

17IT3406

9. a. Explain the following in detail with respect to magnetic disk: **7M**
- i) Seek time
 - ii) Latency
 - iii) Transfer time
- b. Evaluate SSTF and LOOK for the following data.
Given the queue: 95, 180, 34, 119, 11, 123, 62, 64 with the
Read-write head initially at the track 50 and the last track being at
199. **8M**

* * *

VR17

Reg. No:

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, NOVEMBER, 2020

Fourth Semester

INFORMATION TECHNOLOGY

17IT3406 OPERATING SYSTEMS

Time: 3hours

Max. Marks: 70

Part-A is compulsory

Answer One Question from each Unit of Part-B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define the term operating system.
- b. Define system call.
- c. Define the terms waiting time and turnaround time with reference to scheduling algorithm.
- d. What is meant by context switch?
- e. Differentiate between internal and external fragmentation.
- f. What are the requirements that a solution to the critical section problem must satisfy?
- g. Write at least two advantages of virtual memory concept
- h. What are conditions under which a deadlock situation may arise?
- i. List various file operations.
- j. Define rotational latency.

PART-B**4 x 15 = 60M****UNIT-I**

2. a. Elaborate on various operating system structures. **8M**
- b. Explain at least four types of system calls with examples. **7M**

(or)

3. a. List and explain different services provided by the operating systems. **8M**
- b. Explain the significance of Process Control Block and describe its typical elements. **7M**

UNIT-II

4. a. Consider the following set of processes, assumed to have arrived at time '0' in the order given with the length of the CPU burst time in milliseconds.

| Process | Burst Time |
|---------|------------|
| P1 | 10 |
| P2 | 1 |
| P3 | 2 |
| P4 | 1 |
| P5 | 5 |

Draw gantt chart for illustrating the execution of these processes using FCFS and SJF scheduling and calculate the waiting time for both FCFS and SJF scheduling. **9M**

- b. Discuss dining philosopher's problem with semaphores. **6M**

(or)

5. a. What is critical section? Write and explain Peterson's solution for it. **8M**
- b. Discuss Readers-Writers problem using semaphores. **7M**

UNIT-III

6. a. Define deadlock. Describe the necessary conditions for deadlock. **7M**
- b. Explain Banker's algorithm with an example. **8M**

(or)

7. a. Define Thrashing. Explain working-set model in detail. **6M**
- b. Assume that there are 3 page frames which are initially empty. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6, calculate the number of page faults using the optimal replacement policy and least recently used policy. **9M**

UNIT-IV

8. a. Write a short note on indexed sequential file organisation. **6M**
- b. Explain various file allocation methods in detail. **9M**

(or)

17IT3406

i) Find whether this system is safe or not. Also, find safe sequence that satisfies safety requirement.

ii) If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately? **7M**

(or)

7. a. What is paging? Describe in detail about general method with hardware implementation of paging. **8M**
- b. What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem. **7M**

UNIT-IV

8. a. Explain how free space is managed? **8M**
- b. Discuss in detail about different file allocation methods. **7M**
- (or)
9. a. Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600KB (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 236 KB, 543 KB, 92 KB and 350 KB (in order)? Which algorithm makes the most efficient use of memory? **9M**
- b. Explain the process of file mounting. **6M**

* * *

VR17

Reg. No:

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE
(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, MARCH, 2021

Fourth Semester

INFORMATION TECHNOLOGY

17IT3406 OPERATING SYSTEMS

Time: 3 hours

Max. Marks: 70

Part-A is compulsory

Answer One Question from each Unit of Part-B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. List out operating systems functions.
- b. Differentiate tightly coupled and loosely coupled systems.
- c. Define context switch.
- d. What is the difference between preemptive and non-preemptive scheduling?
- e. Define the terms semaphore and busy waiting.
- f. What are the common strategies to select a free hole from a set of available holes?
- g. Define demand paging.
- h. What are the methods of handling a deadlock?
- i. What are the advantages of indexed allocation?
- j. List the structures used in file system implementation.

PART-B**4 x 15 = 60M****UNIT-I**

2. a. Define operating system. List the goals of operating system. **8M**
 b. What is system call and explain its types? **7M**

(or)

3. a. Define process and explain with a neat diagram about process states and process control block. **8M**
 b. Explain briefly about the services and functions provided by the operating system. **7M**

UNIT-II

4. a. What is the average turnaround time for the following processes using **10M**
 i) FCFS ii) SJF non-preemptive iii) Round Robin

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1 | 0 | 8 |
| P2 | 4 | 4 |
| P3 | 1 | 1 |

- b. Explain the thread concept and various multi-threading models for user and kernel threads. **5M**

(or)

5. a. Consider the following set of process with the length of CPU burst time given in milliseconds:

| Process | Arrival Time | Burst Time | Priority |
|---------|--------------|------------|----------|
| P1 | 2 | 2 | 3 |
| P2 | 3 | 3 | 2 |
| P3 | 0 | 1 | 4 |
| P4 | 4 | 2 | 1 |
| P5 | 3 | 2 | 3 |

Draw the four Gantt charts illustrating the execution of these processes using FCFS, SJF, Pre-emptive priority scheduling and calculate waiting and turnaround time of each process for each scheduling algorithm. Explain about SJF process scheduling algorithm with an example. **10M**

- b. Discuss about structure of a process in memory and its states with neat sketches. **5M**

UNIT-III

6. a. List and explain necessary conditions which cause deadlock. **8M**
 b. Consider the following snapshot of the system

| PROCESS | ALLOCATION | | | | MAX | | | | AVAILABLE | | | |
|---------|------------|---|---|---|-----|---|---|---|-----------|---|---|---|
| | 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 | | | | |

VR17

Reg. No:

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE
(AUTONOMOUS)
II/IV B.Tech. DEGREE EXAMINATION, NOVEMBER, 2019
Fourth Semester
INFORMATION TECHNOLOGY
17IT3406 OPERATING SYSTEMS

Time: 3 hours

Max. Marks: 70

Part-A is compulsory

Answer One Question from each Unit of Part-B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1.
 - a. Mention the basic functions of OS.
 - b. Name the values return by fork () system call.
 - c. What is preemptive scheduling?
 - d. What do you meant by mutual exclusion?
 - e. A computer system has 6 tape drives, with 'n' processes competing for them. Each process may need 3 tape drives. Find the maximum value of 'n' for which the system is guaranteed to be deadlock free.
 - f. On simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space and a page size 2^{10} bytes, how many bytes are in a page frame?
 - g. The capacity of a memory unit is defined by the number of words multiplied by the number of bits/word. How many separate address and data lines are needed for a memory of 4 K x 16?
 - h. Consider a disk system with 100 cylinders. The requests to access the cylinders occur in following sequence: 10, 70, 75, 23, 65. Assuming that the head is currently at cylinder 55. With SSTF and FIFO what is the time taken to satisfy all requests if it takes 1ms to move from one cylinder to adjacent one.
 - i. Which page replacement algorithms suffers from Belady's anomaly?
 - j. What is the time taken to move the disk arm to the desired cylinder?

PART-B**4 x 15 = 60M****UNIT-I**

2. Explain the main features of following types of OS outlining their limitations and strengths
- a. Cluster Systems **8M**
- b. Real Time Systems **7M**
- (or)
3. a. Discuss about computer system architecture. **8M**
- b. Describe micro kernels and modules in OS structure. **7M**

UNIT-II

4. Illustrate the various process scheduling algorithms, with a neat diagrams. **15M**
- (or)
5. Consider a system with three smoker processes and one agent process. Each smoker continuously rolls a cigarette and then smokes it. But to roll and smoke a cigarette, the smoker needs three ingredients: tobacco, paper and matches. One of the smoker processes has paper, another has tobacco and the third has matches. The agent has an infinite supply of all three materials. The agent places two of the ingredients on the table. The smoker who has the

remaining ingredient then makes and smokes a cigarette, signaling the agent on completion. The agent then puts out another two of the three ingredients and the cycle repeats. Write a pseudo code using semaphore to synchronize the agent and the smokers.

15M**UNIT-III**

6. Give memory partition of 100K, 500K, 200K, 300K and 600K (in order). How would each of the first fit, best fit and worst fit algorithm place process of 212K, 417K, 112K and 426K (in order)? Which algorithm makes the most efficient use of memory? **15M**
- (or)
7. a. What is Thrashing? **2M**
- b. List out reasons for thrashing. **5M**
- c. Explain various prevention methods for thrashing. **8M**

UNIT-IV

8. Elaborate file system along with different components. **15M**
- (or)
9. Discuss about Free space management. **15M**

*** * ***

17IT3406

UNIT-IV

8. Write a detailed note on the following with suitable example.
- a. File access methods **8M**
- b. File allocation methods **7M**
- (or)
9. a. Discuss about free-space management. **7M**
- b. Differentiate between FCFS and SSTF scheduling algorithms. **8M**

* * *

VR17

Reg. No:

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)
II/IV B.Tech. DEGREE EXAMINATION, APRIL, 2019
Fourth Semester
INFORMATION TECHNOLOGY
17IT3406 OPERATING SYSTEMS

Time: 3 hours

Max. Marks: 70

Part-A is compulsory

Answer One Question from each Unit of Part - B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define an operating system.
- b. Consider the 3 process X, Y and Z as shown in the table. Find the completion order of the 3 processes as per the FCFS scheduling policy.

| Process name | Arrival time | Burst time |
|--------------|--------------|------------|
| X | 0 | 5 |
| Y | 1 | 7 |
| Z | 3 | 4 |

- c. Differentiate between pre-emptive and non-preemptive scheduling.
- d. Which scheduling policy is suitable for Time shared OS?
- e. How many unique process are created by the below code?
pid_t pid;
pid=fork();
if(pid==) {fork(); thread_create();}
fork ();
- f. Name the directed edge from resource type R_j to process P_i .
- g. What is deadlock?
- h. Define semaphore.
- i. Define access method.
- j. What do you mean by file system mounting?

PART-B**4 x 15 = 60M****UNIT-I**

2. a. For each of the following transitions between processes states, indicate whether the transition is possible. If it is possible, give an example of one thing that would cause it **7M**
- i) Run → swapped-blocked
 - ii) Swapped-blocked → Ready
 - iii) Run → New
 - iv) Blocked → run
 - v) Run → ready

- b. Describe PCB structure with its components. **8M**

(or)

3. a. Discuss about various types of system calls. **8M**
- b. Briefly explain about shared memory systems. **7M**

UNIT-II

4. a. Discuss about Shortest-Job-First scheduling and Round-robin scheduling algorithms. **8M**
- b. Discuss about Dining Philosophers problem. **7M**

(or)

5. a. Define multithreading. **2M**
- b. Elaborate the various multithreading models. **13M**

UNIT-III

6. Consider the following page reference string A, B, C, B, D, A, D, B, C, A, D, B, F, E, F, D, E, F, G, A, C, B for a memory with three frames. How many page faults would occur for the following algorithm? Assume initially first three frames are occupied with C, B and D page reference
- a. FIFO **5M**
 - b. LRU **5M**
 - c. Optimal **5M**

(or)

7. Consider the following snapshot of a system **15M**

| Process name | Arrival time | Bust time |
|--------------|--------------|-----------|
| P1 | 0 | 5 |
| P2 | 2 | 4 |
| P3 | 4 | 3 |
| P4 | 6 | 1 |
| P5 | 8 | 1 |
| P6 | 9 | 3 |

Answer the following questions using Banker's algorithm

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

17IT3406

(or)

7. a. Write short note on segmentation. **5M**
- b. Apply FIFO and LRU page replacement methods on the following reference string. Find hit ratio and fault ratio. Frame Size=3.
8 0 5 4 0 3 0 4 2 3 0 3 2 5 2 0 5 8 0 5 **10M**

UNIT-IV

8. a. Differentiate between sequential access and direct access methods. **7M**
- b. Explain different file allocation methods. **8M**

(or)

9. a. Write about SCAN and C-SCAN disk scheduling algorithms with examples. **7M**
- b. Discuss about free-space management. **8M**

* * *

VR17



Reg. No:

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

**VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE
(AUTONOMOUS)**

II/IV B.Tech. DEGREE EXAMINATION, SEPTEMBER, 2021
Fourth Semester

**INFORMATION TECHNOLOGY
17IT3406 OPERATING SYSTEMS**

Time: 3 hours

Max. Marks: 70

Part-A is compulsory

Answer One Question from each Unit of Part - B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define operating system.
- b. Define user interface with examples.
- c. What is CPU-I/O burst cycle?
- d. Define fork() and exec().
- e. Define deadlock.
- f. What is meant by demand paging?
- g. Write about circular wait.
- h. What is volume control block in file system implementation?
- i. Define bit vector.
- j. Define bad blocks.

UNIT-I

2. a. List and explain different types of system calls. **7M**
 b. Discuss about operating system services. **8M**

(or)

3. a. Write in detail about Operations on processes. **7M**
 b. Explain in detail about Inter Process Communication. **8M**

UNIT-II

4. a. Apply FCFS, SJF and Priority non-pre-emptive scheduling algorithm on the given table and do the following:
 a) Create a Gantt (timeline) chart illustrating the execution of these processes?
 b) What is the average turnaround time (time of execution) for the processes?
 c) What is the average waiting time for the processes? **12M**

| Processes | Execution Time (milliseconds) | Priority |
|-----------|-------------------------------|----------|
| P1 | 80 | 2 |
| P2 | 20 | 1 |
| P3 | 10 | 3 |
| P4 | 20 | 5 |
| P5 | 50 | 4 |

(or)

- b. Write short note on critical section problem. **3M**

5. a. Apply Round Robin pre-emptive scheduling algorithm on the given table and do the following:
 a) Create a Gantt (timeline) chart illustrating the execution of these processes?
 b) What is the average turnaround time (time of execution) for the processes?
 c) What is the average waiting time for the processes?
 (Time slice is taken as 10 milliseconds) **10M**

| Processes | Execution Time(milliseconds) |
|-----------|------------------------------|
| P1 | 20 |
| P2 | 10 |
| P3 | 25 |
| P4 | 15 |
| P5 | 5 |

- b. Discuss about Readers-Writers problem. **5M**

UNIT-III

6. a. Elaborate the different techniques to avoid deadlocks. **7M**
 b. Apply Banker's algorithm and Find the safe state sequence for the following scenario.
 5 processes P_0 through P_4 , 3 resource types: A (10 instances), B(5 instances) and C (7 instances). **8M**

| Processes | Allocation | Max | Available |
|-----------|------------|-------|-----------|
| | A B C | A B C | A B C |
| P_0 | 0 1 0 | 7 5 3 | 3 3 2 |
| P_1 | 2 0 0 | 3 2 2 | |
| P_2 | 3 0 2 | 9 0 2 | |
| P_3 | 2 1 1 | 2 2 2 | |
| P_4 | 0 0 2 | 4 3 3 | |