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प्रज्ञानं ब्रह्म

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MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

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FOURTH SEMESTER B.TECH(CCE) DEGREE MAKEUP EXAMINATION JUNE/JULY 2016
SUBJECT: EMBEDDED SYSTEMS DESIGN (ICT 2253)
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **05/07/2016** **MAX. MARKS: 50**

Instructions to candidates

- Answer **ALL** questions.
- Missing data, if any, may be suitably assumed.

1A. Write an assembly language program to sort an array of ten unsigned words available in the code memory and store the sorted array in the data memory.

1B. Assume that the following error free program is executed after microcontroller is RESET:

```
ldr r0,= -12
ldr r1,=-19
ldr r13,=0x10000014
stmdb r13!,{r0,r1}
ldr r2,= -24
push {r2}
ldm r13,{r3,r2}
```

What are the content of the registers r2,r3 and r13 after the execution of above block of code? Justify.

1C. Bring out the differences between single edge and double edge PWM.

[5+3+2]

2A. Write a C program to transfer the message "Failures are stepping stones to success" serially on TxD0 (P0.2 , function 2), at 9600 baud. Assume 1-start bit, 1- stop bit and 8-bit data (PCLK=3 MHz)

2B. Explain how the speed of a DC motor can be controlled using Pulse Width Modulation.

2C. Bring out the differences between microcontroller and microprocessor.

[5+3+2]

3A. Explain the following ARM instructions with an example to each:
i) LDRB ii) MRS iii) UMULL iv) BLE v) CMN

3B. Write a C program using DAC to generate a square waveform with peak to peak amplitude of 3.3 volts and frequency 2 KHz at AOUT (P0.26 , function-3).

3C. Discuss the role of UART and MAX 232 converter in serial communication.

[5+3+2]

4A. Assume that output of a square wave generator (Frequency range 0-99 Hz) is connected to EINT0 input. Write an embedded C program using interrupt to display the frequency of this square waveform on the seven segment displays.

4B. Explain the necessity of the following registers in handling the BURST mode of ADC:
(i) A/D Control Register
(ii) A/D Global Data Register
(iii) A/D Interrupt Enable Register

4C. Differentiate between Memory mapped IO and IO mapped IO.

[5+3+2]

5A. Define the term "Addressing mode". Explain various addressing modes of ARM microcontroller with suitable examples.

5B. Explain various SFRs available in ARM microcontroller to configure and handle GPIO interrupts.

5C. Given PCLK=6 MHz and PR=0. Determine the value to be loaded to MR1 to get a square waveform of frequency of 250 Hz on MAT 0.1.

[5+3+2]