Printed Page:-04 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 (2024 - 2025)

Subject: Operating Systems

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. Process are classified into different groups in[CO1, K2] 1

(a) shortest job scheduling algorithm

(b) Multilevel Queue Algorithm

(c) Priority Algorithm

(d) Round Robin Algorithm

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

1-e. What if a pointer is lost or damaged in a linked allocation?[CO3, K2] 1

(a) the entire file could get damaged

(b) only a part of the file would be affected

(c) there would not be any problems

(d) none of the mentioned

1-f. The operating system collects free memory spaces to form a contiguous memory block. This is known as [CO3,K2] 1

(a) Garbage Collection

(b) Dynamic Memory allocation

(c) Concatenation

(d) collision

1-g. What does the command chmod 777 filename do?[CO4, K2] 1

(a) Changes the owner of the file

(b) Deletes the file

(c) Gives read, write, and execute permissions to everyone for that file

(d) Hides the file

1-h. which command is used to display the file sample.txt one page at a time [CO4, K2] 1

(a) man sample.txt > more

(b) cat sample.txt < more

(c) cat sample.txt | more

(d) None of the mentioned

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

(a) fork()

(b) new()

(c) sleep()

(d) None of these

1-j. How to replace one character in vi editor?[CO5,K2] 1

(a) x

(b) d

(c) r

(d) None of these

2. Attempt all parts:-

2.a. Discuss Process state transition diagram. Explain it with suitable diagram.[CO1, K2] 2

2.b. Define deadlock avoidance algorithm [CO2, K2] 2

.

2.c. Define Virtual Memory Concept using demand paging? [CO3, K3] 2

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

2.e. Define positional parameters [CO5, K2] 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Differentiate between system software and application software with example.[CO1, K2] 6

3-b. Explain the terms:- i) Process control Block(PCB) ii) Context switching [CO1, K2] 6

3-c. Explain Dining Philosopher problem in detail. [CO2, K3] 6

3-d. Explain readers writers problem in Detail.[CO2, K3] 6

3.e. Let us 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. Number of free frame is 3. Find the number of page faults by using Optimal page replacement algorithm.[CO3, K3] 6

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

3.g. Explain how a CASE construct is used in shell script. Elaborate with example. [CO5, K3] 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Read the instructions carefully and answer the following questions, check figure[CO1, K3] 10

Consider the set of 5 processes whose arrival time and burst time are given below –

Process	Arrival Time	Burst Time
P1	0	5
P2	1	6
P3	2	3
P4	3	1
P5	4	5
P6	6	4

(i) If the CPU scheduling policy is Round Robin with time quantum = 4 unit, calculate the average waiting time and average turnaround time and also maintain Gantt chart and ready queue.

(ii) Also find Average waiting time and average turnaround time for SRTF and compare the performance with round robin.

4-b. What are the various objectives and functions of Operating systems? Discuss in 10

.

detail.[CO1, K2]

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

5-a. Read the instructions carefully and answer the following questions, check figure of the questions[CO2, K3] 10

(i) Discuss SJF with pre-emption and SJF with non-pre-emption.

(ii) Consider the following-

Process	Arrival Time	Burst time
P1	0	7
P2	2	4
P3	4	1
P4	5	4

Draw a Gantt chart and calculate average waiting time, average turnaround time and average response time for SJF and SRTF (SJF with pre-emption).

5-b. Write a short notes on:- (i) Deadlock Ignorance (ii) Deadlock Detection and Recovery (iii) Deadlock Prevention [CO2, K3] 10

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

6-a. Suppose that the head of moving head disk with 200 tracks numbered 0 to 199 is currently serving the request at track 143 and has just finished a request at track 125. If the queue request is kept in FIFO order, 86, 147, 91, 177 , 94, 150,102, 175, 130. What is the total head movement to satisfy these requests for i)SCAN ii) FCFS iii) SSTF disk scheduling algorithm. [CO3, K3] 10

6-b. Let us Consider the following reference string 1,3,2,4,0,1,7,4,0,2,3,5,1,0,7,1,0,2 .How many page faults will occur for: i. FIFO Page Replacement ii. LRU Page Replacement iii. Optimal Page Replacement Assuming four frames (initially empty). [CO3, K3] 10

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

7-a. Explain all the directory commands in Linux in detail with examples.[CO4, K2] 10

7-b. Differentiate between ping command and traceroute command.[CO4, K3] 10

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

8-a. Write a shell script to print all odd numbers between 0 to 20. [CO5, K3] 10

8-b. Write a shell script to implement a calculator doing addition, subtraction, multiplication and division.[CO5, K3] 10