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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - CARRY OVER THEORY EXAMINATION - SEPTEMBER 2022

Subject: Operating Systems

Time: 3 Hours Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark each & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. 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 one of the following errors will be handles by the operating system? (CO1) 1

(a) power failure

(b) lack of paper in printer

(c) connection failure in the network

(d) all of the mention

1-b. In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called (C01) 1

(a) process scheduling

(b) process rescheduling

(c) traffic controller

(d) Processor Management

1-c. Under which category Round-Robin scheduling falls ? (CO2) 1

(a) Preemptive scheduling

(b) Nonpreemptive scheduling

(c) All of the mentioned

(d) None of the mentioned

1-d. From the time of submission of a process to the time of completion, The interval is termed as(CO2) 1

(a) waiting time

(b) turnaround time

(c) response time

(d) throughput

1-e. A system is in the safe state if(CO3) 1

(a) the system can allocate resources to each process in some order and still avoid a deadlock

(b) there exist a safe sequence

(c) all of the mentioned

(d) none of the mentioned

1-f. The circular wait condition can be prevented by (CO3) 1

(a) defining a linear ordering of resource types

(b) using thread

(c) using pipes

(d) all of the mentioned

1-g. State true of false. i) With paging, each process is divided into relatively small, fixed-size pages.ii) Segmentation provides for the use of pieces of varying size. (CO4) 1

(a) True, False

(b) True, True

(c) False, True

(d) False, False

1-h. The principle of locality of reference justifies the use of (CO4) 1

(a) virtual memory

(b) interrupts

(c) main memory

(d) cache memory

1-i. Name the block that exists for each file that contains information about the file, including ownership, permissions and location of the file contents.(CO5) 1

(a) metadata

(b) file control block

(c) process control block

(d) all of the mentioned

1-j. The set of tracks that are at one arm position make up a (CO5) 1

(a) magnetic disks

(b) electrical disks

(c) assemblies

(d) cylinders

2. Attempt all parts:-

2.a. Describe the operating system operations?(CO1) 2

2.b. Explain CPU bounded and I/O bounded process.(CO2) 2

2.c. List out the necessary conditions to be satisfied for the solution of critical section problem.(CO3) 2

2.d. Differentiate between static and dynamic loading with their advantages & disadvantages.(CO4) 2

2.e. Explain Input output Buffering.(CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. Describe Monolithic and Microkernel Systems. Mention the differences between them? (CO1) 6

3-b. Define Real time systems? Define the applications of real-time systems? How are they different from time-sharing system?(CO1) 6

3-c. Explain why Scheduling is necessary. Discuss the five different scheduling criteria's used in computing scheduling mechanism.(CO2) 6

3-d. Explain the steps involved in process creation and process termination.(CO2) 6

3.e. Explain Producer/Consumer problem in detail. (CO3) 6

3.f. 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 FIFO page replacement algorithm.(CO4) 6

3.g. Suppose the order of request is given as (82,170,43,140,24,16,190) and current position of Read/Write head is at 50. Use FCFS disk scheduling algorithm to calculate the total seek time? (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. List the advantages of multiprocessing systems and multiuser systems.(CO1) 10

4-b. What are the various objectives and functions of Operating systems? Discuss in detail.(CO1) 10

5. Answer any one of the following:-

5-a. "Let us consider the following set of five processes, with the length of CPU burst time given in milliseconds: Draw the Gantt chart, calculate the average waiting time and turnaround time by using the Preemptive Priority (Max priority=1,Min Priority=4), FCFS, and Round Robin CPU scheduling algorithm. (Time Quantum=3) (CO2) 10

Question Instruction

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

5-b. Distinguish between i) Process and Program ii) Multiprogramming and multiprocessing iii) Job scheduling and CPU scheduling (CO2) 10

6. Answer any one of the following:-

6-a. Illustrate Banker's safety algorithm with an example.(CO3) 10

6-b. Let us consider the above snapshot and answer the following : i. What is the content of need matrix? ii. Is the system in a safe state or not? (CO3) 10

Question Instruction

Process	Current Allocation				Maximum				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	1	2	1	5	2	0
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6				
P4	0	6	3	2	0	6	5	2				
P5	0	0	1	4	0	6	5	6				

7. Answer any one of the following:-

7-a. Explain how paging supports virtual memory. With neat diagram explain hoe logical address is translated into physical address (CO4) 10

7-b. Let us consider the following segment table (CO4) 10

Segment No	Base	Limit
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What is the physical address for the following logical addresses?

a. <0,430>
b. <1,10>
c. <2,500>
d. <3,400>
e. <4,112>

8. Answer any one of the following:-

8	Explain file system implementation using linked list with index and i-node in detail? (CO5)	10
8	Explain the Direct Memory Access in detail. (CO5)	10