

(Following Paper ID and Roll No. to be filled in your Answer Books)

**PAPER ID : ME18**

Roll No.

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**M. TECH. (Sem.II)**

**THEORY EXAMINATION 2015-16**

**ADVANCED MICROCONTROLLERS & APPLICATIONS**

Time : 3 Hours

Total Marks : 100

**SECTION-A**

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)
- (a) Name any four low power advanced microcontrollers/processors used nowadays
- (b) Why MSP 430 is a 16-bit RISC CPU?
- (c) Draw status register of MSP 430 and discuss it?
- (d) Identify the addressing modes in the following MSP430 instruction.

`mov.w@R5,R6 ; mov.w2(SP), R6 ; mov.b3(R5),R6 ;  
mov.w@PC+,R6`

- (e) What is constant generator? How it is used for emulated instructions?
- (f) How to read the input from a switch in MSP430?
- (g) How ARM Cortex M3 supports power aware architecture?
- (h) What is Thumb-2 technology of ARM Cortex M3?
- (i) What is the purpose of link register in ARM Cortex M3?
- (j) How MSP 430 is used in wireless sensor networking?

**SECTION-B**

UPU NOTES

2. Attempt any five questions from this section. (10x5=50)

- (a) Draw functional block diagram of MSP430 Microcontroller and name its peripherals. Also discuss the architecture of MSP430 CPU in short.
- (b) (i) Discuss the digital I/O ports in MSP430? Write a program to light LEDs with constant bit pattern using ports.  
  
(ii) Discuss the low power modes of MSP 430.
- (c) What are wireless sensor networks? Discuss the application of MSP 430 in wireless sensor networking.

- (d) What are the modes of operations in ARM Cortex M3? Also discuss the interrupt mechanism NVIC used?
- (e) Draw the architecture of ARM Cortex M3 Microcontroller and describe it for registers, memory map bus interface and nested vectored interrupt support.
- (f) Why low power is important? In power aware architecture of embedded systems, what are the sources of power consumption? What are the various powers saving techniques available in the embedded system design?
- (g) Discuss the applications of low power microcontrollers in the present era of embedded system.
- (h) Draw the clock module of MSP430 showing some of the important bits in the peripheral registers that control its operation.

### SECTION-C

3. Attempt any two questions from this section. (15×2=30)
- (a) (i) What are the five types of timer modules used in MSP430? Give detailed description of RTC module and watchdog timer.
- (ii) How the pulse width modulation is done using MSP430?

- (b) (i) Define low power RF used in embedded systems with its different components. Also write its applications.
- (ii) How the system exceptions in are handled in ARM Cortex M3?
- (c) What are the characteristics of ARM Cortex M3 that makes it revolutionary product? What are the advanced programming features of ARM Cortex M-3?

