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USN										<u> </u>	12EC118

M.Tech. Degree Examination, February 2013 Advanced Embedded System

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Discuss the characteristic features of embedded systems to contrast them with general purpose computing systems. (08 Marks)

b. Briefly explain the classification of embedded systems based on their purpose. Give examples. (08 Marks)

c. Differentiate the roles of Reset and Brown-out reset circuits.

(04 Marks)

2 a. Explain the operation and specifications of SPI bus.

(08 Marks)

b. Explain UART based on-board communication and discuss how it is extended to an external communication interface. (08 Marks)

c. Define the four types of data transfer supported by the USB.

(04 Marks)

3 a. Briefly discuss the fundamental issues involved in hardware-software co-design methodology. (08 Marks)

b. Design a coin operated public telephone unit based in FSM to have the following nine states. Briefly explain the FSM modeling.

State A: Ready

State B: Wait for coin

State C: Wait for number

State D : Dialling

State E: Call in progress (60 seconds)

State F: Call terminated

State G: Call failure

State H: Invalid Number

State I: Out of order.

The model is required to have the following additional options.

i) Coin return for busy line and on-hook

ii) Call continuation prompt after 50th second.

(08 Marks)

c. Define the following examples of UML building elements:

i) Class and active class 'Things'

ii) Aggregation and generalization 'RelationShips'.

(04 Marks)

4 a. Explain the role of EDA tools in PCB design and fabrication.

(06 Marks)

- b. Discuss the procedure of Design Rules Check (DRC) in a typical CAD tool and list the possible errors in schematic diagram. (08 Marks)
- c. Explain the procedures and rules of PCB track routing considering global space settings.

(06 Marks)

- 5 a. Discuss the software utilities involved in converting an assembly language program into machine executable code. (08 Marks)
 - b. What are the two approaches of embedded firmware design? Discuss their relative merits and demerits in detail (08 Marks)
 - c. List the advantages of assembly language based programming.

(04 Marks)

- 6 a. With definitions, tabulate any four differences between processes and threads. (06 Marks)
 - b. Discuss process management in the context of an RTOS with the help of details of a task control block TCB. (06 Marks)
 - c. Explain the process-life-cycle using a state-transition diagram.

- 7 a. Considering four processes of different priorities in the ready queue, and a fifth process of highest priority entering the queue later (after the second scheduled job is completed by 75%), discuss priority based scheduling for
 - i) Non-preemptive policy
- ii) Preemptive policy.

(08 Marks)

- b. Briefly explain the requirements that a good scheduling algorithm must satisfy. (06 Marks)
- c. What is a memory mapped object (MMO)? Discuss its application in task communication.

(06 Marks)

- 8 a. Explain the problem of priority inversion and discuss any one remedial technique. (10 Marks)
 - b. Define a device driver and list its major responsibilities.

(05 Marks)

c. Write a note on In-Circuit Emulator (ICE) based firmware debugging.

(05 Marks)