustrating the execution of these processes?  
 (b) What is the turnaround time for process p3?  
 (c) What is the average wait time for the processes?

OR iii. Explain any two pre-emptive CPU scheduling scheme with help of **6**  
 worked out examples.

Q.4 i. Explain critical section problem. What is race condition? **4**  
 ii. Consider following table: **6**

<i>Process</i>	<i>Allocation</i>			<i>Max</i>			<i>Available</i>		
	<i>A</i>	<i>B</i>	<i>C</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>A</i>	<i>B</i>	<i>C</i>
P <sub>0</sub>	0	1	0	7	5	3	3	3	2
P <sub>1</sub>	2	0	0	3	2	2			
P <sub>2</sub>	3	0	2	9	0	2			
P <sub>3</sub>	2	1	1	2	2	2			
P <sub>4</sub>	0	0	2	4	3	3			

- (a) What will be the content of the Need matrix?  
 (b) Is the system in safe state? If Yes, then what is the safe sequence?  
 (c) What will happen if process P<sub>4</sub> submits an additional request for  
 (3, 3, 0) in current state of system.

OR iii. Explain Reader's writer's problem using semaphore. Also write **6**  
 algorithm.

Q.5 i. Define external and internal fragmentation. **4**

P.T.O.

## Marking Scheme CA3CO12 Operating System

Q.1	i.	Operating system manages		1
		(d) All of the above.		
	ii.	Time sharing operating system also known as:		1
		(a) Multiprogramming Operating System		
	iii.	If the waiting time for a process is p and there are n processes in the memory then the CPU utilization is given by		1
		(b) $p^n$ (p raised to n)		
	iv.	What scheduling policy will you use when system's efficiency is measured by the percentage of jobs completed		1
		(b) SJF		
	v.	For Mutual exclusion to prevail in the system :		1
		(a) At least one resource must be held in a non sharable mode		
	vi.	Deadlock prevention is a set of methods :		1
		(a) To ensure that at least one of the necessary conditions cannot hold		
	vii.	Which of the following is fastest memory allocation policy?		1
		(a) First Fit		
	viii.	Virtual memory is		1
		(c) Illusion of large main memory		
	ix.	The file structure that redefines its first record at a base of zero uses the term		1
		(a) Relative organization		
	x.	Which type of design problem in file system?		1
		(c) Both (a) and (b)		
Q.2	i.	Define shell and Kernel	- 2 Marks	4
		System Call	- 2 Marks	
	ii.	Operating system	- 2 Marks	6
		Three design issues of operating system.	- 4 Marks	
OR	iii.	2 Marks for each (2 * 3 = 6)		6
		(a) Real-time (b) Multitasking (c) Network		

Q.3	i.	Suppose a new process in a system arrives at an average of six processes per minute and each such process requires an average of 8 seconds of service time. Estimate the fraction of time the CPU is busy in a system with a single processor.		4
	ii.	2 Marks for each (2 * 3 = 6)		6
OR	(a)	Suppose a system uses RR scheduling with a quantum of 15. Create a Gantt chart illustrating the execution of these Processes?		
	(b)	What is the turnaround time for process p3?		
	(c)	What is the average wait time for the processes?		
	iii.	Two pre-emptive CPU scheduling scheme 3 Marks for each (3 * 2 = 6)		6
Q.4	i.	Critical section problem	- 2 Marks	4
		Race condition	- 2 Marks	
	ii.	2 Marks for each (2 * 3 = 6)		6
	(a)	What will be the content of the Need matrix?		
	(b)	Is the system in safe state? If Yes, then what is the safe sequence?		
	(c)	What will happen if process P4 submits an additional request for (3, 3, 0) in current state of system.		
OR	iii.	Reader's writer's problem	- 3 Marks	6
		Algorithm.	- 3 Marks	
Q.5	i.	External and internal fragmentation. 2 Marks * 2 = 4 Marks)		4
	ii.	Page faults for LRU, FIFO and Optimal page replacement algorithm. 2 Marks for each (2 * 3 = 6)		6
OR	iii.	Concept of first fit, best fit & worst fit schemes in contiguous and non-contiguous memory allocation. 2 Marks for each (2 * 3 = 6)		6
Q.6	i.	Three file operations.		4
	ii.	Two free space management schemes. 3 Marks for each (3 * 2 = 6)		6
OR	iii.	Disk scheduling algorithms: (2 * 3 = 6)		6
		(a) SSTF (b) SCAN (c) C-SCAN		

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