Seat No.: _____	Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER–III • EXAMINATION

Subject Code: 2630004 **Date:**

Subject Name: Operating Systems (OS)

Time : **Total Marks: 70**

Instruction:

1. **Attempt all the question**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 A	1. What is Dispatcher? 2. What is the difference between Hard and Soft real-time systems? 3. Discuss the possible reasons for process migration. 4. What is the role of Thread Library in User-Level Thread? 5. Give the difference between consumable and reusable resources. 6. List the function of cluster middleware. 7. Explain the term – 'Time slicing'.	**07**
B	1. Suppose processor has to access 2 levels of memory. Level 1 is Cache and level 2 is RAM. Level 1 access time 0.1µs and level 2 access time of 1µs. If Hit ration (H=0.85) then find the average access time to access a byte. **Note:-** Assume that if a byte to be accessed in level 1 then the processor accesses it directly and if it is in level 2, then the byte is first transferred to level 1 and then access by the processor. 2. Differentiate Batch multiprogramming Vs Time sharing 3. Explain the term – JCL	**03** **03** **01**
Q.2 A	1. Why unequal size partitions are better than equal size partitions? 2. Justify – "Compaction causes performance overhead". 3. Justify the statement: "When a block is released in a buddy system the number of free blocks in the system may increase by 1, may remain unchanged, or may decrease by a number between 1 and n, both inclusive, where n depends on the memory available with the system."	**03** **02** **02**
B	i) Apply Round Robin and First come first serve algorithm for following set of processes. Calculate the throughput by applying q=1 and 4.	**04**

Process	Arrival Time	Service Time
A	0	3
B	2	5
C	4	5
D	6	6
E	8	7

	ii) Validate which quantum value is better for RR 1 or 4 for the above case? iii) Rate which algorithm is good RR or FCFS?	**02** **01**
	OR	
B	Total No of pages for the process are 5 and total number of frames allocated to this process are 3 (using Fixed frame allocation) The page address stream formed by executing the program is as follows: (2 1 4 2 3 1 5 2 3 5 4 1 3 4) Apply OPT, LRU and FIFO algorithm for above. Select which is the best page replacement algorithm according to you? Why?	**07**
Q.3 A	Explain Instruction Fetch and Execution Cycle with example.	**07**
B	Explain the Readers/Writers problem. Give a solution using semaphore if readers' having a priority.	**07**
	OR	
Q.3 A	What is RPC? Explain the required design configuration for RPC.	**07**
B	Explain the different methods for Secondary Storage Management	**07**
Q.4 A	Explain RAID and its level 0-6 in detail	**07**
B	Explain Fair-Share Scheduling and Gang scheduling.	**07**
	OR	
Q.4 A	Why KLT works better than ULT?	**07**
B	State Dinner Philosopher Problem. Do you agree that by adding an attendant who only allows four philosophers at a time will solve the problem? Justify your answer.	**07**
Q.5 A	What is Monitor? Explain the solution to the Bounded-Buffer Producer/Consumer Problem using a Monitor.	**07**
B	Explain Seven-state Process Model mentioning all its transitions.	**07**
	OR	
Q.5 A	Discuss the deadlock avoidance using Banker's algorithm. Also discuss data structure for implementing this algorithm.	**07**
B	1. What is Interrupt? Explain the different classes of Interrupt. 2. Explain Race Condition for multiple processes with example.	**04** **03**

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Other Higher Bloom Level Questions

<table>
<tr><td>1</td><td>Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order) , how much each of the First-fit, Best-fit and Worst-fit algorithms place processes of 212K, 417K, 112K and 426K (in order)? Which algorithm makes the most efficient use of Memory?</td><td>07</td></tr>
<tr><td>2</td><td>Explain why operating system evolved from simple batch systems to multi programmed Batch systems?</td><td>03</td></tr>
<tr><td>3</td><td>Consider the following set of processes, 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>5</td></tr>
</table>
The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

Draw four Gantt charts describing execution of these processes using FCFS, SPN, a non preemptive priority (a smaller priority number implies a higher priority), and RR (quantum=1) scheduling.
What is the turnaround time of each process for each of the scheduling algorithms?
What is the waiting time of each process for each of the scheduling algorithms?
</td><td>07</td></tr>
<tr><td>4</td><td>A dynamic partitioning scheme is being used, and the following is the memory configuration at a given point in time.
<table>
<tr><td>20M</td><td>20M</td><td>40M</td><td>60M</td><td>20M</td><td>10M</td><td>60M</td><td>40M</td><td>20M</td><td>30M</td><td>40M</td><td>40M</td></tr>
</table>
The shaded areas are allocated blocks, the whit areas are free blocks. The next three memory requests are for 40M, 20M and 10M. Indicate the starting address for each of the three blocks using following placement algorithms:

First – fit
(b) Best-fit
Next-fit (assume the most recently added block is at the beginning of memory)
Worst-fit
</td><td>07</td></tr>
<tr><td>5</td><td>Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:
<table>
<tr><th>Process</th><th>Arrival Time</th><th>Service Time</th></tr>
<tr><td>P1</td><td>0</td><td>3</td></tr>
</table></td><td>07</td></tr>
</table>

P2	2	6
P3	4	4
P4	6	5
P5	8	2

a. Draw four Gantt charts describing execution of these processes using RR q=1 and q=4, SRT, and HRRN a non preemptive priority.
b. What is the turnaround time of each process for each of the scheduling algorithms?
c. What is the waiting time of each process for each of the scheduling algorithm?
d. What is the finish time of each process for each of the scheduling algorithm?