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Subject Code:- BCSBS0403

Roll. No:

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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: 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. The main purpose of an operating system is to: (CO1, K1) 1
- (a) Manage hardware resources
 - (b) Manage user inputs
 - (c) Perform data encryption
 - (d) Ensure network connectivity
- 1-b. The Process Control Block contains all of the following except: (CO1,K1) 1
- (a) Program counter
 - (b) Process state
 - (c) Stack pointer
 - (d) Hard disk speed
- 1-c. Identify the primary design goal of the Round Robin scheduling algorithm. (CO2, K1) 1
- (a) Reduce waiting time
 - (b) Improve throughput
 - (c) Ensure fair time-sharing among processes
 - (d) Minimize CPU utilization
- 1-d. Identify the correct definition of "context switch" in process management. (CO2, K1) 1
- (a) Switching from one process to another

- (b) Changing process priority
- (c) Allocating memory to a process
- (d) Killing a process
- 1-e. 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-f. Strict alternation ensures synchronization between two processes using (CO3, K1) 1
 - (a) A turn variable
 - (b) A semaphore
 - (c) A shared lock
 - (d) Hardware interrupts
- 1-g. Memory management is primarily handled by: (CO4, K1) 1
 - (a) CPU
 - (b) Operating System
 - (c) Compiler
 - (d) I/O Devices
- 1-h. The anomaly that occurs in FIFO but not in LRU is: (CO4, K1) 1
 - (a) Page fault
 - (b) Thrashing
 - (c) Belady's Anomaly
 - (d) Stack anomaly
- 1-i. Identify the command that is used to remove an empty directory. (CO5, K1) 1
 - (a) rmdir
 - (b) remove
 - (c) del
 - (d) delete
- 1-j. What does the command `chmod 777 filename` do? (CO5, K1) 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
- 2. Attempt all parts:-
- 2.a. Differentiate between multitasking and multiprocessing operating systems. (CO1, K2) 2
- 2.b. Differentiate between preemptive and non-preemptive scheduling. (CO2, K2) 2
- 2.c. Explain how race conditions occur in concurrent systems. (CO3, K2) 2

- 2.d. State the purpose of virtual memory. (CO4, K2) 2
- 2.e. Explain all three file permission in Linux. (CO5, K2) 2

SECTION-B

30

3. Answer any five of the following:-

- 3-a. Describe the different states of a process, including ready, running, waiting, and terminated, and explain the transitions between them. (CO1,K2) 6
- 3-b. Describe differences between symmetric and asymmetric multiprocessing. What are the advantages and disadvantages of multiprocessor systems? (CO1, K2) 6
- 3-c. Explain Round Robin Scheduling with an example. (CO2, K4) 6
- 3-d. Explain the First come first serve (FCFS) and Shortest Job First (SJF) scheduling algorithm with its advantages and disadvantages. Compare average waiting time of both the algorithm with suitable example. (CO2, K4) 6
- 3.e. Elaborate readers writers problem in Detail. (CO3, K4) 6
- 3.f. Explain when will the page faults occur. Also explain what is the procedure for handling the page fault. (CO4, K4) 6
- 3.g. Describe any six Linux commands with examples. (CO5, K2) 6

SECTION-C

50

4. Answer any one of the following:-

- 4-a. Discuss the role of a kernel in an operating system. Explain the differences between a monolithic kernel and a microkernel. (CO1, K3) 10
- 4-b. Illustrate the layered structure of an operating system and explain the role of each layer in system operation. (CO1, K3) 10

5. Answer any one of the following:-

- 5-a. List and describe the types of CPU schedulers used in operating systems. Provide a diagram to support your explanation. (CO2, K3) 10
- 5-b. Distinguish between Multilevel Queue and Multilevel Feedback Queue Scheduling. (CO2, K3) 10

6. Answer any one of the following:-

- 6-a. Explain Resource allocation graph. Discuss single instance and multi instance RAG suitable example. (CO3, K2) 10
- 6-b. Explain Race condition with example. Also explain Dining Philosopher problem with figure. (CO3, K4) 10

7. Answer any one of the following:-

- 7-a. Given a reference string: 4, 7, 6, 1, 7, 6, 1, 2, 7, 2 and a frame size of 3, calculate the number of page faults using FIFO, Optimal and LRU page replacement algorithm. (CO4, K4) 10
- 7-b. Consider five memory partitions of size 100 KB, 500 KB, 200 KB, 300 KB and 600 KB. These partitions need to be allocated to four processes of sizes 212 KB, 417 KB, 112 KB and 426 KB in that order. Perform the allocation of processes 10

using-First Fit Algorithm,Best Fit Algorithm and Worst Fit Algorithm. (CO4, K4)

8. Answer any one of the following:-

- 8-a. Given a file with the following permissions: -rwxr-xr--, explain what each part represents and how you would change the permissions to allow the group to write to the file. (CO5, K3) 10
- 8-b. Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 122, 14, 124, 65, 67. The head is initially at cylinder number 53 moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199. calculate the total number of track movements of read/write head using FCFS , SSTF ,SCAN,C-SCAN and LOOK Scheduling algorithm. (CO5, K4) 10

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