Printed Page:- 05

Subject Code:- AMICA0301

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA Int.

SEM: III - THEORY EXAMINATION (2023 - 2024)

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. Why process communication is needed? (CO1) 1

(a) Share Information
(b) Speed up Computation
(c) Modularity
(d) All Mentioned Above

1-b. The operating system works between (CO1) 1

(a) User and Computer
(b) Network and User
(c) One user to another user
(d) All of the these

1-c. Each process has a segment of code called _____ in which the process changes common variables (CO2) 1

(a) Non Critical section
(b) Critical Section
(c) Exit Section
(d) Entry section

1-d. Information about a process is maintained in a _____ (CO2) 1

(a) process control block
(b) file control block

(c) program control block
(d) translation lookaside buffer

1-e. Virtual memory can be implemented with (CO3) 1

(a) Large secondary memory
(b) Large main memory
(c) Cache and main memory
(d) None of the above

1-f. In segmentation, each address is specified by _____ (CO3) 1

(a) a segment number & offset
(b) an offset & value
(c) a value & segment number
(d) a key & value

1-g. _____ is a Linux command that displays the current username. (CO4) 1

(a) Display
(b) Showuser
(c) Whoami
(d) Currentuser

1-h. Which command is used to create a file in Linux? (CO4) 1

(a) cut
(b) cat
(c) create
(d) mkdir

1-i. Which command is used to close the vi editor? (CO5) 1

(a) q
(b) wq
(c) both q and wq
(d) none of the mentioned

1-j. What is the default mode of vi editor? (CO5) 1

(a) Command mode
(b) Read Mode
(c) Write Mode
(d) Execute Mode

2. Attempt all parts:-

2.a. Define throughput. (CO1) 2

2.b. Define Deadlock Detection (CO2) 2

2.c. Define compaction. (CO3) 2

2.d. Elaborate all three file permission in Linux. (CO4) 2

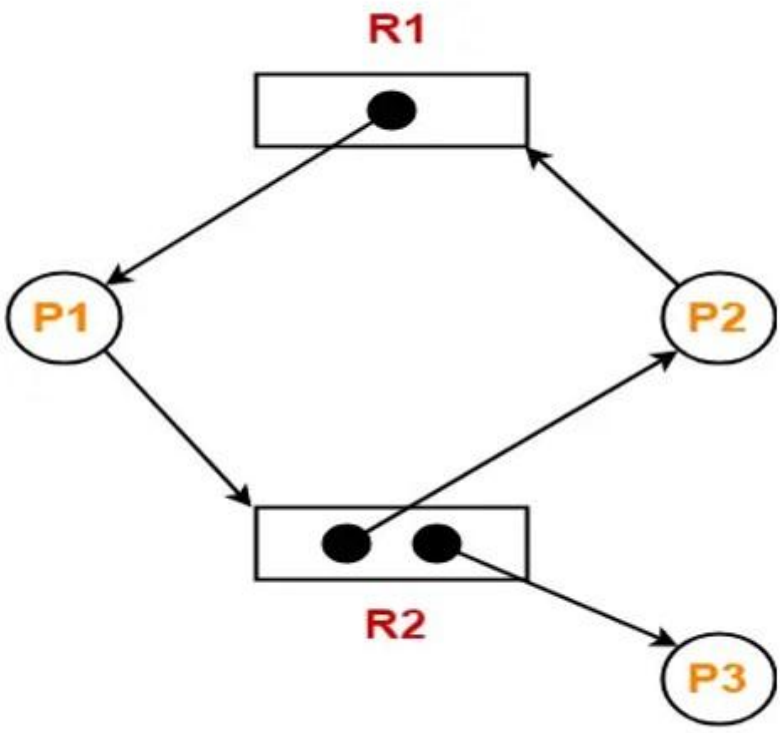
2.e.	Why is a shell script needed? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Define Kernel, system programs, and application programs. (CO1)	6
3-b.	Define Process state with suitable diagram.(CO1)	6
3-c.	Write Short note on:- (i) Critical Section problem (ii) Bounded Waiting (CO2)	6
3-d.	Read the given information carefully- (CO2)	6

Consider the resource allocation graph in the figure-



Find if the system is in a deadlock state otherwise find a safe sequence.

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 Find the number of page faults by using Optimal Page Replacement algorithm. No. of frames is 4. (CO4)	6
3.f.	Explain any six Linux commands which can use the pipe operator. (CO4)	6
3.g.	Explain the difference in background process and foreground process. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Define essential properties of the following types of Operating system: i) Batch operating system ii) Interactive operating system iii) Time sharing operating system iv) Real time operating system v) Distributed operating system (CO1)	10
4-b.	Read the instructions carefully & answer the given questions- (CO1)	10

Consider the following table of arrival time, Priority, and burst time for five processes **P1, P2, P3, P4,** and **P5.** Considering lesser the number higher the priority, find average waiting time, average turnaround time and average response time for priority scheduling (for both pre-emptive and non-pre-emptive).

Priority	Process	Arrival Time	Burst Time
2	P1	0	11
0	P2	5	28
3	P3	12	2
1	P4	2	10
4	P5	9	67

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

5-a. Discuss any five system calls stating their use with the help of examples. (CO2) 10

5-b. Read the question carefully and give the answer accordingly (CO2) 10

Let us consider the following snapshot for understanding the banker's algorithm:

Processes	Allocation A B C	Max A B C	Available A B C
P0	1 1 2	4 3 3	2 1 0
P1	2 1 2	3 2 2	
P2	4 0 1	9 0 2	
P3	0 2 0	7 5 3	
P4	1 1 2	1 1 2	

1. Calculate the content of the need matrix?
2. Check if the system is in a safe state?
3. Determine the total sum of each type of resource?

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

6-a. Define first fit, best fit and worst fit and if Given five memory partitions of 100Kb, 500Kb, 200Kb, 300Kb, 600Kb (in order), how would the first-fit, best-fit, and worst fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb, and 426 Kb (in order)? Which algorithm makes the most efficient use of memory? (CO3) 10

6-b.	Suppose that a disk drive has 500 cylinders, numbered 0 to 499. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 470, 213, 374, 148, 150, 102, 175, 130. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms (i) FIFO, (ii) SSTF, (iii) SCAN ? (CO3)	10

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

7-a.	Differentiate between Graphical User Interface(GUI) and Command Line Interface (CLI) (CO4)	10
7-b.	Demonstrate the use of sort, cut, paste, grep and more command with examples. (CO4)	10

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

8-a.	Differentiate between BREAK and CONTINUE construct in Linux with the help of examples. (CO5)	10
8-b.	Describe the need of command line arguments in Linux. Explain with examples. (CO5)	10