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**5-06-2017**

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**B.Sc. ELECTRONICS – VI SEMESTER**

**SPECIAL SUPPLEMENTARY EXAMINATION: MAY 2017**

**EL 6212: MICROCONTROLLER AND EMBEDDED SYSTEMS**

ATTACH THE QUESTION PAPER WITH THE ANSWER SCRIPT

**Time: 3 Hrs Maximum Marks: 100**

This question paper has two printed pages and three parts.

**PART A**

Attempt any five 5X12=60

1. a. Draw the internal architecture of PIC16F877A.

b. Write any five differences between microprocessor and microcontroller. 7+5

1. a. Mention the bits of INTCON register and their significance.

b. Write a note on memory organization of PIC16F877A. 6+6

3. a. Explain types of addressing modes in PIC16F877A with proper example.

 b. Write any six differences between RISC and CISC architectures. 6+6

4. a. Explain the interfacing of a stepper motor with PIC16F877A with the help of a proper diagram and write the relevant ALP.

 b. Discuss ADC module and the conditions to generate an interrupt. 7+5

 5. a. Draw block diagram of a Pulse width modulator and discuss its working in brief.

 b. What is design metric? List three pair of design metrics that may compete with one another, providing an intuitive explanation of the reason behind the competition. 6+6

6. a. Write a note on bus arbitration.

b. Discuss different processor technologies in Embedded Systems. 6+6

7. a. Write the instructions needed to:

(i)set bit 3 of PORTA;

(ii)clear bit 1 of PORTB;

(iii)clear the file register called testfile;

(iv)move the binary number 11011 into the working register;

(v)move the contents of the working register into a file register called cost;

(vi)move the contents of the file register called cost into the working register;

(vii)branch unconditionally to a point in the program identified by the label repeat;

(viii)test bit 2 of the file register called input, and skip the next instruction if the bit is set.

 b. Write a note on DMA interfacing. 8+4

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**PART B**

**Attempt any five 5X6=30**

8. Write an assembly language program to subtract two 16 bit numbers.

9. Write an assembly language program to initialize Timer 0 to increase on every low to high transition on TOCKI pin and cause interrupt on overflow.

10. Draw a block diagram to show the interfacing of a DAC with PIC and write a program to generate ramp wave output.

11. Write a program to find whether a given number is palindrome or not?

12. Explain customization of a single purpose processor using a proper example.

13.a. Given an analog input signal whose voltage should range from 0V to 15V, and an 8 bit digital encoding. Workout the correct encoding for 7V using the successive approximation approach.

b. Write the formula and calculate the number of clock cycles required to obtain a duration of 12 microseconds from an internal clock frequency of 100 MHz. 4+2

14. Write a program for interfacing the 7-segment display with PIC16F877A.

**PART C**

**Attempt any five 5X2=10**

15. Which type of memory architecture is used in PIC16F877A and why?

16. Name the flags which are affected by the execution of *INCF f,d* instruction.

17. How many clock cycles are needed to execute one instruction (except branch instruction) of PIC 16F877A and what is the time period?

18. Can a relay be directly connected to a port pin of PIC16F877A for interfacing? Justify.

19. What are the events that can wake the device from sleep mode?

20 If the NRE cost is high will the unit cost also be high? Justify your answer.

21. What is the advantage of ASIP over single purpose processor? Name any two classes of ASIP.