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Question Paper Code : 20480

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fourth/Fifth/Sixth Semester

Electronics and Communication Engineering

EC 8691 – MICROPROCESSORS AND MICROCONTROLLERS

(Common to: Biomedical Engineering/Computer Science and Engineering/
Computer and Communication Engineering/Medical Electronics/
Artificial Intelligence and Data Science/Information Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How many operands do each of the following instructions of 8086 have?
 - (a) ADD
 - (b) ADC
 - (c) INC
 - (d) ROR

Write examples for each instruction.

2. What are the conditions under which a LOOPZ instruction exits looping?
3. Using 8086 and 8087, draw a coprocessor configuration with relevant signals.
4. Draw the diagram for address/data demultiplexing of 8086?
5. What is the significance of the modes of operation of the PPI 8255?
6. What is the sequence of actions that occur in an interrupt acknowledge cycle?
7. What is the difference between the LJMP and SJMP instructions of 8051?
8. What is the use of the NOP instruction? Show its use in an example.
9. What is the role of SBUF in serial communication (in 8051)?
10. Name the four ports of 8051 and state the differences between them.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss all the addressing modes of 8086. Use relevant examples for each case.

Or

- (b) There are 10 unsigned bytes stored in memory. Write a program to arrange these bytes in ascending order.
12. (a) Draw a closely coupled coprocessor configuration using 8088 and any other processor and explain its signals and connections. How does this setup differ from a loosely coupled configuration?

Or

- (b) Draw the timing diagram for the 'Memory Write' 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) Design the control word of the 8255 with:

(1) all ports as input ports,

(2) port A and B as input and port C as output.

- (ii) With a 5 MHz clock, write a program to get a symmetric square wave from port B of the 8255.

Or

- (b) (i) Draw the connections between an ADC and 8086, using 8255 as an interface. Write a program to convert an analog voltage to a digital number.

- (ii) Draw the block diagram of the Programmable Interrupt Controller and discuss how it caters to the management of multiple interrupts.

14. (a) (i) Discuss the addressing modes of 8051 with examples for each.

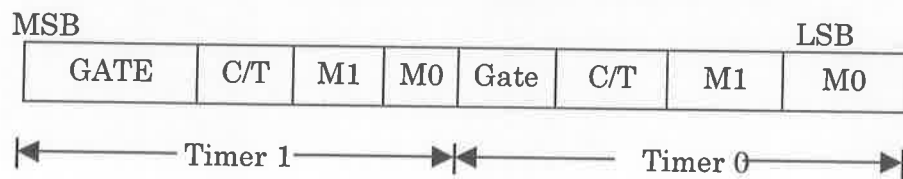
- (ii) Explain the use of the registers A, B, DPTR and PSW.

Or

- (b) Write a program in 8051 assembly language for the following:
- Fill 20 spaces in RAM with the ASCII value of '6'.
 - Add four 16-bit numbers which are in consecutive memory locations, assuming that the sum does not go above 16 bits.
15. (a) Draw the connections between an 8051 and DAC. Explain this diagram clearly (including the function of each pin and connection). Write the steps and assembly program to generate a ramp and a staircase waveform from this setup.

Or

- (b) (i) For an 8051, write the steps to generate a square wave using any timer in the interrupt mode.
- (ii) Write a program in 8051 assembly language to generate a square wave of 1 KHz at pin P1.3 using any hardware timer and interrupts. Use the crystal frequency of 12 MHz, and show the calculations. Refer the figures of register bits given below:



Bit Configuration of the TMOD register



TCON bits used for timer programming



Bit configuration of the IE register.

PART C — (1 × 15 = 15 marks)

16. (a) Design a Traffic Light Controller using 8051 as the Microcontroller. Each lane has a Go (Green), Listen (Yellow) and Stop (Red) LEDs. The working of the system should be specified.

There should be timers for specifying the time for each signal. The connections to the lights (from the port lines of the 8051) should be shown. The program for the working of the system should also be written.

Or

(b) Design a system for home automation and security with the following sensors.

- (i) Temperature
- (ii) Gas
- (iii) Humidity
- (iv) Intruder

If sensor values are above a threshold, alarms should be sounded and necessary actuations should be performed. The necessary explanations, connection diagrams and program should be given.

