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Code No.: 6131 M

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. (CBCS : ECE) I-Semester Make up Examinations, March-2017

(Embedded Systems & VLSI Design)

Embedded Systems Design

Time: 3 hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B***Part-A (10 × 2 = 20 Marks)**

1. List the hardware unit(s) that must be present in the embedded system.
2. What is the criterion in selecting a CPU for designing an embedded system product?
3. Write an embedded C or C++ program to alternatively blink 8 LEDs connected to P1 of 8051 microcontroller at 10ms delay operating XTAL at 11.0592 MHz with 5V DC supply.
4. Specify the principle opted to differentiate the control of the position of the cursor & actual ASCII data to be displayed on 2x16 LCD when interfaced with any standard microcontroller.
5. Draw the register format of Current Program Status Register (CPSR) for ARM core, mentioning the importance of each bit field. Specify how to switch between thumb mode Vs ARM mode.
6. List the standard exceptions & their addresses of ARM core CPU.
7. What is the acronym of IIC? Mention any two important advantages of this protocol compared with the other serial standards.
8. How many wires exists in implementing the SPI protocol? Mention the practical applications of SPI.
9. What is embedded ICE? Mention how to implement it in ARM powered target.
10. Explain the functional queue scheduling algorithm in implementing embedded software.

Part-B (5 × 10 = 50 Marks)

11. a) With the help of a flowchart, explain the important stages and challenges faced in designing an embedded system product. [5]
- b) Bring-out the architectural differences that will allow a designer to select a Microcontroller or Digital Signal Processor or Microprocessor as the CPU for designing an embedded system. [5]
12. a) With the help of a neat circuit diagram, explain the interface of DC motor with 8051 microcontroller. Write a program in embedded C or C++ to rotate the motor either in clockwise or in anticlockwise direction based on the status of the switch press which is connected at P2.0. Assume that the CPU is operating at 11.0592 MHz clock. [5]
- b) Write a standard 4x3 matrix keypad device driver in embedded C or in C++ for detecting a ASCII key press interfaced to 8051. What is key de-bouncing problem? Explain how to avoid it. [5]
13. a) Write in detail about the different modes of ARM CPU that it may undergo and mode specific banked registers available in these modes. Specify the importance of link & SPSR registers. [6]
- b) Discuss the architectural, functional and performance differences among ARM-7, ARM-9 & Cortex series of ARM CPU cores. [4]

14. a) Explain the working of CAN protocol. With the help of a neat frame formats, explain the different versions, throughput, advantages and disadvantages of CAN standards. [6]
- b) Exemplify the usage of PCI standard in embedded networking compared with serial standards. [4]
15. a) Explain in detail the various software design tools, techniques that are used to design, implement & test embedded software. [5]
- b) Describe Round Robin with interrupts scheduling algorithm. Narrate its performance differences with a simple RR polled loop system. [5]
16. a) Write an embedded C program to generate 3 KHz and 5 KHz clocks on P2.0 and P2.1 using the hardware timer programming; and, at the same time continuously receive the ASCII data through UART at 9600bps baud, displaying the same on the 8 LEDs interfaced to Port-1 of 8051 microcontroller operating at 11.0592 MHz with 5V DC supply. [6]
- b) Draw the circuit diagram of interfacing two sensors using ADC0808 with 8051 controller. [4]
17. Answer any *two* of the following:
- a) AMBA bus functional block diagram and its important features in ARM core designs [5]
- b) USB topology, importance & advantages compared with other serial standards [5]
- c) Importance of SRAM in embedded designs & method of interfacing 32KB of SRAM with 8051 microcontroller. [5]

