Roll No.												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 1

Sem & AY: Odd Sem. 2019-20 | **Date:** 27.09.2019

Course Code: CSE 210 | **Time:** 2:30PM to 3:30PM

Course Name: OPERATING SYSTEMS | **Max Marks:** 40

Programme & Sem: B.Tech. (CSE) & V | **Weightage:** 20%

Instructions:

(i) Read the question properly and answer accordingly.

(ii) Question paper consists of 3 parts.

(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer both the Questions. Each Question carries seven marks. (2Qx7M=14M)

1. Describe the evolution of operating systems. (C.O.NO.1) [Knowledge]

2. Explain direct and indirect communications of message passing system. (C.O.NO.2) [Comprehension]

Part B [Thought Provoking Questions]

Answer all the Questions. Each Question carries four marks. (3Qx4M=12M)

3. List the functionalities of various system components of Operating System (C.O.NO.1) [Knowledge]
4. Differentiate between user level and kernel level threads. (C.O.NO.2) [Comprehension]
5. How can we prevent users from accessing other users' programs and data? (C.O.NO.1) [Knowledge]

Part C [Problem Solving Questions]

Answer both the Questions. Each Question carries seven marks. (2Qx7M=14M)

6. "Operating System is a Resource Manager and Control Program" justify this statement with suitable functionality of Operating System. (C.O.NO.1) [Knowledge]
7. Explain the difference between short-term, medium-term and long-term schedulers with a neat sketch. (C.O.NO.2) [Comprehension]

SCHOOL OF ENGINEERING

Semester: 5 TH

Course Code: CSE 210

Course Name: Operating Systems

Date: 27-09-2019

Time: 1Hr

Max Marks: 40

Weightage: 20%

Extract of question distribution [outcome wise & level wise]

Q.NO.	C.O.NO	Unit/Module Number/Unit /Module Title	Memory recall type [Marks allotted] Bloom's Levels	Thought provoking type [Marks allotted] Bloom's Levels	Problem Solving type [Marks allotted]	Total Marks
			K	C	C	
1, 3, 5, 6	1	1	7	4 4	7	22
2,4,7	2	2	7	4	7	18
	Total Marks		14	12	14	40

K =Knowledge Level C = Comprehension Level

Note: While setting all types of questions the general guideline is that about 60%

Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must

be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

Annexure- II: Format of Answer Scheme

SCHOOL OF ENGINEERING

SOLUTION

Semester: 7TH
Course Code: CSE 218
Course Name- HCI

Date: 1-10-19
Time: 1 HOUR
Max Marks: 40
Weightage: 20%

Part A (Q x M = Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
1	Describe the evolution of operating systems. a) Batch Processing b) Multiprogramming c) Time sharing system d) Parallel system e) Distributed system f) Real time system	List – 1M Explanation – 6x1= 6M Total - 7 marks	10 min
2	Explain direct and indirect communications of message passing system.	3+4 = 7	10 min

Part B (Q x M = Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
3	List the functionalities of various system components of Operating System. Functions of at least 4 system components of OS	4x1=4	5 min
4	Differentiate between user level and kernel level threads.	2 marks 2 marks	5 min

5	How can we prevent users from accessing other users' programs and data? Ans: Introduce base and limit registers that hold the smallest legal physical memory address, and the size of the range, respectively. As a user's job is started, the operating system loads these registers; if the program goes beyond these addresses, it is aborted. If another job starts up, these registers are reset for the new job.	4M	5 min

Part C (Q x M = Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
6	"Operating System is a Resource Manager and Control Program" justify this statement with suitable functionality of Operating System. a. Justification for Resource Manager b. Justification for Control Program	4+3 = 7 M	10 min
7	Explain the difference between short-term, medium-term and long-term schedulers with a neat sketch. a. Diagram b. Short-term scheduler c. Medium-term scheduler d. Long-term scheduler	1+2+2+2 = 7M	10 min

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BENGALURU

SCHOOL OF ENGINEERING

TEST - 2

Sem & AY: Odd Sem 2019-20 | **Date**: 16.11.2019

Course Code: CSE 210 | **Time**: 2:30 PM to 3:30 PM

Course Name: OPERATING SYSTEMS | **Max Marks**: 40

Program & Sem: B.Tech (CSE) & V | **Weightage**: 20%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer both the Questions. Each Question carries seven marks. (2Qx7M=14M)

1. Describe the differences between preemptive scheduling and non-preemptive scheduling. (C.O.NO.3) [Knowledge]
2. Explain Peterson's solution for achieving mutual exclusion. (C.O.NO.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each Question carries five marks. (3Qx5M=15M)

3. Define Scheduler? Consider the following set of processes, with the arrival times and the CPU burst times given in milliseconds.

Process	Arrival-Time	Burst-Time
P1	0	5
P2	1	3
P3	2	3
P4	4	1

What is the average turnaround time and average waiting time for these processes with the preemptive shortest remaining processing time first (SRTF) algorithm? (C.O.NO.3) [Comprehension]

4. Explain readers & writers problem? Give its solution with semaphore. (C.O.NO.4) [Comprehension]

5. Most round-robin schedules uses a fixed size quantum. Give an argument in favor of a small quantum. Now give an argument in favor of a large quantum. Compare and contrast the types of systems and jobs to which the argument apply.

(C.O.NO.3) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The Question carries eleven marks. **(1Qx11M=11M)**

6. Consider the following set of process, with the length of the CPU-burst time given in milliseconds: (C.O.NO.3) [Comprehension]

Process	Burst-Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5, all at time 0.

a) Draw four Gantt charts illustrating the execution of these process using FCFS, SJF, a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum=3) scheduling.

b) What is the turnaround time of each process for each of the scheduling algorithms in part a?

c) What is the waiting time of each process for each of the scheduling algorithms in part a?

d) Which of the scheduling algorithm in part a results in the minimal average waiting time (over all processes)?

SCHOOL OF ENGINEERING

Semester: 5 TH

Course Code: CSE 210

Course Name: Operating Systems

Date: 16-11-2019

Time: 1Hr

Max Marks: 40

Weightage: 20%

Extract of question distribution [outcome wise & level wise]

Q.NO.	C.O.NO	Unit/Module Number/Unit /Module Title	Memory recall type [Marks allotted] Bloom's Levels			Thought provoking type [Marks allotted] Bloom's Levels			Problem Solving type [Marks allotted]			Total Marks
			K			C			C			
1, 3, 6	3	3	7			5			11			23
2,4,5	4	4	7			10						17
	Total Marks		14			15			11			40

K =Knowledge Level C = Comprehension Level

Note: While setting all types of questions the general guideline is that about 60%

Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

Annexure- II: Format of Answer Scheme

SCHOOL OF ENGINEERING

SOLUTION

Semester: 5TH
Course Code: CSE 218
Course Name- OPERATING SYSTEM

Date: 5-11-19
Time: 1 HOUR
Max Marks: 40
Weightage: 20%

Part A (Q x M = Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
1	Differences between preemptive scheduling and non-preemptive scheduling in terms of stalling the process, efficiency, starvation, resource utilization etc.	7x1=7	10 min

2	p0:
	flag[0]= true;
	turn= 1;
	while (flag[1] && turn == 1)
	/* do nothing */
	/* Critical section */
	Flag[0]=false;
	
	p1:
	flag[1]= true;
	turn= 0;
	while (flag[0] && turn == 0)
	/* do nothing*/
	/* critical section */
	flag[1]=false;
		Explanation – 3M
		Pseudo code – 4M
			10 min

Part B (Q x M = Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
3	P1 | P2 | P4 | P3 | P1 They should compute waiting and turnaround time based on gnatt chart	5x1=5	8 min
4	Readers & writers problem They should explain what problem with reader writer and give pseudo code with proper justification	Explanation-2M Pseudo code -3M	8 min
5	Based on quantum time RR behaves like FCFS or suppressed with lot of context switching. They should explain with minimal QT and maximum QT	Explanation-2M Pseudo code -3M	8 min

Part C (Q x M = Marks)

<table>
<tr><th>Q No</th><th>Solution</th><th>Scheme of Marking</th><th>Max. Time required for each Question</th></tr>
<tr><td>6</td><td>Consider the following set of process, with the length of the CPU-burst time given in milliseconds:

<table>
<tr><th>Process</th><th>Burst-Time</th><th>Priority</th></tr>
<tr><td>P1</td><td>10</td><td>3</td></tr>
<tr><td>P2</td><td>1</td><td>1</td></tr>
<tr><td>P3</td><td>2</td><td>3</td></tr>
<tr><td>P4</td><td>1</td><td>4</td></tr>
<tr><td>P5</td><td>5</td><td>2</td></tr>
</table>

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5, all at time 0.
a) Draw four Gantt charts illustrating the execution of these process using FCFS, SJF, a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum=3) scheduling.
b) What is the turnaround time of each process for each of the scheduling algorithms in part a?
c) What is the waiting time of each process for each of the scheduling algorithms in part a?
d) Which of the scheduling algorithm in part a results in the minimal average waiting time (over all processes)?</td><td>For four gnatt chart – 4M

Waiting time for all processes – 3M
Turnaround time for all processes – 3M
Best algorithm – 1M</td><td>16 min</td></tr>
</table>

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PRESIDENCY UNIVERSITY

BENGALURU

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Semester: Odd Semester: 2019-20 | **Date**: 23 December 2019

Course Code: CSE 210 | **Time**: 9:30 AM to 12:30 PM

Course Name: OPERATING SYSTEMS | **Max Marks**: 80

Program & Sem: B. Tech.(CSE) & V | **Weightage**: 40%

Instructions:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each Question carries 2 marks. **(10Qx2M=20M)**

1. Differentiate between Uniprogramming and Multiprogramming. (C.O.No.1) [Knowledge]
2. What are the objectives of Operating Systems? (C.O.No.1) [Knowledge]
3. List out the reasons for process termination. (C.O.No.2) [Knowledge]
4. Define context-switching. (C.O.No.2) [Knowledge]
5. Define Starvation. (C.O.No.3) [Knowledge]
6. Differentiate between short-term and long-term schedulers. (C.O.No.3) [Knowledge]
7. What is meant by Direct Communication? (C.O.No.4) [Knowledge]
8. What does a solution to the Critical-Section problem must satisfy? (C.O.No.4) [Knowledge]
9. What is meant by memory compaction? (C.O.No.5) [Knowledge]
10. Define Virtual Memory? (C.O.No.5) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each Question carries 6 marks. **(5Qx6M=30M)**

11. "Operating System is a Resource Manager and Control Program" justify this statement with suitable functionality of Operating System. (C.O.No.1) [Comprehension]
12. Explain the process state transition diagram used in multiprogramming environment. Describe the fields in a process control block (PCB). (C.O.No.2) [Comprehension]
13. Most round-robin schedules uses a fixed size quantum. Give an argument in favor of a small quantum. Now give an argument in favor of a large quantum. Compare and contrast the types of systems and jobs to which the argument apply. (C.O.No.3) [Comprehension]

14. Consider a system with four processes P1, P2, P3, and P4, and two resources, R1, and R2, respectively. Each resource has two instances. Furthermore:
- P1 allocates an instance of R2, and requests an instance of R1;
- P2 allocates an instance of R1, and doesn't need any other resource;
- P3 allocates an instance of R1 and requires an instance of R2;
- P4 allocates an instance of R2, and doesn't need any other resource.

(a) Draw the resource allocation graph.

(b) Is there a cycle in the graph? If yes name it.

(c) Is the system in deadlock? If yes, explain why. If not, give a possible sequence of executions after which every process completes. (C.O.No.4) [Comprehension]

15. Explain the concepts of Paging with hardware implementation of page table.

(C.O.No.5) [Knowledge]

Part C [Problem Solving Questions]

Answer all the Questions. Each Question carries 10 marks. (3Qx10M=30M)

16. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst-Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5, all at time 0.

a) Draw the Gantt charts illustrating the execution of these processes using SJF, a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum=3) scheduling.

b) What is the turnaround time of each process for each of the scheduling algorithms in part a?

c) What is the waiting time of each process for each of the scheduling algorithms in part a?

(C.O.No.3) [Comprehension]

17. Consider the following snapshot of the system.

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

Answer the following questions using Banker's algorithm.

a. Determine the need matrix.
b. Illustrate that the system in a safe state by demonstrating the order in which the processes may complete.
c. If a request from process P1 arrives for (1,1,0,0), can the request be granted immediately.
d. If a request from process P1 arrives for (0,0,2,0), can the request be granted immediately.

(C.O.No.4) [Comprehension]

18. Consider the following page reference string:

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 the following replacement algorithms, assuming three frames in memory? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

a. LRU replacement
b. FIFO replacement
c. Optimal replacement

(C.O.No.5) [Comprehension]

SCHOOL OF ENGINEERING

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Semester: 5 TH

Course Code: CSE 210

Course Name: Operating Systems

Date: 23-12-2019

Time: 3Hrs

Max Marks: 80

Weightage: 40%

Extract of question distribution [outcome wise & level wise]

Q.NO.	C.O.NO	Unit/Module Number/Unit /Module Title	Memory recall type [Marks allotted] Bloom's Levels			Thought provoking type [Marks allotted] Bloom's Levels			Problem Solving type [Marks allotted]			Total Marks
			C			C			C			
1,2,11	1	1	4			6						10
3,4,12	2	2	4			6						10
5,6,13,16	3	3	4			6			10			20
7,8,14,17	4	4	4			6			10			20
9,10,18	5	5	4			6			10			20
	Total Marks		20			30			30			80

K =Knowledge Level C = Comprehension Level

Note: While setting all types of questions the general guideline is that about 60%

Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

SCHOOL OF ENGINEERING

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

SOLUTION

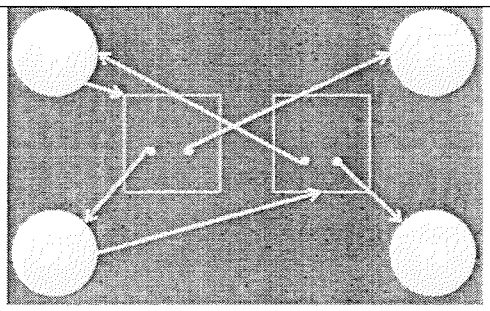
Semester: 5TH
Course Code: CSE 210
Course Name- Operating Systems

Date: 23-12-19
Time: 3 HOURS
Max Marks: 80
Weightage: 40%

Part A (10Q x 2M = 20 Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
1	Two Differences between Uniprogramming and Multiprogramming.	2M	2 min
2	Objectives of Operating Systems: Efficiency, Convenience and ability to evolve	2M	2 min
3	Reasons for process termination: Time limit expired, Memory unavailable, I/O failure, Bounds violation etc	2M	2 min
4	Context Switching definition – switching the CPU between two processes.	2M	2 min
5	Starvation – Indefinite blocking of low priority processes by high priority processes.	2M	2 min
6	At least two differences between short-term and long-term schedulers.	2M	2 min
7	Direct Communication – Send and Receive primitives	2M	2 min
8	Mutual Exclusion, Progress, Bounded Waiting	2M	2 min
9	Compaction – Shuffling memory contents	2M	2 min
10	Virtual Memory definition	2M	2 min

Part **B** (5Q x 6M = 30 Marks)

Q No	**Solution**	**Scheme of Marking**	**Max. Time required for each Question**
11	Justification for Resource Manager. Justification for Control Program.	3m 3m (3+3= 6M)	10 min
12	Process State transition diagram. Transition among states. PCB fields and description.	2+2+2 = 6M	10 min
13	Most round-robin schedules uses a fixed size quantum. Give an argument in favor of a small quantum. Now give an argument in favor of a large quantum. Compare and contrast the types of systems and jobs to which the argument apply. Round Robin – Argument in favor of small quantum with example -Argument in favor of large quantum with example.	3+3 = 6M	10 min
14	a)  b) P2 and P4 are running, P1 is waiting for R1, and P2 is waiting for R2. c) There is a cycle, but no deadlock. - P2 finishes, release R1;	2+2+2 = 6M	10 min

	- P4 finishes, release R2; - P1 acquires R1, finishes and release R1,R2; - P3 acquires R2, finishes and release R1,R2;		
15	-Paging Concept. - Hardware Implementation -Mapping of pages on to frames, representation with suitable diagram	2+2+2 = 6M	10 min

Part C (3Q x 10M = 30Marks)

Q No	**Solution**	**Scheme of Marking**	**Max. Time required for each Question**
16	a) Gantt charts illustrating the execution of these processes using SJF, a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum=3) scheduling. b) Turnaround time of each process for each of the scheduling algorithms in part a? c) Waiting time of each process for each of the scheduling algorithms in part a?	6+2+2 = 10 M	20 min
17	a. Determination of need matrix.	3+4+1.5+1.5	20 min

	b. Illustrating that the system in a safe state by demonstrating the order in which the processes may complete. c. If a request from process P1 arrives for (1,1,0,0), can the request be granted immediately. - Yes d. If a request from process P1 arrives for (0,0,2,0), can the request be granted immediately. - Yes	=10M	
18	-LRU Page Replacement -FIFO -Optimal	3+3+4 = 10M	20 min