# POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2020
Programme: BE | Full Marks: 100
Course: Operating System | Pass Marks: 45
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

***Attempt all the questions.***

1. a) What is Operating System? "Operating system acts as extended machine as well as resource manager", explain this statement. Clarify with the suitable example. 8
   b) Differentiate between process and thread. Explain the field in process control block (PCB). 7
2. a) What is semaphore? Explain how you solve producer-consumer problem using semaphore. 7
   b) What is IPC? Describe its implementation using shared memory and message passing. 8
3. a) Five Processes and 3 resource types A, B, C and D(Below is the snapshot of the state as: 8

| 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 | 2 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 | |

Is this a safe state? If yes, what is safe sequence?

b) What are different types of threads? Explain context switching with 7

respect to kernel mode and user-mode.

4. a) Given the following set of information, What is the average waiting time and average turn-around time using SJF(Preemptive), FCFS, RR (Quantum = 3) and HRRN. 8

| Process | Arrival Time | Service Time (Burst Time) |
|---|---|---|
| A | 0 | 8 |
| B | 2 | 6 |
| C | 4 | 9 |
| D | 7 | 5 |
| E | 9 | 4 |

b) Differentiate between logical address and physical address. Explain contiguous and non-contiguous memory allocation approach with their advantages and disadvantages. 7

5. a) Consider the following page reference strings: 2,3,4,5,3,2,6,7,3,2,3,4,8,7,4,3,2,3,4,7. How many page faults would occur for each of the following page replacement algorithms assuming 3 pages a frame? In each case calculate fault ratio. 8

i) Optimal Page Replacement

ii) LRU page replacement

iii) FIFO page replacement

b) Suppose a disk drive has cylinders numbered from 0 through 3999. The drive is currently serving a request at cylinder 299. The queue of pending request in FIFO order is given by 916,1509,82,1011,1774,130,507,250,2681,56. Calculate total distance (in cylinders) in FCFS, SSF and SCAN. Which one is best? 7

6. a) Describe Access Control Matrix and Access Control List using an appropriate example. How it achieves a level of security in files? 7

b) Define distributed operating system. Explain Remote Procedure Call (RPC) with the help of an appropriate figure. 8

7. Write short notes on: **(Any two)** 2×5

a) Operating system structure

b) Clock synchronization in DS

c) LINUX operating system