

B. E. sem-VII (CBSE) Electronics - ESD 24/11/16
 Embedded system design. QP CODE : 631400 extra

(3 Hours)

(Total Marks : 80)

N.B. Question no. 1 is compulsory.

All questions carry same weightage/marks.

Attempt any other 3 from remaining 5 questions. Attempt total 4 questions

Assume suitable data wherever necessary.

- Q1.a. What are the challenges while meeting low power consumption, performance, low-cost requirement for an embedded 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 programming is popular for embedded programming? Describe related features. (5)
 d. Cortex-A8, R4, M3 are suitable for certain class of applications, justify how? (5)
- Q2.a. What features of cortex-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? (10)
 What is typical design strategy for achieving low-power consumption.
- Q4. Heart is having a natural pulse generator which is responsible to rhythmically beating of heart. Malfunctioning of that leads to arrhythmic 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 implanted inside body near chest. Assume appropriate design challenge and design an embedded system (pacemaker) which can sense and trigger (if required) heart to bring heart back to normal rhythmic 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. Discuss 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 embedded system? Describe various uCOS-II e-functions which are used to implement RTOS functions/role. (10)
 b. What is shared data? How it is handled in RTOS? What are priority 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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