Reg. No. :

Question Paper Code : 90191

21/11/19

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fifth Semester

EC8691 – MICROPROCESSORS AND MICROCONTROLLERS

(Common to Information Technology/Computer Science and Engineering/
Computer and Communication Engineering)

(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. For 8086 microprocessor, the contents of the registers are, CS = 2001H, SS = 6046H, IP = 2456H, SP = 2200H. Calculate the corresponding physical addresses for the addressed byte in
   a) CS
   b) SS

2. Give examples for the following modes of addressing.
   i) Relative Based Indexed mode
   ii) Direct addressing.

3. State the function of ALE signal in 8086.

4. Draw the simplified diagram of co-processor based multiprocessor system.

5. What is the function of the following two signals in an ADC (while interfacing to a microprocessor) ?
   i) EOC
   ii) SC

6. List the function of HOLD and HLDA in 8086.

7. Give the format of the register PSW of 8051 and name each bit.

8. How does the 8051 differentiate between bit and byte addresses in its internal RAM ?

9. Give the format and list the function of the instruction DJNZ for 8051.

10. What are the interrupts of 8051 ? Highlight the function of any two interrupts.

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PART – B   (5×13=65 Marks)

11. a) i) Draw the architectural block diagram of 8086 with its registers.

     ii) Write a program to find the average of 10 bytes stored in memory.

(OR)

  b) i) Find the status of the CF and ZF flags after the execution of each of the following set of instructions. Given that AX = 4160H.

     i) ADD AX, 9034H

     ii) CMP AX, 0B08H

     iii) XOR AL, AL

     iv) MOV AL, 34H

    ii) Write a program for 8086 microprocessor that multiples two bytes and stores the result in memory.

12. a) Draw the diagram showing address demultiplexing for 8086. Explain the use of each IC in the system and the relevant pins and signals.

(OR)

  b) Draw the timing diagram for the 'Memory Read' machine cycle of 8086. Explain the function of the relevant signals and discuss how each signal changes in the progress of the machine cycle.

13. a) i) Draw the block diagram of the PPI 8255 and explain the ports and modes of the chip.

    ii) Write a program in assembly language to set/reset the following bits of Port C. Use the BSR feature of the chip.

     1) PC_0 to be set

     2) PC_7 to be reset

     3) PC_1 to be set

(OR)

  b) i) Draw the connections between an ADC and 8086, using 8255 as an interface. Write a program to generate a triangular waveform using this setup.

    ii) Draw the block diagram of the 8251 and discuss how it caters to serial communication. Write the steps in transmitting one byte of data serially.

14. a) For 8051 microcontroller, discuss the following :

    i) How is RAM organized and addressed ?

    ii) How many register banks are present in RAM and how is bank switching executed ?

(OR)
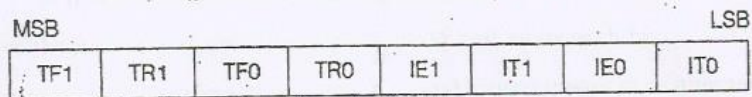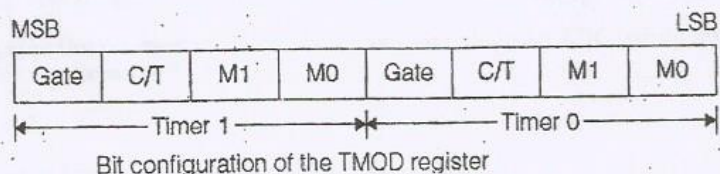
    b) i) Write a program in 8051 assembly language to find the biggest of three numbers.

    ii) Write a program in 8051 assembly language to create a delay of 0.5 seconds, for a clock frequency of 20 MHz.

    Note: Do not use any hardware timer.

15. a) Draw and explain the interfacing connections between an 8051 and a stepper motor by using driver IC as an interface. Write the steps and assembly program to rotate the stepper motor in the clockwise direction.

(OR)

    b) i) Write the assembly language program to generate a square wave using any timer, for an 8051 microcontroller.

    ii) For the above generated square wave, if the crystal frequency is 20 MHz and the frequency of the wave is 10 KHz. Write the assembly language program referring to the bit configuration given below :

MSB   LSB

Gate	C/T	M1	M0	Gate	C/T	M1	M0

    |←——— Timer 1 ———→|←——— Timer 0 ———→|

Bit configuration of the TMOD register

MSB   LSB

TF1	TR1	TF0	TR0	IE1	IT1	IE0	IT0

TCON bits used for timer programming

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PART – C   (1×15=15 Marks)

16. a) Design a microcontroller based system for taking sensor data from an agricultural field and displaying the data, generating alarms, causing actuations and aslo for sending the data to a PC. A complete description of this system should be given.

The following points are to be taken care of.

i) Draw a block diagram of the system and suggest a suitable microcontroller.

ii) Humidity and temperature are the sensor data.

iii) Show the device that displays these parameters.

iv) If these sensor values goes above a threshold, sound alarm and display should occur.

v) If temperature goes above a threshold, a motorised pump should be activated to water the field.

vi) Enumerate the steps for the microcontroller to be connected to the P.C.

(OR)

b) With neat block diagram explain the functions of ARM processor. Compare it with PIC and list out the major differences.   (8+7)

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