

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Applied Operating System

Semester: Spring

Year : 2019  
Full Marks: 100  
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 are system calls? Explain different categories of system calls with example? 8
- b) What is process control block? How can a process and thread be differentiated? Elaborate process life cycle by providing its stage and life cycle. 7
2. a) What are semaphores? Explain solution to producer-consumer problem using semaphores. 7
- b) Consider a multilevel feedback queue scheduling (MLFBQ) with three queues q1, q2, and q3. q1 and q2 use round-robin algorithm with time quantum (TQ) = 5, and 4 respectively, q3 use first-come first-service algorithm. Find the average waiting time (A.W.T) and average turnaround time (A.T.A.T) for executing the following process? 8

Processes	P1	P2	P3	P4
Burst Time	8	22	4	12

3. a) Describe using bankers algorithm if the system is in safe state. 8

Process	Allocation			Max	Available		
	A	B	C		A	B	C
P <sub>0</sub>	0	1	0	7 5 3	3 3 2		
P <sub>1</sub>	2	0	0	3 2 2			
P <sub>2</sub>	3	0	2	9 0 2			
P <sub>3</sub>	2	1	1	2 2 2			
P <sub>4</sub>	0	0	2	4 3 3			

- b) Consider following set of processes along with their burst time, arrival time and priorities. Calculate average waiting time and average turnaround time using following scheduling algorithms. 7
  - i. FCFS

- ii. SJF
- iii. Priority (Preemptive)
- iv. HRRN

Process	Arrival Time	Burst Time	Priority
A	0	3	5
B	2	6	4
C	4	4	1
D	6	5	3
E	8	2	2

4. a) How many page faults occur for the following reference strings for 3 page frames:  
2, 3, 4, 5, 4, 2, 5, 3, 6, 3, 2, 3, 4, 5, Using MFU, LRU, and Optimal page replacement algorithm. 8
- b) Differentiate between paging and segmentation along with their figures. 7
5. a) Disk request come to the disk driver for cylinder 16, 18, 12, 6, 25, 38, 7 and 36 in that order. A seek take 2 micro sec per cylinder move. How much seek time is needed for
  - i. FCFS
  - ii. Closest Cylinder Next
  - iii. C-Scan (Initially moving upward)
  - iv. Scan (Initially moving downward)
 In all cases, the arm initially at cylinder 18. Also describe which one is best algorithm and why? 7
- b) What are different ways to input/output? Explain Interrupt-Driven i/o with diagram. 8
6. a) What are the different operations performed in files? Describe the ways by which directories can be accessed. 8
- b) How data is maintained and managed using RAID technology? Is there any chance of losing data using it? Describe each of available model in details. 7
7. Write short notes on: (Any two) 2×5
  - a) Batch Systems
  - b) Protection on files
  - c) DMA