

**B.TECH**  
**(SEM IV) THEORY EXAMINATION 2017-18**  
**Operating System**

Time: 3 Hours

Total Marks: 70

- Note: 1. Attempt all Sections. If require any missing data; then choose suitably.  
2. Any special paper specific instruction.

**SECTION A**

1. Attempt *all* questions in brief. 2 x 7 = 14
- Define Operating System. List the objectives of an operating system
  - What are the various scheduling criteria for CPU scheduling?
  - What is the use of inter process communication and context switching?
  - Write the difference between internal and external fragmentation.
  - What are the disadvantages of single contiguous memory allocation?
  - Discuss the usage of wait-for graph method.
  - Define Busy Waiting? How to overcome busy waiting using Semaphore operations.

**SECTION B**

2. Attempt any *three* of the following: 7 x 3 = 21
- Explain briefly Layered Operating system structure with neat sketch. Also explain protection and security.
  - What is Dining Philosophers problem? Discuss the solution to Dining philosopher's problem using monitors.
  - Consider the following snapshot of a system:

Process	Allocated			Maximum			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8	7	7	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

Answer the following questions using the banker's algorithm:

- What is the content of the matrix need?
  - Is the system in a safe state?
- d. Consider the following page 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 would occur for the optimal page replacement algorithm, assuming three frames and all frames are initially empty.
- e. Is it possible to have a deadlock involving only a single process? Explain.

**SECTION C**

3. Attempt any *one* part of the following: 7 x 1 = 7
- Enumerate various Operating System components with their functions in brief.
  - Differentiate between (with one suitable example):
    - Interactive and Batch processing System.
    - Multiprogramming and Time Sharing System.
4. Attempt any *one* part of the following: 7 x 1 = 7

- (a) Discuss Mutual-exclusion implementation with test and set() instruction.
- (b) State the Critical Section problem. Illustrate the software based solution to the Critical Section problem.

5. Attempt any *one* part of the following:

7 x 1 = 7

(a) Consider the following process:

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Draw Gantt chart and find the average waiting time and average turnaround time:

- (i) FCFS Scheduling  
(ii) SRTF Scheduling\

(b) Consider the following process:

Process	Arrival Time	Burst Time	Priority
P1	0	6	3
P2	1	4	1
P3	2	5	2
P4	3	8	4

Draw Gantt chart and find the average waiting time and average turnaround time:

- (i) SRTF Scheduling  
(ii) Round robin (time quantum:3)

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) What do you mean by Belady's anomaly? Which algorithm suffers from Belady,s anomaly and how can it be rectified?
- (b) What is Thrashing? What is the cause of Thrashing? How does the system detect Thrashing? What can the system do to eliminate this problem?

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Discuss the Linked, Contiguous and Index and multilevel Indexing file allocation schemes. Which allocation scheme will minimize the amount of space required in directory structure and why?
- (b) Write short notes on :
- i) I/O Buffering  
ii) Disk storage and scheduling