VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
M.E. (ECE: CBCS) I-Semester Main Examinations, January-2018

(Embedded Systems & VLSI Design)

Embedded Systems Design

Time: 3 hours   Max. Marks: 60

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. List any two architectural differences between Microprocessor & Micro Controller.

2. When do you suggest usage of SRAM in embedded system design?

3. Configure the SFRs of AT89C51 MCU to achieve UART full-duplex at 19.2 Kbps and also to generate a clock pulse of 100μSec on P2.0 using Timer-0 in mode-2. Enable Timer0 and UART interrupts; and, assume that 11.0592 MHz as the CPU oscillator clock in the design.

4. Give the details of control pins of a monochrome 2x16 ASCII LCD so as to interface it with any CMOS 5V embedded MCU.

5. Assume that you are working with a microcontroller of a silicon company which has specified in its datasheet that it is using ARM926EJ-S as the main core. List the important design features you can summarize for this microcontroller by considering the ARM nomenclature.

6. Summarize any two important advantages of Thumb mode in ARM powered targets.

7. Draw the mandate circuit which is required to interface a CMOS UART with RS232 port of a GPRS modem to provide networking.

8. What is the advantage of PCI in embedded networking? When do you recommend it?

9. When do you specify the mandate need of usage of JTAG for testing?

10. List the merits and demerits of Round Robin polled loop architecture.

Part-B (5 × 8 = 40 Marks)

11. a) Describe the crucial aspects which needs to be considered for finalizing a specific CPU to design an Embedded system product.   [5]

    b) Differentiate hard real-time Vs soft real-time embedded system characteristics and mention one example under each classification.   [3]

12. a) Discuss the hardware and software design of interfacing a single sensor to 8051. Choose the appropriate components required and specify how to achieve the sampling clock? Assume 11.0592 MHz crystal is being used in the design.   [5]

    b) Is it possible to control two DC motors using a single parallel port of 8051? If it is possible, draw the circuit indicating the control principle; if not, specify the reason.   [3]

13. a) Summarize the different registers of ARM CPU that are accessible in different modes. Justify the importance of SPSR and Link Register.   [5]

    b) Differentiate the architectural and performance aspects of ARM7 Vs ARM9 RISC cores. [3]

14. a) Narrate the distinct advantage of CAN serial protocol compared with the other serial standards. Draw the CAN2.0B frame format, indicating the importance of each field. Discuss its merits and demerits. [5]

    b) List the important differences between SPI Vs I^{2}C serial protocols used in embedded. [3]

15. a) Explain different software tools and techniques that you suggest for debugging a typical embedded system product. [4]

    b) Draw the flowchart indicating different tools associated with any embedded cross compiler in converting an embedded C application into the target understandable binary. [4]

16. a) Draw the flowchart of a typical embedded system product development, clearly indicating various stages of its life cycle. [4]

    b) Explain the principle opted for detecting a key-press using a polled loop matrix keypad. In this key scanning algorithm, specify the method opted for eliminating the problem of key de-bouncing. [4]

17. Answer any *two* of the following:
    a) Discuss the features of USB – topology, entities along with merits in embedded system. [4]
    b) Explain the significance of AMBA bus in Embedded networking using a block diagram. [4]
    c) Explain the functional Queue scheduling architecture with the help of pseudo code. [4]

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