Seventh Semester B.E. Degree Examination, January 2013
Real Time Systems

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Differentiate:
         i)   Real time and non real time programming.
         ii)   Hard and soft real time with example.
         iii) Clock based and event based tasks.   **(09 Marks)**
    b.   Define the term "time constraint". How are RTS classified based on time constraint? Explain
         them with appropriate equations.   **(08 Marks)**
    c.   Why real time programming is more difficult to verify than non-real time programming?
                                                                         (03 Marks)

2   a.   What is a DDC? What are the advantages of DDC over analog control? Discuss PID control
         algorithm.   **(10 Marks)**
    b.   Compare batch processing and continuous processing.   **(04 Marks)**
    c.   List out the responsibilities of a control engineer in designing the suitable computer system.
                                                                         (06 Marks)

3   a.   Consider a printer interfaced for polling data from the computer. Assuming the data is being
         transferred to a printer at 40 character/sec. The computer finds the device is ready once
         every 25 msec. The 3 instructions involved in performing the test will take approximately
         5µ sec. Find the time for each character transfer and percentage of spending time of
         computer for checking the device is ready for every character. **(05 Marks)**
    b.   Why is memory protection important in real time system? What methods can be used to
         provide memory protection?   **(05 Marks)**
    c.   Mention the features of specialized processors and explain MIMD, with a neat diagram.
                                                                         (10 Marks)

4   a.   What are the major requirements of CVTCLASS? Explain.   **(08 Marks)**
    b.   List and explain the various requirements in programming languages used for real time
         applications.   **(12 Marks)**

PART – B

5   a.   3 tasks A, B and C are required to run at 1ms, 6ms and 25ms intervals [corresponding to
         1 tick, 2 tick and 4 tick, if the clock interrupt rate is set at 20 ms]. If the task priority order is
         set as A, B and C with A has highest priority and also calculate the delay required to invoke
         task A at every 4th invocation. Consider the tasks are in cyclic manner.   **(08 Marks)**
    b.   What are functions of attack management module? Explain various tasks states, with the
         help of state diagram.   **(12 Marks)**

6 a. List the set of functions and primitives for RTOS. **(10 Marks)**

b. Consider the system whose outline diagram is shown in Fig.Q.6(b). It is assumed that the "control", "display" and "operator" i/p program are to be run as separate tasks with priorities 1, 10, 20 respectively. The "control" task has to run at 40 ms intervals and the "display" update task at 55 intervals. The system clock is set at 20ms and "control" task has to run every 2 system ticks. The operator run at 10 S intervals. Write the outline structure of the system. **(10 Marks)**
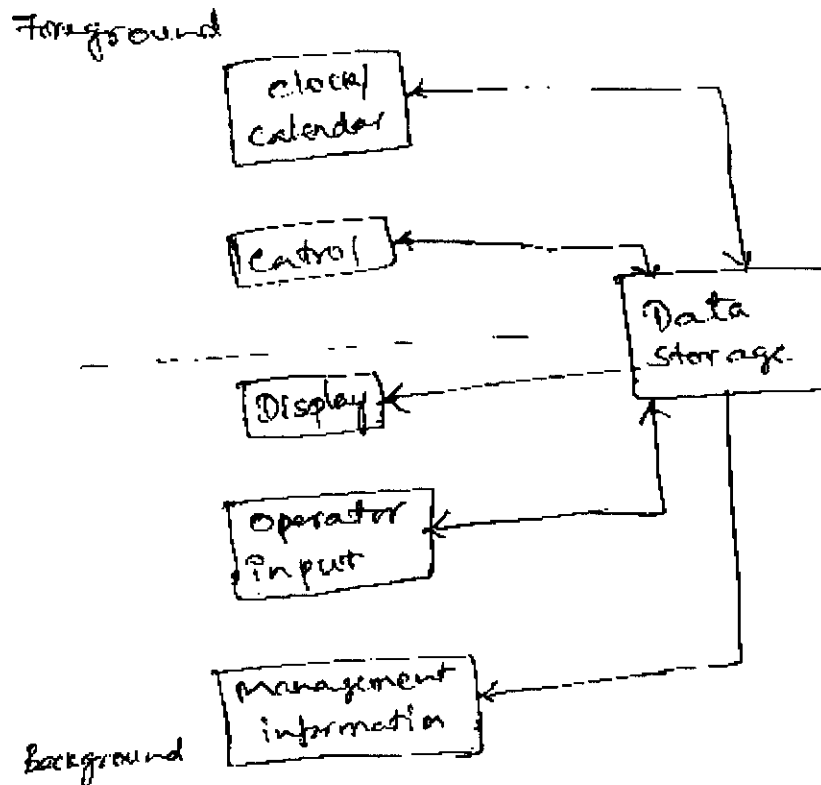

Fig.Q.6(b)

7 a. Explain software design for RTS using software module. **(10 Marks)**

b. How data will be shared with common memory. **(05 Marks)**

c. Mention the importance of conditions flag and binary semaphores. **(05 Marks)**

8 a. Explain Yourdon methodology. **(04 Marks)**

b. Write short notes on:
  i) PSPECs and CSPECs
  ii) Ward and Mellor method. **(16 Marks)**

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