Sem VII ETRX Embedded System Design 24 NOV 2016

CBCGS

QP CODE : 631400

(3 Hours) (Total Marks : 80)

N.B. Question no. 1 is compulsory.
All questions carry same weightage/marks.
Attemt any other 3 from remaining 5 questions. Attempt total 4 questions
Assume suitable date whereever necessary.

Q1.a. What are' the challenges while meeting low power consumption, performance, low-cost requirement for an embeded system. Explain how they affect other? (5)
b. What kind of communication an embedded system may need? Describe any two types (5)
c. Why C programing is popular for embedded programing? Describe related features. (5)
d. Cortex-A8, R4, M3 are suitable for certain class of applications, justify how? (5)

Q2.a. What features of cortx-M3 makes it suitable for low-power, RTOS based applications. (10)
b. What is CAN protocol? Describe topology and Frame formats with significance of fields. (10)

Q3.a. What is need of debug and trace facility? How cortex-M3 supports it? (10)
b. For low power design which microcontroller architecture will you use? Why? What is typical design strategy for achieving low-power consumption. (10)

Q4.Heart is having a natural pulse generator which is responsible to rythmically beating of heart. Malfunctioning of that leads to arythmic heart beating. Design a pacemaker (pulse generator) which generates electrical pulses to trigger heart, if it senses irregular(or low) heart rate. This pacemaker is typically inplanted inside body near chest. Assume appropriate design challenge and design an embeded system (pacemaker) which can sense and trigger (if required) heart to bring heart back to normal rythmic beating. For this design develop
a. Functional model /FSM which describes functioning of system
b. Hardware block diagram which describes typical hardware building blocks
c. Software architecture which describe typical functions/drivers/tasks required in program d. piscuss special design challenges for this design and suggest solutions/approach
e. Suggest list of components with justification. (20)

Q5.a. What is Real time operating system's role, function in an embeded system? Describe various uCOS-II c-functions which are used to implements RTOS functions/role. (10)
b. What is shared data? How it is handled in RTOS? What are priorty inversion problems? How priority inversion problem can be addressed/solved? (10)

Q6. Write short notes on any four.
a. Task scheduling policies (any three) and its impact on average waiting, turn-around time
b. Compare FPGA/CPLD based embedded system against Microcontroller based
c. Testing methodologies, tools and need.
d. Wireless embedded communication.
e. Inter process communication in RTOS (20)

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