

Printed Page:-

Subject Code:- ACSE0403B

Roll. No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - CARRY OVER THEORY EXAMINATION - APRIL 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. In which year the first batch operating system was developed by General Motors for use on an IBM 701. (CO1) 1
- (a) mid 1940's
(b) mid 1950's
(c) mid 1970's
(d) mid 1960's
- 1-b. In Unix, which system call creates the new process? (CO1) 1
- (a) create
(b) fork
(c) new
(d) none of the mentioned
- 1-c. Consider an arbitrary set of CPU-bound processes with unequal CPU burst lengths submitted at the same time to a computer system. Which one of the following process scheduling algorithms would minimize the average waiting time in the ready queue? (CO2) 1

- (a) Shortest remaining time first
(b) Round-robin with time quantum less than the shortest CPU burst
(c) Uniform random
(d) Highest priority first with priority proportional to CPU burst length
- 1-d. The number of processes completed per unit time is known as ____ (CO2) 1
(a) Output
(b) Throughput
(c) Efficiency
(d) Capacity
- 1-e. A system is in the safe state if ____ (CO3) 1
(a) There exist a safe sequence
(b) Process select the resources on their own
(c) Process switching from one to another
(d) the system can allocate resources to each process in some order and still avoid a deadlock
- 1-f. What are the two kinds of semaphores ?(CO3) 1
(a) mutex & counting
(b) binary & counting
(c) counting & decimal
(d) decimal & binary
- 1-g. The first fit, best fit and worst fit are strategies to select a ____ (CO4) 1
(a) process from a queue to put in memory
(b) processor to run the next process
(c) free hole from a set of available holes
(d) all of the mentioned above
- 1-h. Which of the following information is not included in memory table? (CO4) 1
(a) The allocation of main memory to process.
(b) The allocation of secondary memory to process
(c) Any information needed to manage virtual memory
(d) Any information about the existence of file
- 1-i. What will happen in the single level directory? (CO5) 1
(a) all directories must have unique names
(b) all files must have unique names

(c) all files must have unique owners

(d) all of the mentioned above

1-j. 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 above

2. Attempt all parts:-

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

2.b. What do you mean by convoy effect? (CO2) 2

2.c. List the two approaches for deadlock recovery. (CO3) 2

2.d. Define thrashing. (CO4) 2

2.e. Give brief about Contiguous Memory. (CO5) 2

SECTION B

30

3. Answer any five of the following:-

3-a. What are system calls? Explain the different categories of the system calls. (CO1) 6

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

3-c. Explain types of thread? Define which type of thread is important for operating system. (CO2) 6

3-d. Explain process scheduler. What criteria affect the schedulers performance? (CO2) 6

3.e. Discuss the atomic operations of Semaphore and show how mutual exclusion can be implemented. (CO3) 6

3.f. What is paging? Explain the paging hardware. (CO4) 6

3.g. Explain and compare the FCFS and SSTF disk scheduling algorithms with example. (CO5) 6

SECTION C

50

4. Answer any one of the following:-

4-a. Explain the following types of operating system (a) Multiprocessing (b) Multitasking (c) Batch Processing (d) Multithreading (e) Distributed (CO1) 10

4-b. Explain the characteristics of operating system in detail.(CO1) 10

5. Answer any one of the following:-

5-a. Discuss how scheduling algorithms are selected for a system. What are the criteria considered? Explain the different evaluation Methods.(CO2) 10

5-b. Explain any three scheduling algorithms. (CO2) 10

6. Answer any one of the following:-

6-a. Illustrate critical section problem along with the necessary conditions that must satisfy the solution. Explain any one solution. (CO3) 10

6-b. Discuss the inter-process communication schemes along with their advantages and drawbacks.(CO3) 10

7. Answer any one of the following:-

7-a. Describe the LRU page replacement algorithm, assuming there are 4 frames and the page reference string is 7, 0, 1, 2, 0, 3, 0 4, 2 ,3, 0, 3, 2, 1, 2, 0, 1, 7 ,0 ,1 Find the number of page faults by using LRU and Optimal Page Replacement Algorithm. (CO4) 10

7-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 three and four frames (initially empty). (CO4) 10

8. Answer any one of the following:-

8-a. Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 122, 14, 124, 65, 67. Assume Shortest Seek Time First disk scheduling algorithm is used. 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. Compute the total head movement (in number of cylinders) incurred while servicing these requests? (CO5) 10

8-b. Give a brief about Raspbian operating system. Explain the architecture of Linux. (CO5) 10