b) i) Consider the atomic fetch-and-set x, y instruction unconditionally sets the memory location x to 1 and fetches the old value of x in y without allowing any intervening access to the memory location x. Consider the following implementation of P and V functions on a binary semaphore.

```
void P (binary_semaphore *s) {
unsigned y;
unsigned *x = & (s- > value);
do {
    fetch-and-set x, y;
} while (y);
}
void V (binary_semaphore *s) {
    S- >value = 0;
}
```

Write whether the implementation may or may not work if context switching is disabled in P.   (4)

ii) Consider a situation where we have a file shared between many people.

If one of the people tries editing the file, no other person should be reading or writing at the same time, otherwise changes will not be visible to him/her. However if some person is reading the file, then others may read it at the same time.

a) What kind of situation is this ?   (3)

b) Consider the following problem parameters to solve this situation.   (8)

Problem parameters :

1) One set of data is shared among a number of processes.

2) Once a writer is ready, it performs its write. Only one writer may write at a time.

3) If a process is writing, no other process can read it.

4) If at least one reader is reading, no other process can write.

5) Readers may not write and only read.

Reg. No. :

24/11/2017
AN

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fourth/Fifth/Sixth Semester

Computer Science and Engineering

CS 6401 – OPERATING SYSTEMS

(Common to : Electronics and Communication Engineering/Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Medical Electronics/Information Technology)

(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Mention the objectives of an operating systems.

2. What is SYSGEN and system boot ?

3. Name and draw five different process states with proper definition.

4. Elucidate mutex locks with its procedure.

5. Write about swapping. Let us assume the user process is of size 1MB and the backing store is a standard hard disk with a transfer rate of 5MBPS. Calculate the transfer rate.

6. Consider the following page-reference string :

   1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

   How many page faults and page fault ratio would occur for the FIFO page replacement algorithm ? Assuming there is four frames.

7. Suppose that the disk rotates at 7200 rpm.

   a) What is the average rotational latency of the disk drive ?

   b) Identify seek distance can be covered in the time ?

8. Enlist different types of directory structure.

9. List the advantages of Linux OS.

10. Write the purpose of using virtualization.

PART – B   (5×13=65 Marks)

11. a) Explain Cache memory and its mapping.   **(13)**

(OR)

b) Describe evolution of operating system.   **(13)**

12. a) i) What is a process ? Discuss components of process and various states of a process with the help of a process state transition diagram.   **(8)**

ii) Write the difference between user thread and kernel thread.   **(5)**

(OR)

b) i) What is the average turnaround time for the following processes using

a) FCFS   **(3)**

b) SJF non-preemptive.   **(3)**

c) Preemptive SJF.   **(3)**

Process	Arrival Time	Burst Time
P1	0.0	8
P2	0.4	4
P3	1.0	1

ii) With example elucidate livelock.   **(4)**

13. a) Draw the diagram of segmentation memory management scheme and explain its principle.   **(13)**

(OR)

b) When do page faults occur ? Consider the 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 and page fault rate occur for the FIFO, LRU and optimal replacement algorithms, assuming one, two, three, four page frames ? **(13)**

14. a) i) In a variable partition scheme, the operating system has to keep track of allocated and free space. Suggest a means of achieving this. Describe the effects of new allocations and process terminations in your suggested scheme. **(5)**

ii) What are different allocation methods in disk storage ? Explain with neat sketch.   **(8)**

(OR)

b) Consider a disk queue with requests for I/O to blocks on cylinders

98, 183, 37, 122, 14, 124, 65, 67

If the disk head is start at 53, then find out the total head movement with respect to FCFS, SSTF, SCAN, C-SCAN and LOOK scheduling.   **(13)**

15. a) i) Explain the components of Linux system with neat sketch.   **(6)**

ii) Write the various system administrator roles in LINUX OS.   **(7)**

(OR)

b) i) How to install and configuring network services in LINUX.   **(9)**

ii) Describe the benefits of virtualization in LINUX OS.   **(4)**

PART – C   (1×15=15 Marks)

16. a) Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C and D and process P0 to P4 :

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

Using Banker's algorithm, answer the following questions :

a) How many resources of type A, B, C and D are there ?   **(2)**

b) What are the contents of the need matrix ?   **(3)**

c) Is the system in a safe state ? Why ?   **(3)**

d) If a request from process P4 arrives for additional resources of (1, 2, 0, 0,), can the Banker's algorithm grant the request immediately ? Show the new system state and other criteria.   **(7)**

(OR)