TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2080 Baishakh

Exam.	Back		
Level	BE	Full Marks	80
Programme	BEI	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Operating System *(CT 612)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) Explain OS as an Extended Machine. Differentiate between Monolithic Kernel and Micro-Kernel. [2+4]

   b) Explain operating system as a virtual Machine. [4]

2. a) Differentiate between Preemptive and Non-Preemptive Scheduling. Apply MLQ scheduling for following set of processes of two queues Q1 and Q2 where Priority of Q1 is greater than that of Q2 and Q1 uses Round Robin (Time Quantum = 2) and Q2 uses FCFS.

Process	AT	BT	Queue Number
P1	0	5	1
P2	2	12	2
P3	5	3	1
P4	10	6	1

   Construct Gantt –Chart and compute average TAT for above scenario. [2+4]

   b) What is multithreading? Explain five state process model with figure. [4]

3. a) Why process need to be synchronized? Explain Peterson's Solution in mutual exclusion. [2+3]

   b) What is Semaphore? How can Producer Consumer problem be solved using Semaphore? Explain. [1+4]

4. a) Why multilevel paging is required? [2]

   b) Consider the following page reference string: 5,0,2,1,0,3,0,2,4,3,0,3,2,1,3,0,1,5

   Calculate page hit percentage. How many page faults would occur for the FIFO, Optimal, LFU and LRU replacement algorithms having four frames? Remember all frames are initially empty, so your first unique page will cost one fault each. [8]

5. What are the different methods for allocating disk space for file? Explain free space management techniques. [3+7]

6. What are the functions of device independent I/Q software? Suppose that a disk has 5000 cylinders, numbered from 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO order is:

   86,1470,913,1774,948,1509,1022,1750,130

   Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for FCFS, SSTF, C-SCAN and C-LOOK Algorithm? [2+8]

7. Explain Coffman conditions for deadlock. Consider the following snapshot

Processes	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Is the state safe? If so, show the safe execution of processes. [3+7]

8. Write short notes on: [4×2.5]
   a) Cryptography
   b) Access Control List
   c) Roles of System Admin
   d) AWK Tool

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2079 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEI	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Operating systems *(CT 612)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. a) Why is the process table needed in a timesharing system? Is it also needed in personal computer systems running UNIX or Windows with a single user? [6]

   b) Distinguish between Shell and Kernel. [4]

2. a) What are the advantages and disadvantages of implementing threads in user space? [4]

   b) Let us consider five processes with given arrival time and length of the CPU burst given in milliseconds. [6]

Process	Arrival time	CPU time
P1	0	9
P2	1	5
P3	2	2
P4	3	6
P5	4	8

   Calculate the turnaround time and waiting time for all processes applying First Come First Serve, Shortest Job first and Round Robin (time quantum = 3) algorithms.

3. Define race condition. What are the requirements of mutual exclusion? How can you achieve mutual exclusion using Peterson's Solution? Explain with pseudo code. [2+2+6]

4. a) Differentiate between Compaction and Coalescing technique. [4]

   b) Consider a swapping system in which memory consists of the following hole sizes in memory order: 10 MB, 4 MB, 20 MB, 18 MB, 7 MB, 9 MB, 12 MB and 15 MB. Which hole is taken for successive segment requests of [6]

   (i) 12 MB
   (ii) 10 MB
   (iii) 9 MB

   for first fit? Now repeat the question for best fit and worse fit.

5. a) Explain various ways of implementing file system. [6]

   b) How do you measure the file system performance and how it can be improved? [4]

6. What do you mean by RAID? Suppose a disk with 200 cylinders numbered from 0-199. The drive is currently serving a request at 45 and previous request was at 125. The queue of pending request is 105, 178, 23, 67, 43, 78, 167, 56 and 98. Starting from current head position, calculate the total head movement (in cylinder) that the disk arm moves to satisfy all pending request for SSTF, SCAN, LOOK and C-SCAN disk scheduling algorithm. [2+8]

7. Explain in detail how can detect deadlock in operating system. Consider the following system with resources A, B, C, D and process P0 to P4. Is the state safe? If so, show the safe execution of processes. [3+7]

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

8. Write short notes on Caesar Cipher and Access Control Lists. [3+3]

9. What is the significance of system Administration? Describe the roles and responsibilities of system administrator in Insurance Company. [4]

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