

KATHMANDU UNIVERSITY  
End Semester Examination  
March/April 2017

Marks Scored:

Level : B.E./B.Sc.

Year : III

Exam. Roll No. :

Time: 30 mins.

Course : COMP 307

Semester: I

F. M. : 10

Registration No.:

Date :

APR 09 2017

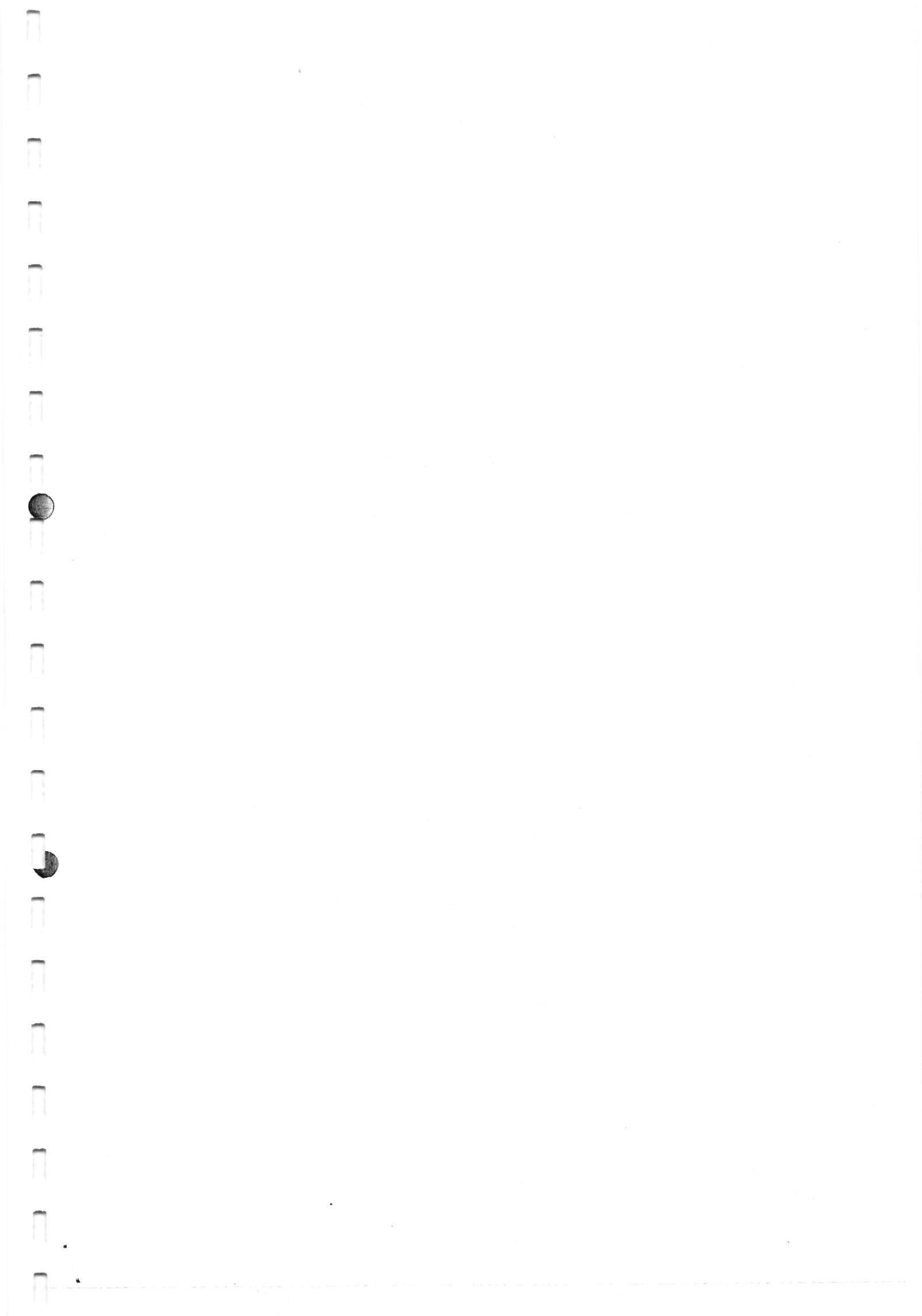
SECTION "A"  
[20 Q. × 0.5 = 10]

Circle the most appropriate answer.

1. A situation where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which access takes place is called:
  - a) data consistency
  - b) race condition
  - c) aging
  - d) starvation
  
2. Mutual exclusion implies that:
  - a) if a process is executing in its critical section, then no other process must be executing in their critical sections
  - b) if a process is executing in its critical section, then other processes must be executing in their critical sections
  - c) if a process is executing in its critical section, then all the resources of the system must be blocked until it finishes execution
  - d) none of the above
  
3. If the disk head is located initially at 32, find the number of disk moves required with FCFS if the disk queue of I/O blocks requests are 98, 37, 14, 124, 65, 67.
  - a) 239
  - b) 310
  - c) 321
  - d) 325
  
4. Which scheduling algorithm is most suitable for a time-shared operating system?
  - a) Shortest first job
  - b) Round robin
  - c) First come first server
  - d) Elevator
  
5. A state is safe if the system can allocate resources to each process up to its maximum in some order and still avoid deadlock.  
Which of the following are **NOT** true?
  - a) Deadlocked state is unsafe
  - b) unsafe state may lead to a deadlock situation
  - c) unsafe state must lead to a deadlock situation
  - d) Deadlocked state is a subset of unsafe state
  
6. Which of the following page replacement algorithms suffers from Belady's anomaly?
  - a) Optimal replacement
  - b) LRU
  - c) FIFO
  - d) Both Optimal and FIFO

7. What is Aging?
- keeping track of cache contents
  - keeping track of what pages are currently residing in the memory
  - keeping track of how many times a given page is reference
  - increasing the priority of jobs to ensure termination in a finite time.
8. In which type of allocation method each file occupy a set of contiguous block on the disk?
- contiguous allocation
  - dynamic-storage allocation
  - linked allocation
  - indexed allocation
9. The host sets \_\_\_\_\_ bit when a command is available for the controller to execute.
- write
  - status
  - command-ready
  - control
10. CPU fetches the instruction from memory according to the value of \_\_\_\_\_.
- program counter
  - status register
  - instruction register
  - program status word
11. Which one of the following is the deadlock avoidance algorithm?
- banker's algorithm
  - round-robin algorithm
  - elevator algorithm
  - karn's algorithm
12. \_\_\_\_\_ can not be turned off by the CPU before the execution of critical instruction sequences that must not be interrupted.
- Non-maskable
  - Maskable
  - Vector
  - Chaining
13. A system has 12 magnetic tape drives and 3 processes : P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives.  
 Process = {P0, P1, P2}  
 Maximum = {10, 4, 9}  
 Allocation = {5, 2, 2}
- P0, P1, P2
  - P1, P2, P0
  - P2, P0, P1
  - P1, P0, P2
14. A process refers to 5 pages, A, B, C, D, E in the order : A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page transfers with an empty internal store of 3 frames is :
- 7
  - 8
  - 9
  - 10
15. A process is thrashing if \_\_\_\_\_
- it is spending more time paging than executing
  - it is spending less time paging than executing
  - page fault occurs
  - swapping can not take place
16. \_\_\_\_\_ is a unique tag, usually a number, identifies the file within the file system.
- File identifier
  - File name
  - File type
  - none of the above

17. What is fragmentation? \_\_\_\_\_
- a) dividing the secondary memory into equal sized fragments
  - b) dividing the main memory into equal sized fragments
  - c) fragments of memory words used in a page
  - d) fragments of memory words unused in a page
18. Consider three CPU-intensive processes, which require 10, 20 and 30 time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if the operating system implements a shortest remaining time first scheduling algorithm? Do not count the context switches at time zero and at the end.
- a) 1
  - b) 2
  - c) 3
  - d) 4
19. Which of the following is non-preemptive algorithm?
- a) Round robin
  - b) First in first out
  - c) Multilevel queue scheduling
  - d) multilevel queue scheduling with feedback
20. Which of the following memory allocation scheme suffers from external fragmentation?
- a) Segmentation
  - b) Pure demand paging
  - c) Swapping
  - d) Paging



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Course : COMP 307  
Semester: I  
F.M. : 40

SECTION "B"  
[6 Q. × 4 = 24]

Attempt any *SIX* questions.

1. What is a process? How does round robin algorithm work for scheduling a process? [1+3]
2. What is race condition? Illustrate with an example. [1+3]
3. What is Deadlock? Discuss the four conditions of deadlock. [1+3]
4. How does Direct Memory Access work? Explain in detail.
5. What are file allocation methods? Describe two different methods of file allocation. [1+3]
6. What is the difference between the C-LOOK and LOOK algorithm? Why might one prefer one over the other?
7. Consider a system with 3 physical frames of memory that is given the following page memory reference sequence: 1, 3, 6, 7, 1, 3, 6, 7, 1, 3, 6, 7  
What is the number of page faults that would occur for each of the following page replacement algorithms?  
a) Optimal page replacement algorithm  
b) LRU

SECTION "C"  
[2 Q. × 8 = 16]

Attempt *ANY TWO* questions.

8. Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Which algorithm makes the most efficient use of memory?
9. Suppose that a disk drive has 300 cylinders, numbered 0 to 299. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 15. The queue of pending requests, in FIFO order, is 86, 147, 291, 18, 95, 151, 12, 175, 30. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms?  
a) SSTF  
b) SCAN  
c) C-SCAN  
d) LOOK  
e) C-LOOK

[1+1+6]

10. Consider the following snapshot of a system:

	<u>Allocation</u>				<u>Max</u>				<u>Available</u>			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using the banker's algorithm:

- What is the content of the matrix Need?
- Is the system in a safe state?
- If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately?