

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MCA - SEMESTER-III • EXAMINATION – WINTER 2016**

**Subject Code: 2630004****Date: 04/01/ 2017****Subject Name: Operating Systems****Time: 10.30 AM TO 01.00 PM****Total Marks: 70****Instructions:**

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

- Q.1 (a)** Answer the following questions in short. **07**
1. What is cache memory?
  2. What is the difference between hard and soft real-time tasks?
  3. What does it mean to preempt a process?
  4. What is jacketing?
  5. What is JCL?
  6. What is thrashing?
  7. What is dispatcher?
- (b)**
1. Suppose processor has to access 2 levels of memory. Level 1 is Cache and level 2 is RAM. Level 1 access time  $0.1\mu s$  and level 2 access time of  $1\mu s$ . If Hit ration ( $H=0.80$ ) 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. **03**
  2. What is context switching? How does it differ from mode switching? **03**
  3. What is real time system? **01**
- Q.2 (a)**
1. What are the differences between user level threads and kernel supported threads. **03**
  2. Which scheduling policy is most suitable for time-shared operating systems? Why? **02**
  3. Why DMA is considered an efficient mechanism for performing I/O. **02**
- (b)**
1. The following are the set of processes with their respective CPU burst time (in milliseconds). **04**
- | Processes | CPU-burst time |
|-----------|----------------|
| P1        | 10             |
| P2        | 5              |
| P3        | 5              |
- Calculate the average waiting time if the process arrived in the order:  
 (i) P1, P2 & P3 (ii) P2, P3 & P1
2. Consider the following segment table: **03**
- | Segment | Base | Length |
|---------|------|--------|
| 0       | 320  | 550    |
| 1       | 2300 | 14     |
| 2       | 90   | 100    |
| 3       | 1327 | 580    |
| 4       | 1952 | 96     |
- What are the physical addresses for the following logical addresses?  
 a) 0,430 b) 1,10 c) 3,500

**OR**

- (b) 1. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would 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? **04**
2. Consider a logical address space of 8 pages of 1024 words each, mapped onto a physical address space of 32 frames. **03**  
 How many bits are there in the logical address?  
 How many bits are there in the physical address?
- Q.3** (a) Explain Instruction Fetch and Execution Cycle with proper example. **07**  
 (b) List common events lead to a creation of process and also list the steps performed by an OS to create a new process **07**
- OR**
- Q.3** (a) 1. What are semaphores? How do they implement mutual exclusion? **04**  
 2. What is Race condition? Explain with example. **03**  
 (b) Explain the Dining Philosopher Problem. Give a proper solution for the problem using semaphore. **07**
- Q.4** (a) What is virtual memory? Describe the combined paging and segmentation approach for memory management explaining how physical address is generated in this scheme. **07**  
 (b) Explain multiprocessor thread scheduling approaches. **07**
- OR**
- Q.4** (a) List the steps needed to perform page replacement. Explain the different page replacement policies. Also list out the main requirements, which should be satisfied by a page replacement policy. **07**  
 (b) Briefly explain the seven RAID levels. **07**
- Q.5** (a) Explain Seven-state Process Model mentioning all its transitions. **07**  
 (b) List various file allocation Methods. Explain in brief free space management. **07**
- OR**
- Q.5** (a) What is RPC? Explain the required design configuration for RPC. **07**  
 (b) 1. What is thread? Discuss the importance of thread in multiprocessing. **04**  
 2. Discuss four necessary conditions for deadlock. **03**

\*\*\*\*\*