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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 (2022-2023)

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. | A process control block (PCB) also called a (CO1) | 1 |
| | (a) Task Controlling Box | |
| | (b) Task Calling Box | |
| | (c) Task Connect Box | |
| | (d) none of the mentioned | |
| 1-b. | The first OS built by Microsoft was (CO1) | 1 |
| | (a) DOS | |
| | (b) IBM 701 | |
| | (c) Window | |
| | (d) Blackberry | |
| 1-c. | Which one of the following is not a valid state of a thread? (CO2) | 1 |
| | (a) parsing | |
| | (b) running | |
| | (c) ready | |

(d) blocked

- 1-d. Consider a set of 5 processes whose arrival time, CPU time needed and the priority are given below 1

Process	Priority	Arrival Time (in ms)	CPU Time Needed (in ms)
P1	0	10	5
P2	0	5	2
P3	2	3	1
P4	5	20	4
P5	10	2	3

P1 0 10 5

P2 0 5 2

P3 2 3 1

P4 5 20 4

P5 10 2 3

smaller the number, higher the priority.

If the CPU scheduling policy FCFS, the average waiting time will be

- (a) 12.8 ms
- (b) 8 ms
- (c) 6.5 ms
- (d) none of the mentioned

- 1-e. RAG stands for (CO3) 1

- (a) Resource and Graph
- (b) Resource Allocation Graph
- (c) Resource After Graph
- (d) None of the above

- 1-f. Deadlock avoidance requires knowledge of future (CO3) 1

- (a) Process
- (b) Resource
- (c) Program
- (d) Application

- 1-g. MMU stands for (CO4) 1

- (a) Micro Memory Unit
- (b) Memory Management unit
- (c) Memory Micro Unit
- (d) None of these

- 1-h. In a paged memory, the page hit ratio is 0.35. The required to access a page in secondary memory is equal to 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is? (CO4) 1

- (a) 3.0 ns

- (b) 68.0 ns
- (c) 68.5 ns
- (d) none of the mentioned

- 1-i. A disk that has a boot partition is called a _____ (CO5) 1
- (a) start disk
 - (b) end disk
 - (c) boot disk
 - (d) all of the mentioned
- 1-j. When the head damages the magnetic surface, it is known as _____ (CO5) 1
- (a) disk crash
 - (b) head crash
 - (c) magnetic damage
 - (d) all of the mentioned

2. Attempt all parts:-

- 2.a. Define Process. (CO1) 2
- 2.b. Define Average Waiting Time (CO2) 2
- 2.c. List three examples of deadlocks that are not related to a computer system environment? (CO3) 2
- 2.d. Define Compaction. (CO4) 2
- 2.e. Explain SSTF Algorithm. (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. Explain the task of Operating System as File Management. Explain advantages and disadvantages of context switching? (CO1) 6
- 3-b. What is a context switch? In a multitasking operating system, under what circumstances will a context switch occur? (CO1) 6
- 3-c. What are the difference between Short-term and Middle-term scheduler? (CO2) 6
- 3-d. Describe Priority based CPU scheduling with example.(CO2) 6
- 3.e. What are co-operating processes? Describe the mechanism of inter-process communication using shared memory in a producer-consumer problem. (CO3) 6
- 3.f. Explain First-Fit with an example. (CO4) 6
- 3.g. Write a Shell Script to print the following pyramid (CO5) 6

1 2
1 2 3
1 2 3 4
1 2 3 4 5

SECTION C

50

4. Answer any one of the following:-

- 4-a. Explain different types of tasks of Operating System. (CO1) 10
- 4-b. What is the purpose of Command Interpreter? Why is it usually separate from the kernel? (CO1) 10

5. Answer any one of the following:-

- 5-a. Consider the set of 5 processes whose arrival time and burst time are given below- 10
(Process P1, Arrival Time=00, Burst Time=05;
Process P2, Arrival Time=01, Burst Time=03;
Process P3, Arrival Time=02, Burst Time=01;
Process P4, Arrival Time=03, Burst Time=02;
Process P5, Arrival Time=04, Burst Time=03)
If the CPU scheduling policy is Round Robin with time quantum = 2 unit, calculate the average waiting time and average turnaround time. (CO2)
- 5-b. Consider the set of 5 processes whose arrival time and burst time are given below- 10
(Process P1, Arrival Time=03, Burst Time=04;
Process P2, Arrival Time=05, Burst Time=03;
Process P3, Arrival Time=00, Burst Time=02;
Process P4, Arrival Time=05, Burst Time=01;
Process P5, Arrival Time=04, Burst Time=03)
If the CPU scheduling policy is FCFS, calculate the average waiting time and average turnaround time. (CO2)

6. Answer any one of the following:-

- 6-a. Describe the conditions required to solve the critical section problem. Explain Resource Allocation Graph with a suitable example and graph ? (CO3) 10
- 6-b. What is the important feature of critical section? State the Readers Writers problem and give solution using semaphore. (CO3) 10

7. Answer any one of the following:-

- 7-a. Explain paging scheme of memory management. What hardware support is needed for its implementation? Write its advantages and disadvantages? (CO4) 10

- 7-b. Explain TLB , TLB Hit, TLB Miss. Compute the effective memory access time of cache memory. if TLB hit ratio = 0.9, RAM access time $T=100\text{ns}$ and TLB access time $t=20\text{ns}$. (CO4) 10

8. Answer any one of the following:-

- 8-a. Explain different free space management techniques in detail. Explain the file system in UNIX ? (CO5) 10
- 8-b. Explain SCAN and C-SCAN Disk Scheduling algorithm with example. (CO5) 10

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