B.TECH DEGREE EXAMINATIONS: MAY 2015

(Regulation 2009)

Seventh Semester

INFORMATION TECHNOLOGY

ITY120: Real Time Systems

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In real time operating system
   a) All processes have the same priority
   b) A task must be serviced by its deadline period
   c) Process scheduling can be done only once
   d) Kernel is not required

2. The constraints defined in terms of tails of some probability distribution is called
   a) Deterministic constraints
   b) Hard time constraints
   c) Soft time constraints
   d) Probabilistic constraints

3. _____ is the module that allocates processors and resources to jobs and tasks.
   a) Pipeline
   b) Graph
   c) Scheduler
   d) Multiprocessor

4. The maximum allowable response time of the job is called as
   a) Release time
   b) Absolute deadline
   c) Execution time
   d) Relative deadline

5. The bandwidth preserving algorithm is one type of _____algorithm
   a) Periodic job scheduling
   b) Aperiodic job scheduling
   c) Sporadic job scheduling
   d) Sporadic job with soft deadlines

6. Deadline monotonic algorithm assigns priorities to tasks based on their _____
   a) Periods
   b) Absolute deadline
   c) Relative deadline
   d) Slacks

7. The priority inheritance protocol works with _____

a) Non preemptive, priority driven scheduling algorithm

b) Non preemptive, clock driven scheduling algorithm

c) Preemptive, clock driven scheduling algorithm

d) Preemptive, priority driven scheduling algorithm

8. Priority ceiling blocking is also called as avoidance blocking, the reason for this term is

a) Avoidance of deadlock among jobs

b) Lower priority jobs

c) Does not prevent deadlock

d) Low blocking time

9. In priority based service disciplines , the local deadline for the transmission of the jth packet at switch 'k' is

a) $d_{i,j}=a^e_{i,j}$

b) $d_{i,j}=D_{i,k}$

c) $d_{i,j}=a^e_{i,j}-D_{i,k}$

d) $d_{i,j}=a^e_{i,j}+D_{i,k}$

10. The main advantage of weighted fair queuing discipline is

a) Connection is accepted only when D is achievable

b) Timing isolation for each connection

c) End to end delay

d) Requires priority queues

PART B (10 x 2 = 20 Marks)

11. What is meant by Real Time Systems and when this system is called failed system?

12. List the steps to validate timing constraints.

13. What are the distinguishing characteristics of periodic, aperiodic and sporadic real-time tasks?

14. Mention the conditions to be satisfied for valid schedule.

15. Distinguish between fixed priority and dynamic priority scheduling algorithms.

16. How deadlock condition can be avoided?

17. Define sporadic server.

18. List the differences between the priority inheritance and priority ceiling protocols.

19. What is meant by parallelism?

20. Why RPS algorithm is called least potential first algorithm?

PART C (5 x 14 = 70 Marks)

21. a) i) Compare the performance of Hard and Soft real time systems with examples. (7)

ii) Elucidate the concept of hard timing constraints and temporal Quality of service guarantees in real time system. (7)

(OR)

b) List the design and implementation issues of real time systems and explain some of the disciplines that affect the design and analysis of real time system.

22. a) i) The Periodic task model is a well known deterministic workload model. Justify (7) the statement and give its characterization.

   ii) With examples give the illustration of round robin scheduling and priority – (7) driven approach of precedence constrained jobs and explain.

   (OR)

   b) Explain the different temporal parameters of real time workload in detail and give the impact of those parameters in real time system design.

23. a) i) List the execution process steps involved in Rate-Monotonic and Deadline- (7) Monotonic fixed priority scheduling algorithms.

   ii) On what basis priority driven scheduling is assigned and explain the algorithm (7) of EDF and LST for optimal conditions.

   (OR)

   b) i) Explain the operations of deferrable server for Rate-Monotonic schedule and (7) EDF schedule.

   ii) Discuss the schedulability of fixed-priority systems containing deferrable server (7) using time demand analysis method.

24. a) Discuss the rules of basic priority inheritance protocol with examples and also explain the properties of the priority inheritance protocol.

   (OR)

   b) A system contains the following four periodic tasks. The tasks are scheduled by the rate monotonic algorithm and priority ceiling protocol.

   $T_1=(3,0.75)$ $b_1=0.9$

   $T_2=(3.5,1.5)$ $b_2=0.75$

   $T_3=(6,0.6)$ $b_3=1.0$

   $T_4=(10,1)$

   b_i is the blocking time of T_i. Are the tasks schedulable? Explain your answer.

25. a) i) Draw and explain the architecture of interprocessor communication. (7)

   ii) List and explain the different Interprocessor synchronization protocols in (7) elements of scheduling algorithms for end to end periodic tasks.

   (OR)

   b) i) Elaborate how weighted fair queuing algorithm can be used for scheduling (7)

aperiodic jobs.

ii)   Explain the rate proportional server algorithm with connection potential and link   (7)
     potential.

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