

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Operating System

Semester: Fall

Year : 2021  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

4. a)

*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.*

b)

5. a)

1. a) What is an operating System? Discuss the main advantage for an operating system designer for using virtual machine architecture. Give the main advantage for user. 8
- b) Write advantages of threads over processes. How multiprocessor system can be effectively utilized with threads? Explain with example. 7
2. a) What is test and set instruction? Explain producer-consumer problem and algorithm for resolving it using monitor. 8
- b) Consider the deadlock situation that could occur in the dining philosophers' problem when the philosophers obtain the chopstick one at a time. Discuss how the four necessary conditions for deadlock indeed hold in this setting. Discuss how deadlock could be avoided by eliminating any one of the four conditions. 7
3. a) Write advantages of threads over processes. Explain the advantage of multithreading. 8
- b) Given the following information, draw the GANTT charts for processor scheduling for HRRN, Preemptive Shortest Job First and RR (Quantum=2). Also, find the average waiting time, average turnaround time and average response time for all the cases. 7

b)

6. a)

b)

7. W

Process	Arrival Time	Burst Time
P1	0.0	7
P2	3.0	4
P3	5.0	2
P4	6.0	4

4. a) What is thrashing? Consider the following page reference strings:  
2-2-2-4-5-7-1-2-5-8-6-4-1. How many page faults would occur for  
each of the following page replacement algorithms assuming 3 pages

8

i) LRU page replacement

ii) FIFO page replacement

iii) Optimal page replacement

b) Define swapping. Explain contiguous and non-contiguous memory  
allocation scheme with their advantages and disadvantages.

7

5. a) Suppose a disk drive has 2000 cylinders, numbered 0 to 1999. The  
drive is currently serving a request at cylinder 134 and the previous  
request was at cylinder 124. The queue of pending requests in FIFO  
order is 66, 1470, 913, 174, 948, 1509, 102, 1751, 130

Sequencing from the current head position what is the total distance that  
the disk arm moves to satisfy all the pending requests for each of the  
following disk scheduling algorithms?

i) FCFS ii) SSTF iii) SCAN iv) CSCAN

6. a) What is file system implementation? Explain link list and i-node file  
system implementations.

7

b) What is distributed operating system? Explain advantage of  
distributed system over independent PC.

7

c) Explain file and disk management in LINUX

8

d) Write short notes on: (Any two)

7

a) Context Switching

b) Internal vs External Fragmentation

c) Multilevel feedback queues

205

POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Operations

Semester: Fall

Year : 2020  
Full Marks: 100  
Pass Marks: 45  
Time : 3 hrs

*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.
  - b) Differentiate between process and thread. Explain the field in process control block (PCB).
  2. a) What is semaphore? Explain how you solve producer-consumer problem using semaphore.  
b) What is IPC? Describe its implementation using shared memory and message passing.
  3. a) Five Processes and 3 resource types A, B, C and D(Below is the snapshot of the state as:

Process	Max	Allocation	Available
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?

L.

- 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: 8  
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.
- 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) 2x5
- a) Operating system structure
  - b) Clock synchronization in DS
  - c) LINUX operating system

## POKHARA UNIVERSITY

**Level:** Bachelor

**Semester:** Spring

**Year :** 2019

**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 are System Calls? Explain the types of System Calls. Explain the sequence of System Calls for copying one file to a new file. 8
- b) Explain the process state transition diagram used in multiprogramming environment. Describe the fields in a process control block (PCB). What is switching overhead? 7
  
2. a) State Producer Consumer problem. Explain how to solve it. 8
- b) How can Mutual exclusion affect program performance? Describe sleeping barber problem with pseudo codes. 7
  
3. a) Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, with a cycle but no deadlock. 8
- b) Explain about the types of kernels. 7
  
4. a) From the following set of information, Find the average waiting time and average turn-around time using FCFS, SJF, RR (Quantum = 3) and HRRN. 8

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

- b) Explain the sequence of events during remote procedure call using an example; also explain why remote procedure call (RPC) doesn't fit in OSI model. 7

5. a) Explain the concept of Thrashing. Suggest ways to prevent it.
- b) Consider the following page reference strings: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. 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.
- Second Chance page replacement
  - LRU page replacement
  - FIFO page replacement
6. a) Suppose a disk drive has 400 cylinders, numbered 0 to 399. The driver is currently serving a request at cylinder 143 and previous request was at cylinder 125. The queue of pending request in FIFO order is: 86, 147, 312, 91, 177, 48, 309, 222, 175, 130. Starting from the current head position what is the total distance in cylinders that the disk has to satisfy all the pending requests for each of the following disk scheduling algorithms?
- SSTF
  - SCAN
  - C-SCAN
- b) How files can be allocated using Linked list and I-Node method?  
Describe using appropriate figures.
7. Write short notes on: (Any two)
- ATM
  - Internal and External Fragmentation
  - HRN Scheduling

7  
8

8

2x5

**POKHARA UNIVERSITY**

**Level:** Bachelor  
**Programme:** BE  
**Course:** Operating System

**Semester:** Fall

**Year :** 2019  
**Full Marks:** 100  
**Pass Marks:** 45  
**Time :** 3 hrs.

*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) Explain types of kernel with necessary diagrams 7  
 b) Differentiate Process and Threads. Draw five stage process state diagram and explain each stage. 8
2. a) What is multi-threading? Explain different multi-threading model. What is the biggest advantage of implementing threads in user space? 8  
 b) What are classical IPC Problems? Explain reader-writer problem. 7
3. a) Write and explain solution for producer consumer problem using semaphore variables 7  
 b) What are the necessary characteristics of dead lock? Explain deadlock prevention and avoidance methods 7
4. a) Draw a Gantt chart and find average turnaround time and waiting time of the following process applying FCFS, STRF and round robin (with quantum = 3) scheduling algorithm. 8

Process	A	B	C	D	E
Arrival Time(sec)	0	3	4	6	10
Burst Time(sec)	6	3	6	4	2

- b) Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 50, and previous request was at cylinder 25. The queue of pending request is: 95, 180, 34, 119, 11, 123, 62, 64. Starting from the current head position, what is the total distance (in cylinder) that the disk arm moves to satisfy all pending request for FCFS, SSTF, SCAN and C-LOOK disk scheduling algorithm. 7
5. a) Explain the difference between internal and external fragmentation. How external fragmentation can be combat, illustrate with example. 7



# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Operating System

Semester: Spring

Year : 2018

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 the main functions of operating system? Discuss on the different structures of operating system in brief.                                                                                                                                                    | 8 |
|    | b) What is a process control block? How are the states and transitions associated with process? Illustrate using three state models.                                                                                                                                     | 7 |
| 2. | a) What is a race condition and mutual exclusion? Show how mutual exclusion can be achieved using TSL (Test and set Lock).                                                                                                                                               | 7 |
|    | b) What is deadlock? Consider a system with four processes P0 through P3 and three resources types A,B,C. Resource type A has 8 instances, B has 6 instances and type C has 4 instances. Suppose at time t <sub>0</sub> following snapshot of the system has been taken. | 8 |

Allocation Matrix			
Process	A	B	C
P0	2	1	1
P1	2	1	1
P2	1	2	1
P3	1	1	1

Required Matrix			
Process	A	B	C
P0	4	3	2
P1	5	4	2
P2	6	3	2
P3	3	2	1

Use resource allocation graph to model the given system.

- |    |                                                                                                                                                                      |   |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 3. | a) What is critical region? Write and explain Dekker's algorithm.                                                                                                    | 8 |
|    | b) Consider the following set of information. Determine the average waiting time and average turn-around time using FCFS, SJF (Preemptive), RR (Quantum=2) and HRRN. | 7 |

Process	Arrival Time	Service Time (Burst Time)
P1	0	7
P2	2	6
P3	4	2

4. a) Differentiate between internal and external fragmentation. How external fragmentation can be combat? Discuss with example.
- b) Why does page fault occur? Consider the following page reference sequence: a a d b a c c c b a b c c c. How many page faults would occur for each of the following page replacement algorithms assuming 3 pages is frame in each case calculate fault rate?
- c) What are the problems of programmed and interrupt driven I/O?
- d) What is Aver's counter for (AC)? Describe difference in detail.
- e) Explain what DNA solve these problems? Explain in detail.
- f) What are different major advantages in distributed system?
- g) Define short notes on: (Any two)
- h) Explain what is meant by distributed technique in distributed system and Linux.
- i) Define distributed system with respect to the operation of databases and Linux.
- j) Explain distributed system with respect to the operation of databases and Linux.
- k) Explain distributed system with respect to the operation of databases and Linux.
5. a) CSU/DSU page replacement
- b) LRU page replacement
- c) Second Chance page replacement
- d) FIFO page replacement
- e) What are the problems of programmed and interrupt driven I/O
- f) What is Aver's counter for (AC)? Describe difference in detail.
- g) Explain what DNA solve these problems? Explain in detail.
- h) What are different major advantages in distributed system?
- i) Define short notes on: (Any two)
- j) Explain distributed system with respect to the operation of databases and Linux.
- k) Explain distributed system with respect to the operation of databases and Linux.
6. a) Explain distributed system with respect to the operation of databases and Linux.

Process	Burst Time	Priority	
P <sub>6</sub>	8	4	
P <sub>5</sub>	5	5	
P <sub>4</sub>	18	3	
P <sub>3</sub>	5	1	
P <sub>2</sub>	7	6	
P <sub>1</sub>	30	2	

chart and calculate average waiting time.

1. a) What is an operating system? Explain the concept "OS as a resource manager and OS as an extended machine." 8
- b) Differentiate between deadlock and starvation. For resources type with multiple instances, we can model resource allocation and overcomes this problem? 8
2. a) What is the problem associated with sleep and wake up based solution for achieving mutual exclusion? Explain how monitor overcomes this problem? 7
- b) Explain the step involved in deadlock detection taking such graph as an example. 7
3. a) Define process. Explain process control block (PCB) and explain process states and its transition. 8
- b) What do you mean by thread? Differentiate between user level and kernel level threads. 8
4. a) Explain the difference between internal and external fragmentation. How external fragmentation can be combat, illustrate with example. 7
- b) Consider the following set of processes that arrives at time 0, with the length of the CPU burst given in milliseconds: Construct Gant chart and calculate average waiting time. 8

Attempt all the questions.

The figures in the margin indicate full marks.

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

Course: Operating System  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.  
Programme: BE  
Semester: Fall  
Year : 2018  
Level: Bachelor

## POKHARA UNIVERSITY

2x5

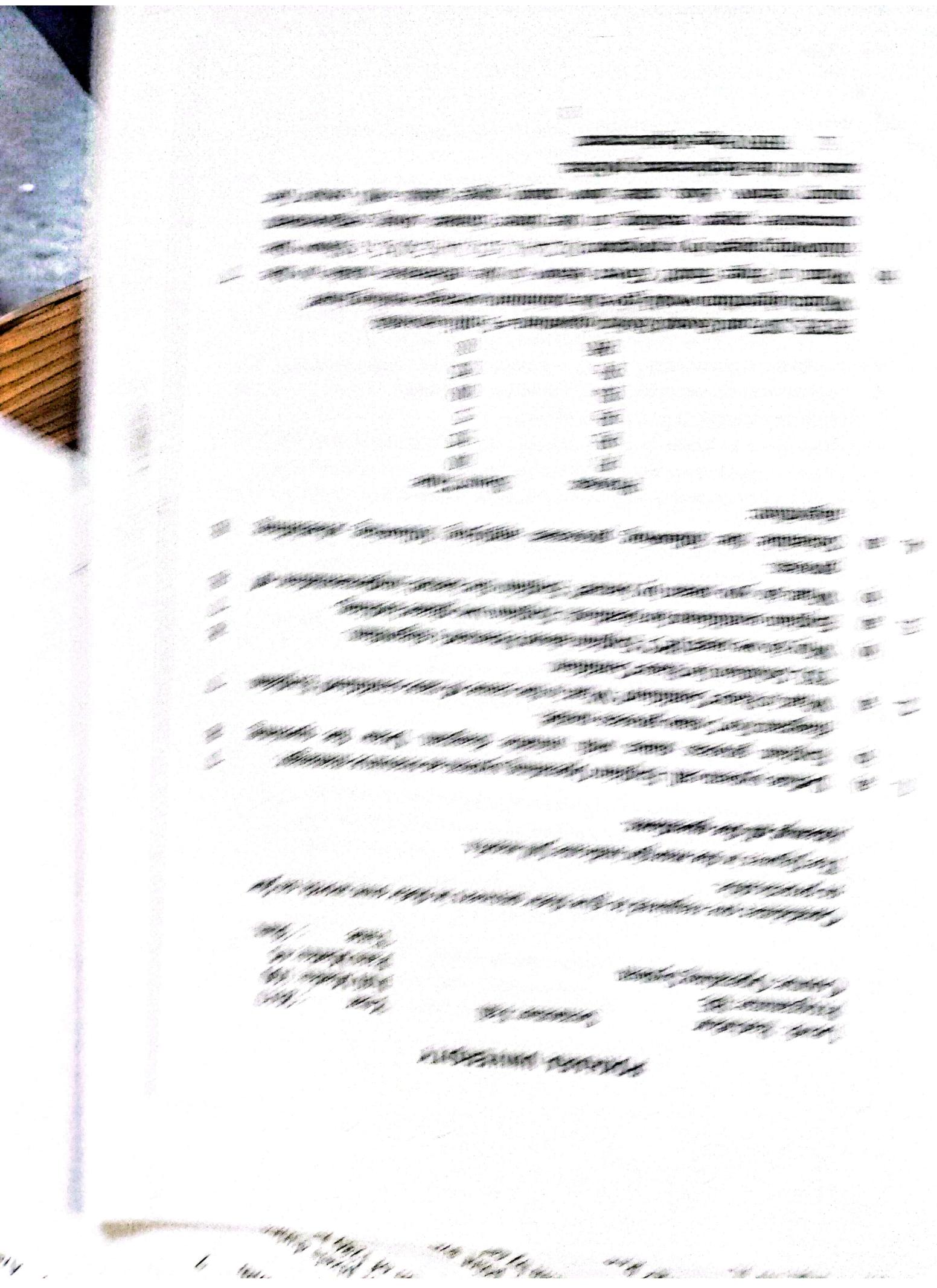
8

7

8

7

5. a) What is page fault? Consider the following page reference strings:  
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. 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.
- i. FIFO page replacement  
ii. LRU page replacement  
iii. Optimal page replacement  
b) How files and directories are stored in memory such that they can be managed efficiently? Explain the approaches.
6. a) What RPC? Show the operation of RPC in a client server computing environment taking an example and a necessary figure.
- b) Explain about file and disk management in Windows 2000.
7. Write short notes on: (Any two)
- a) Interrupt Handler  
b) Autoexec.bat and Config.sys files in MS-DOS  
c) Group Communication



- ii. NRU Page Replacement
  - iii. Optimal Page Replacement
5. a) Explain Direct Mapping and Block Mapping Techniques? What is TLB? 7
- b) Consider a disk queue with requests for I/O to blocks on cylinders in that order: 43, 79, 142, 56, 34 and 187. There are 200 cylinders numbered from 0 - 199 and the disk head starts at number 100. What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms? 8
- i. FCFS
  - ii. SSTF
  - iii. SCAN
6. a) Define Contiguous List and Linked List file system implementations. Explain ACL with the help of diagram. 7
- b) What do you mean by RPC? Explain advantages and disadvantages of distributed OS. 8
7. Write short notes on: (Any two) 2x5
- a) File systems in Linux
  - b) ATM (Asynchronous Transfer Mode)
  - c) Unix

**PUNJAB UNIVERSITY**

1. Ans: Bachelor  
Programme: B.T.  
Course: Operating System

Semester: Spring

Year : 2017  
Full Marks: 100  
Pass Marks: 45  
Time : 3 hrs.

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.

- a) Define operating system. Explain monolithic and layered structure of operating system. 3
- b) Define process. Differentiate between process and program. 7
- c) Explain difference between thread and process? Explain different multitasking models? 7
- d) What makes message passing IPC as one among the best method of IPC implementation? Explain with pseudo code details. 3
- e) Explain necessary and sufficient condition for deadlock. Give an algorithm for deadlock detection for a system with multiple resource of same kind. 3
- f) Consider the Dining Philosophers problem with n philosophers but with  $n+1$  forks; the extra fork is in the middle of the table and can be used by any philosopher (but only by one of them at a time). Is deadlock possible? Explain your answer. 7
- g) Define context switching (Kernel mode and user mode). 3
- h) Consider 5 processes P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>, P<sub>4</sub>, and P<sub>5</sub> which arrives at time 2, 6, 4, 5 and 0 units to the waiting queue. And burst time of processes are 8, 4, 6, 3, 4 units respectively. Find throughputs of the following algorithms:
  - i. HRRN
  - ii. Round Robin
  - iii. SJF 7
- i) Define term thrashing and pre-paging. Explain Working set page replacement Algorithm with example. 5
- j) Given below is the references made to the following pages by a 3

program: 1,3,2,3,4,5,3,2,5,1,4,3,2,4,3,5,1,6,3,4,0,3,2 Show the successive pages residing in the four frames using replacement policy below. Also, state how many page faults will occur for each of the Replacement policies and calculate the fault rate.

- i. FIFO
  - ii. NRU
  - iii. optimal
- b) The disk track requests are: 173, 250, 298, 129, 13, 309 and 224. Assume that the last request is at track 150 and the head is moving towards track 0. Find out the total seek time for each of the following algorithms below:

- i. SSTF
- ii. CSCAN
- iii. SCAN

## POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2016

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 an operating system? Explain the different major function of Operating System.                                                                                                                      | 7 |
| b)    | What is process? Illustrate and define the different state of process with neat diagram.                                                                                                                    | 8 |
| 2. a) | Define deadlock and its causes. Explain deadlock prevention methods.                                                                                                                                        | 8 |
| b)    | What is the relationship between Thread and Process? Multi-programming (or multi-tasking) enables more than a single process to apparently execute simultaneously. How is this achieved on a uniprocoessor? | 7 |
| 3. a) | Differentiate the role between kernel mode and user mode in operating system.                                                                                                                               | 7 |
| b)    | Schedule the following processes applying following scheduling algorithm:                                                                                                                                   | 8 |

Process	Burst Time
P <sub>1</sub>	15
P <sub>2</sub>	20
P <sub>3</sub>	4
P <sub>4</sub>	9
P <sub>5</sub>	17

FCFS, SJF and Round Robin (quantum = 4 mili seconds)

Which algorithm would give the minimum average waiting time?

- |       |                                                                                                                                                                       |   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 4. a) | "Optimal Page replacement algorithm have lesser page fault than the FIFO Page replacement". Is the above statement correct? Explain your answer with proper examples. | 7 |
| b)    | What is a TLB? How does the TLB map virtual and real addresses? Explain with mapping diagram.                                                                         | 8 |

5. a) Consider a disk queue with requests for I/O to blocks on cylinders in that order: 43, 79, 142, 56, 34 and 187. There are 200 cylinders numbered from 0 - 199 and the disk head starts at number 100. What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms? 8
- FCFS
  - SSTF
  - SCAN
- b) What is file system implementation? Explain Contiguous List and Linked List file system implementations with their relative advantages. 7
6. a) Define Network Architecture. Describe OSI layered architecture.  
b) How distributed shared memory is different from message passing. 7
7. Write short notes on: (Any two) 8
- File System in Windows 2000
  - Race Condition
  - Context Switching

2x5

POKHARA UNIVERSITY

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

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*Attempt all the questions.*

1. a) What is the difference between multitasking and multiprogramming? 8  
 b) Explain process control block (PCB) and process states in detail. 7

2. a) List the essential properties for the Batch-oriented and time sharing operating system.

b) What are safe, unsafe states and deadlock? Explain banker's algorithm for dead lock detection. 8

b) Define thread. Why it is called light weight process? Compare and contrast between process and thread. 7

3. a) What do you mean by concurrent process? Describe any two methods for process synchronization. 7

b) Schedule the following processes applying (Highest Response Ratio Next) HRN scheduling algorithm. Assume that P1 is the first process and processor is instantly available for processing. 8

Process	P1	P2	P3	P4	P5
Arrival Time	1ms	2ms	4ms	7ms	9ms
Service Time	5ms	6ms	4ms	7ms	8ms

i. Find waiting time and turnaround time for each process and Find the order of execution.

ii. Change the arrival time of P4 and P5 to 6ms find the execution order.

4. a) Draw and describe memory hierarchy diagram. How virtual memory increases the performance of computer system? Describe in detail. 7

b) How many page fault occurs for your algorithm for the following reference string for three frames: 8

Process	P1	P2	P3	P4	P5
Arrival Time	1ms	2ms	4ms	7ms	9ms
Service Time	5ms	6ms	4ms	7ms	8ms

3. a) Why  
line  
b) How

1, 1, 2, 2, 1, 4, 2, 3, 3, 5, 5, 4

Using FIFO, Optimal, LRU, and LFU page replacement algorithm?

5. a) Distinguish between block oriented and character oriented I/O 7  
devices. Explain the various steps involved in DMA transfer.
- b) Explain I-node and linked list allocation based file system 8  
implementation.
6. a) Define distributed operating system. Write about the issues that have 8  
to be considered while designing Distributed OS.
- b) What do you mean by context switching? Explain how context 7  
switching is done. How context switching helps for  
multiprogramming?
7. Write short notes on: (Any two)  
a) RPC(Remote Procedure Call)  
b) RAID  
c) Linux operating system 2x5

POKHARA UNIVERSITY

**Level:** Bachelor  
**Programme:** BE  
**Course:** Operating System

Semester – Spring	Year : 2015
	Full Marks : 100
	Time : 3 hrs

*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 the difference between kernel mode and user mode? Why is the difference important to an operating system?  
b) "OS' is simply considered as Resource manager as well as Virtual machine", Why? Explain in your own words.
  2. a) Define process. Why different process states are essential in multiprogramming? Justify with an example.  
b) Why mutual exclusion is required in multiprogramming? Explain with an example of an appropriate race condition case.  
c) What is the difference between deadlock and starvation? What are the strategies used to solve the problem of deadlock?
  3. a) What are the advantages and disadvantages of using the same systemcall interface for manipulating both files and devices?  
b) Consider the following set of processes, along with their burst time (in milliseconds), arrival time and priorities. Calculate average waiting time and average turnaround time using following scheduling. Also describe which one is best algorithm and why.

- |      |     |                       |                     |
|------|-----|-----------------------|---------------------|
| FCFS | SJF | Priority (Preemptive) | RR (Quantum = 1 ms) |
| i.   | ii. | iii.                  | iv.                 |

Process	Arrival Time	Burst Time	Priority
P <sub>1</sub>	0.0	8	2
P <sub>2</sub>	0.4	4	1
P <sub>3</sub>	1.0	1	3
P <sub>4</sub>	0.0	8	4

4. a) What is a TLB? How does the TLB map virtual and real addresses?  
 Explain with mapping diagram? 8

b) Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would the first-fit, best fit and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Which algorithm makes the most efficient use of memory? 7

- 4.
5. a) What is RAID? Explain Levels of RAID with suitable diagram, 8  
b) What is a file? Explain different file allocation techniques in OS. 8
6. a) What is the distributed operating system? Explain Remote Procedure Call (RPC) with the help of an appropriate figure. 7  
b) Why distributed system is growing rapidly than centralized system? Give reasons. What are the advantages and disadvantages of a distributed operating system? 8
7. Write short notes on (Any Two): 8  
a) Amoeba System Architecture  
b) DOS  
c) Device Controllers
- 2x5

POKHARA UNIVERSITY

<b>Level:</b> Bachelor	<b>Semester:</b> Fall	<b>Year :</b> 2015
<b>Programme:</b> BE		<b>Full Marks:</b> 100
<b>Course:</b> Operating System		<b>Pass Marks:</b> 45
		<b>Time :</b> 3hrs.

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

### *All except all the questions.*

- 8

1. a) Define Batch System. How the disadvantages of Batch System are overcome in Multi-programmed Operating System? Also describe how Multi-programmed operating system is milestone in development of operating system.

b) Draw and describe process state diagram. What types of operations are performed in a process?

7

2. a) 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. Also describe which one is best algorithm and why.

8

Process	Priority	Arrival Time	CPU Burst Time	PP(Quantum size=6ms)
P1	2	0	3	
P2	1	1	14	
P3	3	2	9	
P4	4	3	17	

- 7      7

b) Define deadlock and its causes. Explain deadlock prevention methods.

3. a) Given five memory partitions of 100 KB, 500KB,200KB,300KB and 600KB (in order), how would the first-fit, best fit and worst-fit algorithms place processes of 212KB,, 417KB,112KB, and 426KB (in order)? Which algorithm makes the most efficient use of memory?

Illustrate.

- b) Consider a disk queue with requests for I/O to blocks on cylinders in the order: 15, 25, 68, 142, 64, 90, 187 and 215 there are 150 cylinders numbered from 0-250 and the disk head starts at number 50. What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?  
i) FCFS    ii) SSTF    iii) SCAN
4. a) Explain the reader's and writer's classical IPC Problem and its solution  
b) List out pros and cons of distributed system over centralized system. Explain Flynn's taxonomy of computer system.
5. a) Compare and contrast between virus and worm. Explain Access Control List (ACL) and Access Control Matrix (ACM).  
b) Describe the process management scheme in either Linux or Microsoft-windows OS.
6. a) Define Distributed System. List out advantages and disadvantages of distributed system over centralized system.  
b) Write the difference between logical and physical address. Describe about Coalescing and Compaction with suitable examples.
7. Write short notes on: (Any two)  
a) Kernel  
b) ATM  
c) Windows 2000
- 2x5

## POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Operating System

Semester: Spring

Year : 2014  
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 time sharing, parallel and real-time operating systems? Discuss their characteristics. 8
- b) Do you think a process can exist without any state? Justify your view with the help of process state transition diagram and PCB. 7
2. a) A barber has N chairs in its waiting room and the hair-cutting cabin has just one chair to serve one customer at a time. If there are no customers in the shop, the barber goes to sleep. When a customer arrives, the following happens:
  - If there is other customer and the barber is sleeping, the customer wakes up the barber
  - If the barber is busy with other customer and at least one chair is vacant in the waiting room, the customer occupies one chair in the waiting room and waits for its turn
  - If the barber is busy and no chair is vacant in the waiting room, the customer goes away, without getting service. Write an algorithm to coordinate the barber and the customer.8
- b) What is cooperative process threading? How does process differ with thread? Discuss at least one multithreading model with its advantages and disadvantages 7
3. a) What is memory management? Explain memory hierarchy. 5
- 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. 10
  - i. FCFS
  - ii. SJF

**iii. Priority (Preemptive)**

**iv. HRRN**

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

4. a) Differentiate virtual page and a page frame. What is the difference between LRU and NRU page replacement algorithms? 7
- b) Suppose a disk drive has 5500 cylinders, numbered 0 to 5499. The drive is currently serving a request at cylinder 2243 and the previous request was at cylinder 1125. The queue of pending requests in FIFO order is 586, 1470, 1913, 1774, 5348, 1509, 5022, 1750, 130  
Starting from the current head position what is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?  
 i. FCFS  
 ii. Closest Cylinder Next  
 iii. C-Scan (Initially moving upward)  
 iv. Scan (Initially moving downward) 8
5. a) What is distributed operating system? Explain advantages and disadvantages of distributed operating system. 8
- b) What is the difference between absolute and relative path name of a file? What criteria should be used to decide which strategy? (Contiguous, linked, indexed, allocation) is best utilized for a particular file? 7
6. a) Describe the process management scheme in either Linux or Microsoft Windows OS. 7
- b) Discuss the working principles and advantages of Direct Memory Access 8
7. Write short notes on: (Any two) 2x5
- a) File access methods  
 b) The Shell  
 c) Types of Kernel.

# POKHARA UNIVERSITY

Level: Bachelor  
 Programme: BE  
 Course: Operating System

Semester: Fall

Year : 2014  
 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) Define Operating System. Explain different services provided by operating system. 8
- b) Draw and describe process state diagram. What types of operations are performed in a process? 7
- 2 a) Do you feel deadlock is great enemy of computer system? If yes, why? Also write protection mechanism for deadlock. 8
- b) When multiple processes need to cooperate, there is a choice between shared memory and inter-process communication (IPC). Compare and contrast these two techniques. What is the role of the operating system in each? 7
- 3 a) Explain how the producer-consumer problem is relevant to an operating system. Describe briefly the semaphore based solution to this problem. 7
- 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. 8
  - 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

- a) How many page faults occur for following reference strings for three page frames? 8

7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,1,2,0,3

Using LRU, FIFO and Optimal page replacement algorithm.

- b) Differentiate virtual page and a page frame. What is the difference between LRU and NRU page replacement algorithms? 7

- a) Disk request come to the disk driver for cylinder 6, 8, 18, 16, 25, 38 and 36 in that order. A seek take 5msec per cylinder move. How much seek time is needed for 8

- 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?

- b) Give a scenario where choosing a large file-system block size might be a benefit. Give an example where it might be a hindrance. 7

- i. a) Describe OSI layered architecture. How it is important in network architecture of operating system? 7

- b) Describe the process management scheme in either Linux or Microsoft-Windows OS. 8

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

- a) Peterson's Algorithm
- b) Context Switching
- c) Windows 2000.

# POKHARA UNIVERSITY

Level: Bachelor  
 Programme: BE  
 Course: Operating System

Semester : Spring

Year : 2023

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) Define operating system. Explain the fundamental differences between monolithic and layered structure of operating system. 8
- b) For what purpose semaphores are used? Give solution to producer-consumer problem using semaphores. 7
2. a) Define PCB. How do processes transition between different states and what triggers these transitions? Illustrate with neat diagram. 8
- b) What are different types of kernels? Explain each in detail. 7
3. a) Consider the following set of processes with the length of the CPU burst given in milliseconds. Construct the Gantt chart and calculate average waiting time and turnaround time. Also explain which one is the best algorithm. 8

Process	Arrival Time	Burst Time	Priority
P1	0	9	2
P2	4	4	1
P3	10	3	3
P4	0	6	4

- i) HRRN
- ii) RR (Quantum = 1ms)
- iii) Priority Scheduling (1 higher priority)
- iv) Shortest Job First (pre-emptive)
- b) Examine the role of virtual memory. How does the Operating system map virtual address to physical address? Explain with example. 7

4. a) Consider the following page reference strings: 9, 3, 4, 5, 3, 9, 6, 7, 3, 9, 3, 4, 8, 7, 4, 3, 9, 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) Second Chance page replacement
  - ii) LRU page replacement
  - iii) FIFO page replacement
- b) Define context switching Explain context switching by demonstrating a diagram that show how CPU switches from one process to another. 7
5. a) Given a disk drive with 400 cylinders. The driver is currently serving a request at cylinder 162 and previous request was at cylinder 128. The queue of pending request in FIFO order is: 90, 150, 386, 94, 187, 48, 278, 202, 188, and 135. Starting from the current head position what is the total distance in cylinders that the disk to satisfy all the pending request for each of the following disk scheduling algorithms? 8
- v) FCFS
  - vi) SSTF
  - vii) SCAN
  - viii) C-Look
- b) How file naming is done? Discuss different file allocation methods. 7
6. a) What are advantages of distributed system? Discuss RPC technique in Distributed System. 7
- b) How process management is done in UNIX or Linux? Explain. Why is Linux considered more secured then other operating system? 8
7. Write short notes on: (Any two) 2×5
- a) DMA.
  - b) Windows 2000.
  - c) The Shell.