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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Seventh Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; Dec - 2016/Jan - 2017

Advanced Microcontroller

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Draw the functional block diagram of MSP 430 F2013 and explain units used for peripheral functions. 10
- b. Discuss structure and mechanism of 'Reset' in MSP 430. 10
- 2 a. Discuss important features of clock generator of MSP 430. Justify its contribution to low power feature. 8
- b. Discuss different addressing modes of MSP 430 with an example for each. 8
- c. Show the formation of Format-1 instruction. 4

UNIT - II

- 3 a. Discuss the issues associated with interrupts. 8
- b. Identify switch debouncing in push button switch. Discuss role of SR flip flop and RC filter in handling switch debouncing. 8
- c. Show the bias connection for LCD controller to provide bias voltage to drive segments and back planes. 4
- 4 a. List the sequence of steps during an interrupt request. Differentiate between subroutine and interrupt service routine. 6
- b. List the different functionality of register associated with port P1 in a MSP 430 F2xx. 6
- c. Discuss the different hardware approaches used to drive a heavier load than the MSP 430 can supply. 8

UNIT - III

- 5 a. Explain typical embedded device based on an ARM core with neat block diagram. 8
- b. Discuss pipelining in ARM-7 core with an example. 6
- c. Illustrate the following in ARM processor, 6
- i) Moving 32-bit constant into a register
- ii) Moving contents of 'cpsr' or 'spsr' to and from a register.
- 6 a. Discuss the hardware extension of ARM core. 8
- b. Explain functionalities of memory and interrupt controller in ARM based embedded system. 5

- c. Illustrate with proper ARM instructions: 7
- i) Barrel shifting operation with an example ii) Software interrupting.

UNIT - IV

- 7 a. Highlight the features of thumb instruction with an example to bring out its advantage. 4
- b. Illustrate the advantage of using,
- i) Unsigned types over Signed types operations for diversion 8
- ii) 'int' rather than 'char' type for local variables.
- c. List the different issues one may encounter when posting C code to the ARM. 8
- 8 a. Discuss the following and provide remedies to avoid it, 10
- i) Pointer aliasing ii) Unaligned data and Endianess.
- b. Differentiate thumb stack operation from its equivalent ARM instruction. 4
- c. Define loop unrolling. List the techniques to write loop efficiently in a program. 6

UNIT - V

- 9 a. Discuss the exceptions and associated modes of ARM processor. 8
- b. Provide flowchart for priority interrupt handling. 6
- c. List the features supported by μ HAL and Angel. 6
- 10 a. Discuss the mechanism of handling IRQ and SWI exceptions. 6
- b. Discuss Nested and Re-entrant handling mechanism with relevant flow diagrams. 10
- c. List the main features of Red Boot. 4

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