JAIN COLLEGE OF ENGINEERING & RESEARCH, BELAGAVI
Programme: Computer Science & Engineering (AIML)

CONTINUOUS INTERNAL EVALUATION-I

Semester: 3rd | **Date:** 19-10-2024
Course: Operating Systems | **Code:** BCS303 | **Max. Marks:** 50
Course Coordinator: Prof.Pallavi. P. Dixit | **Duration:** 1 Hour 30 Min

Note: Answer any one full question choosing from each part.

Part -A

Q.No.	Question	Marks	CO	R.B.T. Level
1 a)	Define operating Systems. Explain the dual-mode operating system with a neat diagram.	10	1	L2
1 b)	With a neat diagram, explain the concept of the virtual machine.	10	1	L2
1 c)	Distinguish briefly between Multiprogramming and Multitasking.	5	1	L2
	OR			
2 a)	Explain the services of the operating system that are helpful for the user and the system.	10	1	L2
2 b)	What are system calls? Briefly point out its types with illustrations.	10	1	L2
2 c)	List out the User Views and System views of OS.	5	1	L2
	Part -B			
3 a)	What is Process? With a neat diagram, explain the states of a process with a transition diagram and process control block.	10	2	L2
3 b)	Calculate average waiting and turnaround times by drawing the Gantt chart using FCFS and Round Robin Scheduling Algorithm with quantum time q=2ms.	10	2	L3
3 c)	Illustrate Peterson's solution for the critical section problem.	5	3	L2
	OR			
4 a)	What is Inter-process communication? Discuss briefly message passing and the shared memory concept of IPC.	10	2	L2
4 b)	Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using SRTF and the Priority scheduling algorithm.	10	2	L3

Processes	Arrival Time	Burst Time
P1	0	9
P2	1	4
P3	2	9
P4	3	5

		Processes	Arrival Time	Burst Time	Priority		
		P1	0	8	3		
		P2	1	4	2		
		P3	2	9	1		
		P4	3	5	4		
4 c)	Explain briefly the Critical Section Problem.					5	3	L2

COURSE OUTCOMES (COs)	
1	Explain the structure and functionality of operating system
2	Apply appropriate CPU scheduling algorithms for the given problem.
3	Analyze the various techniques for process synchronization and deadlock handling.
4	Apply the various techniques for memory management
5	Explain file and secondary storage management strategies.
6	Describe the need for information protection mechanisms.

REVISED BLOOMS TAXONOMY LEARNING LEVEL (RBT)					
L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

PROGRAM OUTCOMES (POs)					
1	Engineering Knowledge	5	Modern tool usage	9	Individual and Team-Work
2	Problem Analysis	6	Engineer and Society	10	Communication
3	Design / Development Solutions	7	Environment and Sustainability	11	Project Management and Finance
4	Conduct Investigations of Complex problems	8	Ethics	12	Life-long Learning

JAIN COLLEGE OF ENGINEERING & RESEARCH, BELAGAVI
Programme: Computer Science and Engineering (AIML)

CONTINUOUS INTERNAL EVALUATION-II

Semester: 3rd
Course: Operating Systems **Code: BCS303** **Date:** 24/12/2024
Course Coordinator: Prof. Pallavi. Dixit **Max. Marks:** 50
Duration: 1 Hour 30 Min

Note: Answer any one full question choosing from each part.

Q. No.	Questions	Marks	CO	R.B.T. Level
	Part -A			
1 a)	Explain Reader- Writers Problems. Give the solution for readers/writers problem using semaphore	10	C203.3	L2
1 b)	Describe the following allocation algorithms. 1)first fit 2) best fit 3) worst fit	10	C203.4	L2
1 c)	With a neat diagram, describe Acyclic structured directory.	5	C203.5	L1,L2
	OR			
2 a)	The operating system contains 3 resources, the number of instances of each resource type are 7, 7, 10.The current resource allocation state is as shown below. R1 R2 R3 R1 R2 R3 P1 2 2 3 3 6 8 P2 2 0 3 4 3 3 P3 1 2 4 3 4 4 1) Is the current allocation in safe state. 2) Can the request made by process P1(1,1,0) be granted.	10	C203.3	L3
2 b)	Consider the following page reference string 2,3,2,1,5,2,4,5,3,2,5,2 How many page faults would occur in case of a) LRU b) FIFO c) optimal page replacement algorithms assuming 3 frames. Note that initially all frames are empty.	10	C203.4	L3
2 c)	With a neat diagram, describe tree structured directory.	5	C203.5	L1,L2
	Part -B			
3 a)	Describe the Bankers algorithm for deadlock avoidance.	10	C203.3	L1,L2
3 b)	Explain Translation lookaside buffer (TLB) with a neat diagram.	10	C203.4	L1,L2
3 c)	Describe the working of contiguous file allocation methods.	5	C203.5	L1,L2
	OR			
4 a)	Explain semaphores. State the dining philosopher problem and give the solution for the same using semaphores.	10	C203.3	L1,L2
4 b)	What is paging? Explain with a neat diagram.	10	C203.4	L1,L2
4 c)	Describe the working of indexed file allocation methods.	5	C203.5	L1,L2

CBCS SCHEME

USN | 2 | J | R | 2 | 3 | C | I | 0 | 3 | 2 | BCS303

Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Operating Systems

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Operating System. Explain dual mode of operating systems with a neat diagram.	06	L1 L2	CO1
	b.	Distinguish between the following terms: i) Multiprogramming and Multitasking ii) Multiprocessor and Clustered system	06	L2	CO1
	c.	Explain with a neat diagram VM-WARE Architecture.	08	L1 L2	CO1
		OR			
Q.2	a.	List and explain the services provided by OS for the user and efficient operation of system.	06	L2	CO1
	b.	Explain the different computing equipments.	06	L2	CO1
	c.	What are systems calls? List and explain the different types of systems calls.	08	L1 L2	CO1
		Module – 2			
Q.3	a.	What is process? Explain process state diagram and process control block with a neat diagram.	10	L1 L2	CO2
	b.	What is interprocess communication? Explain direct and indirect communication with respect to message passing system.	10	L1 L2	CO2
		OR			
Q.4	a.	List and explain the different types of multithreading models.	06	L1 L2	CO2
	b.	Calculate the average waiting time and average turnaround time by drawing the Gantt-chart using FCFS, SJF, RR (Q = 4ms) and priority scheduling (Higher Number is having highest priority).	14	L3	CO2

Process	B.T. (ms)	Priority
P_1	24	1
P_2	03	2
P_3	03	3

		Module – 3			
Q.5	a.	What is critical section? Give the Peterson's solution to 2 processes critical section problem.	05	L1 L2	CO3
	b.	Explain Reader's and Writer's problem in detail.	07	L2	CO3
	c.	What is semaphore? Discuss the solution to the classical dinning philosopher problem.	08	L1 L2	CO3

OR

Q.6	**a.**	What is a Deadlock? What are the necessary conditions for the deadlock to occur?	**06**	**L1 L2**	**CO3**
	b.	Consider the following snap shot of the system. Process | Allocation (A B C) | Max (A B C) | Available (A B C) P_0 0 1 0 | 7 5 3 | 3 3 2 P_1 2 0 0 | 3 2 2 P_2 3 0 2 | 9 0 2 P_3 2 1 1 | 2 2 2 P_4 0 0 2 | 4 3 3 Answer the following questions: i) What is the content of the matrix need? ii) Is the system on a safe state? If so, find safe sequence. iii) If P_1 requirements for (1, 0, 2) additional resources can P_1 be granted.	**14**	**L3**	**CO2**

Module – 4

Q.7	**a.**	What is paging? Explain with a neat diagram paging hardware with TLB.	**10**	**L1 L2**	**CO4**
	b.	Explain the different strategies used to select a free hole from available holes.	**05**	**L1**	**CO4**
	c.	What is Fragmentation? List and explain its types.	**05**	**L2**	**CO4**

OR

Q.8	**a.**	What is page fault? With a neat diagram explain steps in handling page fault.	**08**	**L2**	**CO4**
	b.	Consider the page reference string for a memory with 3 frames determine the number of page faults using FIFO, optimal and LRU replacement algorithms. Which algorithms is more efficient? 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1	**12**	**L3**	**CO4**

Module – 5

Q.9	**a.**	Define File. List and explain different file operations and file attributes.	**10**	**L1**	**CO5**
	b.	Explain the different file allocation methods.	**10**	**L2**	**CO5**

OR

Q.10	**a.**	What is Access Matrix? Explain the implementation of Access Matrix.	**10**	**L2**	**CO5**
	b.	A drive has 5000 cylinders numbered 0 to 4999. The drive is currently servicing at a request 143 and previously served a request at 125. The queue of pending request in FIFO order. 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 starting from current head position. What is the total distance travelled (in cylinders) by a disk arm to satisfy the request using FCFS, SSTF, SCAN, LOOK and C-Look algorithm	**10**	**L3**	**CO5**

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