Class Test (1) Examination: Fall-2024
Course Code: CIS 232 (Batch: 18)
Course Title: Operating System

Time: 30 Minutes

Total Marks: 15

1. What do you mean by an operating system? Briefly explain the different function of operating systems.   5

2. Define the process? Explain the process state diagram.   5

3. What are co-operating processes? Describe the mechanism of inter process communication using shared memory in a dining philosophers problem.   5

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1. What is the need of CPU scheduling? What are the criteria of scheduling?   3

2. Consider the following set of processes, with the length of CPU bust given in   6
    milliseconds:

Process	P1	P2	P3	P4	P5
B.T.	11	4	14	9	21
A.T.	5	0	0	1	2

If the CPU scheduling policy is Round Robin with time quantum = 5 unit, calculate the
average waiting time and average turn around time.

3. Suppose you want to build an operating system, you want to implement methods for   6
handling deadlock. Which method will you add in your operating system and why?
Explain the benefits of your chosen method over others in details.

P_2 P_1

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1. Slightly discuss the difference between internal and external fragmentation for a   4
    system that perform contiguous memory allocation.

2. Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125   5
    KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes
    of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order)? Rank the algorithms
    in terms of how efficiently they use memory.

3. How many page faults will occur for the following mentioned page replacement   6
    algorithms for the page reference string R in a memory system with 3 frames?

    R = 1, 2, 3, 4, 2, 1, 5, 6, 7, 2, 1, 2, 3, 5, 7, 6, 3, 2, 1, 2, 3, 6,

    i) FIFO

    ii) LRU

Daffodil International University
Department of Computing and Information System
Faculty of Science & Information Technology
Final Examination, Fall 2024
Course Code: CIS 232
Course Title: Operating Systems

Time: 02:00 Hours   Marks: 40

[The figures in the right margin indicate the full marks and corresponding course outcomes.
All portions of each question must be answered sequentially.]

1. a) What do you mean by process? Explain the process state diagram? [3]

   b) How does a CPU switch from one process to another, and what steps are [3]
   involved in making this transition?

   c) What is a Process Control Block (PCB) in the context of operating systems, [4] CO2
   and what specific information does it typically store for each process? How
   is the PCB used in process management and scheduling within an operating
   system?

2. a) Consider the following set of processes with their respective arrival times [5]
   and burst times (in milliseconds) provided below.

Process	Arrival time	Burst time
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

   If the CPU scheduling policy is Round Robin with time quantum = 2 unit, CO3
   calculate the average waiting time and average turnaround time.

   b) Which of the following scheduling algorithms could result in starvation? [3]
   Justify your answer.
   i. First-come, First served
   ii. Shortest Job First
   iii. Round robin
   iv. Priority

   c) Differentiate between preemptive and non-preemptive CPU scheduling. [2]

3. Consider the following snapshot of a system:

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

a) What is the content of the matrix Need? [2]

b) Is the system in a safe state? Describe with proper explanation. [4]

c) If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately? [4] CO4

4. a) State the differences between Paging and Segmentation. [3]

b) Explain the concept of contiguous allocation in main memory within the context of operating systems. [2]

c) Consider the following reference string, and also page frame size is three. [5]
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 1, 2, 0

CO5

i. Find total number of page fault using Optimal Page Replacement Algorithm.

ii. Find total number of page Hits.

iii. Find page fault and page hits ratio.

Lab Final (OS) (Batch 18)

Marks: 40
Date: 11-12-2024

u are managing a Student Management System for your university's Computer Science partment. The system needs to handle student records, grade calculation, for university super up you need to manage fruits shop and handle the process.

Directory Structure and File Management (15 marks)

Create a directory structure:

```
/university/CS/
├── students/
├── courses/
├── attendance/
└── backups/
```
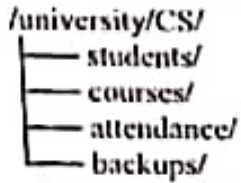
- Create a file "student_records.txt" with following student information (one per line):
  ID, Name, CGPA
  (Add at least 5 students)
- Create a backup directory and copy student_records.txt there
- Change permissions of student_records.txt to allow read-write for owner, read for group, and no access for others
- Display the contents of student_records.txt

1. Shell Script - Grade Calculator (15 marks)

Create a script named "grade_calculator.sh" that:

- Prompts user to enter marks (0-100)
- Calculates and displays grade based on:
  - 90-100: A+
  - 80-89: A
  - 70-79: B
  - 60-69: C
  - Below 60: F
- Stores results in "grade_report.txt"
- Make script executable and demonstrate its working

Fruit Shop Inventory

Create a script named "fruit_shop.sh" that:

- Creates an array of fruits: "Apple" "Banana" "Orange" "Mango" "Grape"
- Creates an array of prices: 2 1 3 4 2
- Using a loop, display both array like below:
  1. Apple
  2. Banana
  and
  1. $2
  2. $1

3. Write an FCFS Scheduling Program in C to determine the average waiting time and average turnaround time given n processes and their burst times. (10 marks)

Process	Arrival Time	Burst Time
P1	0	5
P2	0	11
P3	0	11