JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS-2022

B.Tech.-VII Semester (ECE)

COURSE CODE (CREDITS): 19B1WEC731(3)   MAX. MARKS: 35

COURSE NAME: REAL TIME OPERATING SYSTEM

COURSE INSTRUCTORS: Dr. Rajiv Kumar   MAX. TIME: 2 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q-1. a) What is role of 'concurrency control protocol' in a database? Also explain that the selection of an appropriate concurrency control protocol that is important to meet the timeliness requirements for transactions.   [CO-4, 4]

b) You are given the following temporal data item:

d=(10,2500 mSec, 100 mSec) and the value of the current time as 2700 mSec

Is the given data item is absolutely valid?   [CO-4, 3]

Q-2. a) What is role of bandwidth, delay, jitter, loss rate and blocking probability in the Quality of Service (QoS) real-time applications?   [CO-4, 4]

b) Assume that a certain real-time application receives data at the rate of 10 mbps. The QoS guarantee to the application permits a delay jitter of 10 mSec. Compute the buffer requirement at the receiver.   [CO-4, 3]

Q-3 a) Why it is necessary to synchronize the clocks in a distributed real-time system? Discuss the two relative advantages and disadvantages of the centralized and distributed clock synchronization schemes.   [CO-3, 4]

b)Determine the required synchronization interval in case a distributed real-time system have 10 clocks, and it is required to restrict their maximum drift of 1 mSec. Let the maximum drift of the clocks per unit time be 2×10^{-6}.   [CO-3, 3]

Q-4 a) Explain the problems that might arise if hard real-time tasks are made to share critical resources among themselves using traditional operating system primitives such as semaphores or monitors. Briefly explain how these problems can be overcome.   [CO-1, 3]

b) What do you understand by the term "priority inversion" in the context of real-time task scheduling? When several tasks share a set of critical resources, is it possible to avoid priority inversion altogether by using a suitable scheduling algorithm? Explain your answer.

[CO-1, 3]

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Q-5 In this question, total EIGHT parts are there and each part carries one marks: [CO-2, 8]

a) Identify the constraints that a set of periodic real-time tasks need to satisfy for RMA to be optimal scheduler for the set of tasks?

b) What are the basic criteria on which a real-time task can be determined to belong to one of three categories i.e. periodic, aperiodic, and sporadic?

c) What do you understand by jitter associated with a periodic task?

Explain in brief whether the following are TRUE or FALSE?

d) Cyclic schedulers are more proficient than table-driven scheduler.

e) All hard real-time systems are safety-critical in nature.

f) It should be the goal of any good real-time operating system to complete every hard real-time task as ahead of its deadline as possible.

g) Every safety-critical real-time system has a fail-safe state.

h) In real time operating system a task must be serviced by its deadline period.