

## B Tech V Semester Back Paper Examination - 2016

### TIT501-Operating System

Time: 3 Hours

Total Marks: 100

Note: (i) Attempt **ALL** questions all Questions carry equal marks.

(ii) In case of numerical problems assume data wherever not provided.

(iii) Be precise in your answer.

1. Attempt **any four** parts of the following: (5 × 4 = 20)

(a) Give examples of at least two applications which in your opinion are real-time applications. Support your example with appropriate rationale?

(b) Define Mutual Exclusion and its need. One solution to the critical section problem or mutual exclusion implementation is with TestAndSet instruction (Test and lock). Explain this approach in detail?

(c) When do we say a system is "multi-programming"? When do we say it is an "on-line" system?

(d) Write the type services provided by the Operating System to the user?

(e) Windows was the first OS that offered visual icons to launch applications or not?

2. Attempt **any four** parts of the following: (5 × 4 = 20)

(a) List three examples of deadlocks that are not related to a computer system environment?

(b) Explain starvation. When and how starvation may occur and also explain the difference between busy waiting and blocking.

(c) Explain the differences in the degree to which the following scheduling algorithms discriminate in favour of short processes:

- i. FCFS
- ii. RR
- iii. Multilevel feedback queue

(d) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	Arrival Time	Burst Time
P <sub>1</sub>	0.0	8
P <sub>2</sub>	0.4	4
P <sub>3</sub>	1.0	1

What is the average turn-around time for these processes with the FCFS scheduling algorithm? (e) Write the definition for *wait()* and *signal()* semaphore operation.

3. Attempt **any two** parts of the following: (10 × 2 = 20)

(a) Explain critical region and mutual exclusion with respect to producer-consumer problem?

(b) Write the algorithms for *wait()* and *signal()* functions. Explain their usage in an example?

(c) Describe two kernel data structures in which race conditions are possible. Be sure to include a description of how a race condition can occur.

4. Attempt **any two** parts of the following: (10 × 2 = 20)
- (a) If memory partition of 100k, 500k, 200k, 300k and 600k (in order) are given here would each of the first fit, best fit and worst fit algorithms place processes of 212k, 417k, 112k, and 426k (in order)? Which algorithm makes the most efficient use of memory?
  - (b) When do page faults occur? Describe the actions taken by the operating system when a page fault occurs.
  - (c) Consider the following page reference string:  
7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1  
Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms?  
i) LRU replacement      ii) FIFO replacement      iii) Optimal replacement
5. Attempt **any two** parts of the following: (10 × 2 = 20)
- (a) On a disk with 1000 cylinders numbers 0 to 999 compute the number of the tracks the disk arm move to satisfy all requests in disk queue. Assume the last request received was at track 345 and the head is moving towards track 0. The queue in FIFO order contains request for the following tracks  
123, 874, 692, 475, 105, 367  
Perform the computation for the SSTF and SCAN scheduling algorithms.
  - (b) A process uses several buffers while processing a file containing block records. If system failure occurs during its execution, is it possible to resume execution of the process from the point of failure.
  - (c) What are the advantages of the variation of linked allocation that uses a FAT to chain together the blocks of a file?