**Printed Page:-**                                           **Subject Code:-  BCSEH0403**
                                                              **Roll. No:**

# NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
### (An Autonomous Institute Affiliated to AKTU, Lucknow)
### B.Tech
### SEM: IV - THEORY EXAMINATION (20.....- 20.....)
### Subject: Operating Systems

 **Time: 2 Hours**                                           **Max. Marks: 50**

**General Instructions:**

**IMP:** *Verify that you have received the question paper with the correct course, code, branch etc.*
*1. This Question paper comprises of **three Sections -A, B, & C.** It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
*2. Maximum marks for each question are indicated on right -hand side of each question.*
*3. Illustrate your answers with neat sketches wherever necessary.*
*4. Assume suitable data if necessary.*
*5. Preferably, write the answers in sequential order.*
*6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*


## SECTION-A                                                                  15

1. Attempt all parts:-

1-a.       Real-time operating systems are primarily designed to handle (CO1, K1)          1

   (a)    General-purpose tasks

   (b)    Time-sensitive processing

   (c)    File system management

   (d)    User-level processes

1-b.       Choose the CPU scheduling algorithm that yields the lowest average waiting time.     1
           (CO2 , K1)

   (a)    FCFS

   (b)    SJF

   (c)    Round Robin

   (d)    Priority Scheduling

1-c.       A binary semaphore can have the following values (CO3, K1)                           1

   (a)    Any integer value

   (b)    0 and 1

   (c)    Only positive integers

   (d)    None of the above

1-d.       Variable partitioning suffers from (CO4, K1)                                          1

   (a)    Internal fragmentation

   (b)    External fragmentation

(c) Thrashing

(d) Segmentation fault

1-e. GPUs are optimized for (CO5, K1)     1

(a) Parallel computation

(b) Disk management

(c) Sequential task execution

(d) Cache memory management

2. Attempt all parts:-

2.a. Define Kernel? (CO1, K1)     2

2.b. Describe the role of the dispatcher in process scheduling. (CO2, K1)     2

2.c. Define process synchronization in operating system. (CO3, K1)     2

2.d. Explain the term "page fault" in demand paging. (CO4, K2)     2

2.e. Explain the term rotational latency. (CO5, K2)     2

**SECTION-B**     15

3. Answer any <u>three</u> of the following:-

3-a. Write a shell script program to find greatest among three numbers. (CO1, K4)     5

3-b. Explain the various components Process Control Block (PCB). (CO2, K2)     5

3.c. State dining philosopher's problem and give a solution using semaphores. (CO3, K2)     5

3.d. Explain the concept of paging with their advantages & disadvantages. (CO4, K2)     5

3.e. Explain the file access mechanism with their advantages and disadvantages. (CO5, K2)     5

**SECTION-C**     20

4. Answer any <u>one</u> of the following:-

4-a. Explain the multi-programming and multitasking operating system with their advantages & disadvantages. (CO1,K2)     4

4-b. Describe the different types of system call with their examples. (CO1, K2)     4

5. Answer any <u>one</u> of the following:-

5-a. Define process and also explain process states in details with diagram.(CO2, K2)     4

5-b. Consider the following four processes with the arrival time and CPU Burst time given in millisecond     4

| Process Name | Arrival Time | CPU Burst Time |
|---|---|---|
| P1 | 3 | 2 |
| P2 | 2 | 5 |
| P3 | 0 | 7 |
| P4 | 1 | 4 |

Calculate the average waiting time and turnaround time by using Non Preemptive SJF CPU scheduling Algorithm. (CO2, K4).

6. Answer any <u>one</u> of the following:-

| | | |
|---|---|---|
| 6-a. | Explain deadlock avoidance with suitable example using banker's algorithm. (CO3, K2) | 4 |
| 6-b. | Explain three requirements that a solution to critical–section problem must satisfy. (CO3, K2) | 4 |

7. Answer any <u>one</u> of the following:-

| | | |
|---|---|---|
| 7-a. | 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 occurs for the Least Recently Used (LRU) Page replacement algorithms, assuming three frames initially empty? (CO4, K3) | 4 |
| 7-b. | Define thrashing.Explain the term locality of reference and elaborate on its usefulness in presenting thrashing. (CO4, K3) | 4 |

8. Answer any <u>one</u> of the following:-

| | | |
|---|---|---|
| 8-a. | Explain the SCAN , LOOK and SSTF disk scheduling algorithm with example. (CO5,K2) | 4 |
| 8-b. | Define GPU and explain its basic role in computing. (CO5, K2) | 4 |