POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2017
Programme: BE Full Marks: 100
Course: Applied 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 are batch, time-sharing, parallel and real-time operating systems? Discuss their characteristics. 7
   b) What is Process? Draw and describe process state diagram. What types of operations are performed in a process? 8
2. a) What are the requirements for the solution of critical section problem? Explain the software solution for critical section problem. 7
   b) From the following set of information, determine the average waiting time and average turn around time using FCFS, RR (Quantum = 2) and HRRN 8

Process	Arrival Time	Service Time (Burst Time)
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

3. a) What is dispatcher and dispatch latency? Differentiate short-term scheduler, medium term scheduler and long-term scheduler. 7
   b) Consider the following Snapshot of a system: 8

Processes	Allocation ABCD	Max ABCD	Available ABCD
P0	0012	0012	1520
P1	1000	1750	
P2	1354	2356	
P3	0632	0652	
P4	0014	0656	

Answer the following questions using the Banker's algorithm:
   i. What is the content of the matrix need?

   ii. Is the system in a safe state? Also find the safe sequence.
   iii. If the request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately?

4. a) Describe the actions taken by a kernel to context-switch between processes. Provide two programming examples in which multithreading doesnot provide better performance than a single-threaded solution? 7
   b) What is page fault? Consider the following page reference strings: 1, 3, 5, 3, 7, 1, 5, 3, 1, 2, 3, 7, 6, 3, 4, 1, 8. How many page faults would occur for each of the following page replacement algorithms assuming 3 and 4 pages a frame? In each case which algorithm perform better? 8
      i. LRU page replacement
      ii. FIFO page replacement
      iii. Optimal page replacement
5. a) Disk requests come in to the disk driver for cylinders 10, 22, 20, 2, 40, 6, and 38, in that order. A seek takes 6.25msec per cylinder moved. How much seek time is needed for 7
      i. FCFS
      ii. SSTF
      iii. SCAN(initially moving downward)
      iv. CSCAN(initially moving upward)

      In all cases, the arm is initially at cylinder 20.
   b) What are the advantages and disadvantages of supporting memory mapped I/O to device control registers? 8
6. a) What is bad sector? Describe the different bad block recovery mechanisms in disk management. 7
   b) How free-space management is done in file systems? Explain. 8
7. Write short notes on: **(Any two)** 2×5
   a) DMA
   b) Sequential File Access Method
   c) RAID