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Printed Page:-4 **Subject Code:- BMICA0304**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
MCA Integrated
SEM: III - THEORY EXAMINATION (2025 - 2026)
Subject: Operating System

Time: 3 Hours **Max. Marks: 100**

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 20

1. Attempt all parts:-

1-a. Which of the following is not the state of a process? [CO1, K2] 1

(a) New
(b) Old
(c) Waiting
(d) Running

1-b. In Priority Based Scheduling, if Processes have same priority then which Scheduling algorithm is used?[CO1, K2] 1

(a) SJN
(b) FCFS
(c) SRT
(d) Round Robin

1-c. A Process Control Block contains[CO2, K2] 1

(a) List of Open Files
(b) Process state
(c) Process ID
(d) all of the mentioned

1-d. Mutual Exclusion problem occurs _____[CO2, K2] 1

(a) Between 2 disjoint processes that do not interact
(b) Among processes that share resources
(c) Among processes that do not share resources
(d) Between processess which use different resources on different machines

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1-e. The index contains _____[CO3, K2] 1

(a) names of all contents of file
(b) pointers to each page
(c) pointers to the various blocks
(d) all of the mentioned

1-f. Program always deals with _____ [CO3, K2] 1

(a) logical address
(b) absolute address
(c) physical address
(d) relative address

1-g. Which command shows some attributes of a process?[CO4, K2] 1

(a) pid
(b) $$
(c) ps
(d) HOME

1-h. The Linux Kernel was written by?(K1,CO4) 1

(a) Brian Kernighan
(b) Dennis Ritchie
(c) Richard Stallman
(d) Linus Torvalds

1-i. How to display the value of a variable[CO5, K2] 1

(a) echo #var_name
(b) echo $var_name
(c) $var_name
(d) echo var_name

1-j. Which command is used to create new process?[CO5, K2] 1

(a) fork()
(b) new()
(c) sleep()
(d) None of these

2. Attempt all parts:-

2.a. Define Kernel, system programs, and application programs.[CO1, K2] 2

2.b. Define deadlock prevention[CO2, K2] 2

2.c. Define the concept of memory management in operating systems.[K1,CO3] 2

2.d. Explain any two filter commands.[CO4, K2] 2

2.e. What do you mean by root and ordinary user? [CO5, K2] 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i) Explain why Scheduling is necessary. Discuss the five different scheduling criteria 6

used in computing scheduling mechanism.[CO1, K2]

3.a.(ii) Demonstrate with a diagram how Process States change during execution. [CO1,K3] 6

3.b. Answer any one of the following:-

3.b.(i) Differentiate between binary semaphore and counting semaphore with examples.[CO2, K3] 6

3.b.(ii) Sketch a Resource Allocation Graph for single and multi-instance resources.[K4,CO2] 6

3.c. Answer any one of the following:-

3.c.(i) Analyze fragmentation by classifying its types and examining their advantages and disadvantages. [CO3, K4] 6

3.c.(ii) Analyze the C-SCAN Disk Scheduling Algorithm by examining its operation and evaluating it with an example. [CO3, K4] 6

3.d. Answer any one of the following:-

3.d.(i) Describe how can a file be copied, moved and renamed in Linux.[CO4, K2] 6

3.d.(ii) Analyze the process of creating and removing directories in Linux with suitable examples. [CO4, K4] 6

3.e. Answer any one of the following:-

3.e.(i) Explain how a WHILE LOOP construct is used in shell script. Elaborate with example.[CO5, K3] 6

3.e.(ii) Explain in detail the shell script features. Elaborate with examples. [CO3, K3] 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Evaluate the essential functions of the following types of operating system (a)Multiprocessing (b)Multitasking (c)Batch Processing (d)Real time. [CO1, K4] 10

4-b. Consider the set of 5 processes whose arrival time and burst time are given below- 10

Process Id	Arrival time	Burst time
P1	3	4
P2	5	3
P3	0	2
P4	5	1
P5	4	3

If the CPU scheduling policy is FCFS & SJF, calculate the average waiting time and average turn around time. [CO1, K3]

5. Answer any one of the following:-

5-a. Explain three requirements that a solution to critical–section problem must satisfy.[CO2, K4] 10

5-b. Assess different strategies for handling Deadlock and rank them based on efficiency.[K5,CO2] 10

6. Answer any one of the following:-

6-a. Suppose a disk contains 200 tracks (0-199) and the request queue contains track no: 10

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	93, 176, 42, 148, 27, 14,180. The current position of the read/write head is 55 moving towards larger cylinder numbers on its servicing pass. calculate the total number of track movements of read/write head using FCFS , SSTF scheduling.[CO3, K4]	
6-b.	Evaluate how file system protection and security mechanisms are handled by the operating system by judging their effectiveness. [CO3, K5]	10
7. Answer any one of the following:-		
7-a.	Explain all the directory commands in Linux in detail with examples.[CO4, K2]	10
7-b.	Examine the working of the chmod command with all its options. Support your analysis with examples. [CO4, K4]	10
8. Answer any one of the following:-		
8-a.	Write a shell script to print first 10 numbers using a loop construct. Starting number is 1.[CO5, K3]	10
8-b.	Write a shell script to print all odd numbers between 0 to 20. [CO5, K3]	10