EC6504– MICROPROCESSOR AND MICROCONTROLLER

QUESTION BANK

UNIT I - THE 8086 MICROPROCESSOR

PART – A

1) What is the processing element inside the microprocessor? What process it does? [NOV/DEC 2014]

2) How many memory locations can be addressed by 8086 microprocessor? [NOV/DEC 2014]

3) If the stack segment register contains 3000H and the stack pointer register contains 8434H, what is the physical address of the top of the stack? [NOV/DEC 2014]

4) What do you mean by addressing modes? [MAY/JUN 2014]

5) Give the operation of CBW and TEST instructions of 8086? [NOV/DEC 2013]

6) What is the function of parity flag? [NOV/DEC 2013]

7) How 16-Bit address is converted into 20-Bit address in 8086? [NOV/DEC 2013]

8) Name the hardware interrupts of 8086. [MAY/JUN 2013]

9) What address in the interrupt vector table, are used for a Type-2 interrupt in 8086? [NOV/DEC 2012]

10) Why do we use macros? [NOV/DEC 2012]

11) What are called assembler directives? Give two examples. [MAY/JUN 2012]

12) What is BIOS function call in 8086 Microprocessor? [MAY/JUN 2012]

13) Explain the coordination between BIU and EU.

14) If BH = 0F3H, what is the value of BH in hex after the instruction SAR BH, 1.

15) If AL = 78H and BL=73H, explain how DAS instruction (after subtracting BL from AL) adjusts to the BCD result.

16) Draw the 8086 flag register format.

17) Why AAD is to be executed before DIV instruction while converting unpacked BCD to Binary number?

18) List the pointer and index registers of 8086 architecture.

19) Identify the addressing modes involved in the following 8086 instructions: MOV AX, 0005H; MOV AX, 50H [BX][SI].

20) Give the significance of Interrupt flag in 8086 processor.

21) Give a note on the use of auxiliary carry flag.

22) What do you mean by Non Maskable Interrupt?

23) List the different flags affected by the arithmetic and logic operations.

24) Draw the contents of the stack and the registers after a PUSH instruction.

25) What is an interrupt service routine?

26) What is storage space required to store the interrupt vectors of 8086?

27) What is pipelined architecture?

28) What are the maximum address space and data bus width of 8086 processor?

29) Mention the addressing modes of the following 8086 instructions: MOV AL, disp[BX]; MOV AH, disp[BX], [SI]
30) The CS contains A820H, while the IP contains CE24H. What is the resulting physical address?

31) What do these instructions do? : STD, IRET.

32) List the interrupts present in 8086 with interrupt vector table.

33) What is the Physical address corresponding to DS: 103FH if DS=94D0H?

34) What are the advantages of using memory segmentation in 8086?

35) Can the 8086 processor operate on more than one instruction at a time? If so explain how it is done?

36) What does REP prefix accomplish and what type of instruction is it used with?

**PART – B**

1) [i] Describe the sequence of signals that occurs on the address bus, the control bus, and the data bus when a simple microcomputer fetches an instruction. [8]
   [ii] Explain the bus interface unit and execution unit of 8086 microprocessor. [8]  [NOV/DEC 2014]

2) [i] Write an 8086 assembly language program to multiply two 16-bit numbers to give 32-bit result. [8]
   [ii] Describe the conditions which cause the 8086 to perform type 0 and type 1 interrupt. [8]  [NOV/DEC 2014]

3) Draw and discuss the interrupt structure of 8086. [16]  [MAY/JUN 2014]

4) [i] Write an 8086 assembly language program to get an input from the keyboard for 2 digits and convert that input into a hexadecimal number using BIOS int.
   [ii] Write an 8086 assembly language program to multiply 2 digit numbers by getting an input from the keyboard using BIOS interrupt call.  [MAY/JUN 2014]

5) Write an 8086 ALP to sort out any given 10 numbers in ascending and descending order.[10]  [NOV/DEC 2013]

6) With neat block diagram, explain the architecture of 8086 microprocessor. [16]  [NOV/DEC 2013]

7) Write a program to find the average of ten numbers. [8]  [MAY/JUN 2013]

8) Write a program to divide two 8-Bit numbers. [4]  [MAY/JUN 2013]

9) Explain about the following assembler directives : END P, EQU, EVEN, EXTRN with examples. [8]  [MAY/JUN 2013]

10) What are the assembler directives and pseudo ops? [4]  [MAY/JUN 2013]

11) [i] Draw the internal architecture of 8086 microprocessor and explain its Bus Interface Unit (BIU). [8]
    [ii] Give an example for the 8086 instructions: AAA, CWD, JNBE, LAHF, MOV, RCL, ROL and SAHF. [8]  [NOV/DEC 2012]

12) [i] What is the use of the following assembler directives: DD, ENDS, EVEN and EXTRN. [8]
    [ii] Explain the 8086 Interrupt types with an example. [8]  [NOV/DEC 2012]

13) [i] Draw the architectural block diagram of 8086 microprocessor and explain. [8]
    [ii] Explain how to pass parameters to macros. [8]  [MAY/JUN 2012]

14) [i] Explain the interrupt structure of an 8086 microprocessor with 8086 interrupt-pointer table. [8]
    [ii] Write an 8086 assembly language program to read in 100 samples of data at 1-ms intervals. [8]  [MAY/JUN 2012]

15) Explain any 8 addressing modes of 8086 processor with an example.

16) Explain the register organization of 8086 processor in detail.

17) Explain the role of the following.
18) [i] Describe the action taken by 8086 when INTR pin is activated. [6]
   [ii] Write an assembly language program in 8086 to search the largest data in an array. [10]
19) Explain the following assembler directives used in 8086
20) [i] Write a program to find the number of positive numbers and negative numbers in a given series of signed numbers using 8086.
   [ii] Explain the following assembly directives: SHORT, TYPE, FAR PTR

UNIT II - 8086 SYSTEM BUS STRUCTURE

PART – A

1) How does the main processor distinguish its instructions from the co-processor instructions when it fetches the instruction from memory? [NOV/DEC 2014]
2) Compare closely coupled configuration with loosely coupled configuration. [NOV/DEC 2014]
3) What are advantages of coprocessor? [MAY/JUN 2014]
4) What is meant by a loosely coupled configuration? [MAY/JUN 2014]
5) List the features of memory mapped I/O. [MAY/JUN 2014]
6) What is co-processor? [NOV/DEC 2013]
7) What is a floating point co-processor? [NOV/DEC 2013]
8) What are the differences between 8085 and 8086 processor? [NOV/DEC 2013]
9) How does CPU differentiate the 8087 instructions from its own instructions? [MAY/JUN 2013]
10) How 8089 operates in loosely coupled configuration and tightly coupled configuration? [MAY/JUN 2013]
11) In what ways are the standard microprocessor and co-processor differ from each other? [NOV/DEC 2012]
12) How does the main processor distinguish its instructions from those for 8087 as it fetches instructions from memory? [NOV/DEC 2012]
13) Compare closely coupled configuration features with loosely coupled configuration features. [MAY/JUN 2012]
14) List any four 8087 data formats. [MAY/JUN 2012]
15) Why a latch is used for an O/P port, but a tri-state buffer can be used for an input port? [MAY/JUN 2012]
16) What is the function of HOLD and HLDA?
17) List out the pin details other than address pins and data pins.
18) State the use of READY signal in 8086 processor.
19) Name the signals used by the processor to communicate with an I/O processor.
20) Differentiate minimum and maximum mode of 8086.
21) What are the advantages of the multiprocessor systems?
22) What is Daisy chaining?
23) What is polling?
24) Name the three bus allocation schemes used in loosely coupled multiprocessor system.
25) What are the three basic multiprocessor configurations that the 8086 can support?
26) What is Bus Arbitration?
27) List some advanced processors.
PART – B

1)  [i] Draw the control word and status word format of 8087 processor. [8] [NOV/DEC 2014]
    [ii] Explain how the communication between CPU and IOP processor takes place. [8]

2)  [i] Draw the architecture of 8089 I/O processor and explain it. [8] [NOV/DEC 2014]
    [ii] Explain the different data formats of 8087 co-processor. [8]

3)  [i] Explain the execution steps of 8087 Coprocessor. [8] [MAY/JUN 2014]
    [ii] Explain the architecture of 8089 I/O Processor. [8]

4)  Explain the closely coupled configuration of multiprocessor configuration with suitable diagram. [16] [MAY/JUN 2014]

5)  Explain the Maximum and Minimum mode of operation of 8086. [16] [NOV/DEC 2013]

6)  [i] Design an 8086 based system in minimum mode containing 64Kb of EPROM and 64Kb of RAM. [12] [NOV/DEC 2013]

7)  Draw and discuss a typical minimum mode 8086 system. [8] [MAY/JUN 2013]

8)  Describe the maximum mode of operation of 8086. [8] [MAY/JUN 2013]

9)  Explain the architecture of 8087 numeric data processor. [16] [NOV/DEC 2013]

10) [i] Differentiate closely coupled configuration and loosely coupled configuration. [6] [NOV/DEC 2013]
    [ii] Explain the architecture of 8089 I/O processor. [10]

11) Discuss the operation of 8087 numeric data processor. [16] [MAY/JUN 2013]

12) Describe the architecture of 8089. [16] [MAY/JUN 2013]

13) [i] Draw the architecture of 8089 I/O processor and explain the need for 8089 I/O processor. [8] [NOV/DEC 2012]
    [ii] Compare closely coupled configuration with loosely coupled configuration. [8]

14) [i] How is the communication between CPU and IOP being done? [8] [NOV/DEC 2012]
    [ii] Draw the internal block diagram of 8087 co-processor and explain. [8]

15) [i] Draw the 8087 internal architecture and explain. [8] [MAY/JUN 2012]
    [ii] Give two examples of 8087 data transfer instructions, arithmetic instructions, processor control instructions and transcendental instructions. [8]

16) [i] Draw the architecture of 8089 I/O processor and explain. [8] [MAY/JUN 2012]
    [ii] Explain how I/O processor communicates between the CPU and I/O peripherals with an example. [8]

17) Explain the functions of an 8086 processor in the maximum mode.

18) Explain the significance of the following signals:

19) Explain how the memory unit is addressed by 8086 with a neat diagram.

20) [i] Explain in detail about memory access mechanism in 8086 [8]
    [ii] Explain the function of following 8086 signals. HLDA, RQ/GTO, DEN, ALE

21) Discuss in detail about any one of the advanced processors.

UNIT III - I/O INTERFACING

PART – A

1) What are the advantages of Programmable Interval Timer/Counter IC? [MAY/JUN 2014]

2) What is bus stealing? [NOV/DEC 2013]

3) What are the operating modes of 8255? [NOV/DEC 2013]

4) What are the requirements to be met while interfacing memory or I/O devices to 8085 processor? [MAY/JUN 2013]
5) What are the modes of operation of 8237?  

6) What is the function of LOCK and RQ/GT signals?  

7) How to change the direction of the stepper motor from clockwise direction to anticlockwise direction using a program segment.  

8) List the six modes of timer.  

9) Mention any two applications that uses ADC and DAC.  

10) What are the steps in interfacing peripherals with the microprocessor?  

11) What are the differences in interfacing RWMs while 8086 is in minimum and maximum modes?  

12) State the use of cascading signals of 8259 programmable interrupt controller.  

13) State the role of In-service register of 8259 interrupt controller.  

14) What are the operating modes of 8253?  

15) What is the use of IRR[Interrupt Request Register]?  

16) What does it imply if 8259’s ICW1 bit fields LTIM and SNGL bits are set to zero?  

17) What is key bouncing?  

18) List the uses of USART.  

19) List the features of 8251.  

20) List the functions performed by 8279.  

21) What is the function of gate signal in 8254 timer?  

22) Write the format of ICW1 in 8259.  

23) Name the two modes used by the DMA processes to transfer data.  

24) Name the six modes of operations of an 8253 programmable interval timer.  

25) Using two 8259-interrupt controllers what is the maximum number of peripherals that can be provided with interrupt facility.  

PART – B  

1) [i] In how many modes we can use 8253/54 timer? Explain the different modes of operation of 8253/54 timer.  

   [ii] How to interface a DMA controller with a microprocessor? Explain how DMA controller transfers large amount of data from one memory locations to another memory locations?  

2) [i] Draw the block diagram of a keyboard display controller and explain.  

   [ii] Explain in detail about the parallel communication interface.  

3) [i] Explain the mode 0 operation of 8255 Programmable Peripheral Interface.  

   [ii] Explain the different modes of operation of a timer.  

4) Explain the internal architecture of 8237 Direct Memory Access Controller.  

5) [i] Bring about the features of 8251.  

   [ii] Discuss how 8251 is used for serial data communication.  

   [iii] Explain the advantages of using the USART chips in microprocessor based systems.  

6) List the major components of 8279 keyboard display interface and explain their functions.  

7) Explain the [i] modes of operation of timer and [ii] operation of interrupt controller.  

8) [i] Explain the operating modes of 8253 timer.  

   [ii] What is DMA? Explain the DMA based data transfer using 8237 DMA controller.
9) [i] How do you interface a keyboard and the display using Keyboard/display controller?[8] [NOV/DEC 2012]
    [ii] Explain the parallel communication interface with microprocessor. [8]

10) [i] Explain the operating modes of 8255 programmable peripheral interface. [8] [MAY/JUN 2012]
    [ii] Draw the control word format of 8254 programmable interval timer and explain. [8]

11) [i] Draw the architectural block diagram of 8259 Programmable Interrupt controller and explain. [8] [MAY/JUN 2012]
12) Write a program to interface LED and LCD displays with 8086 Microprocessor.
13) Write a assembly language program to interface a keyboard and the display using 8086 microprocessor.
14) With a simple program, explain how will you interface alarm controller with 8086 microprocessor.
15) Explain the Traffic light controller and write a program in 8086 processor to interface traffic light controller and processor.

UNIT IV - MICROCONTROLLER

PART – A

1) Compare the features of microprocessor and microcontroller. [NOV/DEC 2014]
2) What are the differences between the microprocessor and microcontroller? [MAY/JUN 2014]
3) What is the significance of EA line of 8051 microcontroller? [MAY/JUN 2014]
4) What is the difference between MOVX and MOV? [NOV/DEC 2013]
5) What is Baud rate for mode 0 operation of the serial port of 8051? [MAY/JUN 2013]
6) In the program status word of 8051, the bits RS0 and RS1 are 1 and 0, then which register bank is selected for operation? [MAY/JUN 2013]
7) Why are the port lines of programmable port devices automatically put in the input mode when the device is first powered-up or reset? [NOV/DEC 2012]
8) What is the size of the on-chip program memory and on-chip data memory of 8051 microcontroller? [MAY/JUN 2012]

9) List the features of the parallel ports of 8051 microcontroller.
10) What are the advantages of using a microcontroller in place of a microprocessor?
11) What are the functions of the following signals of 8051? ALE/PROG, PSEN
12) List the applications of a microcontroller.
13) Define XTAL1 and XTAL2.
14) What do you mean by Indirect Addressing Mode?
15) What is the function of DPTR register?
16) What is the possible branching range when an AJMP/ACALL of 8051 instruction is executed?
17) How does the status of EA pin affect the access to internal and external program memory?
18) State the difference between RET and RET1 instruction in 8051.
19) What are register banks in 8051 microcontroller?
20) Differentiate RRA and RRCA instruction in 8051 microcontroller.
21) Draw the format of PSW of 8051.
22) What is SFR?
23) How does 8051 differentiate between external and internal program memory?
24) What is the function of GATE bit in the TMOD register of 8051?
25) Explain the function of following pins of 8051 microcontroller.
   a. PSEN  b. EA

26) What are the addressing modes supported by 8051?

27) Which of the following are illegal?

**PART – B**

1) Draw the data memory structure of 8051 microcontroller and explain. [8] [NOV/DEC 2014]

2) [i] Draw the functional block diagram of 8051 microcontroller and explain each block. [8] [NOV/DEC 2014]

3) Draw the pin diagram of 8051 Microcontroller and explain the Input /Output lines in detail. [8] [MAY/JUN 2014]

4) [i] Describe the 8051 I/O port structure. [6] [NOV/DEC 2013]
   [ii] Explain the internal and external data memory organization of 8051. [10]

5) Describe the functions of the signals present in 8051. [10] [MAY/JUN 2013]

6) Explain the internal data memory structure of 8051 microcontroller with its SFRs. [8] [NOV/DEC 2012]

7) Draw the architectural block diagram of 8051 microcontroller and explain. [8] [MAY/JUN 2012]

8) Explain the features of 8051 microcontroller and compare it with 8086 microprocessor. Write short notes on register set of 8051 micro controller.

9) Bring out the features of Special Function Registers of 8051 microcontroller.

10) With a neat sketch of a Schematic diagram, explain the functions of various signals of 8051.

11) [i] Draw and explain the functions of bits in TMOD and TCON registers of 8051. [10]
   [ii] Explain how 8051 distinguishes between internal and external ROMs. [6]

12) [i] Explain the architecture of 8051.
   [ii] Write a program to find the number of positive and negative numbers in an array.

13) [i] Write a program to generate Fibonacci series.
   [ii] Write a program to find out the smallest number in an array.

**UNIT V - INTERFACING MICROCONTROLLER**

**PART – A**

1) What is the necessity to interface DAC with microcontroller? [NOV/DEC 2014]

2) What is difference between watch dog timer and ordinary timer? [NOV/DEC 2013]

3) What is the need for de-bouncing the keyboard? [NOV/DEC 2012]

4) What is the use of ‘Vref’ pin in the ADC? [NOV/DEC 2012]

5) How do you calculate baud rate for serial communication for 8051?

6) Draw the interfacing diagram of LCD with 8051 controller.

7) Sketch the control word for Programmable timer.

8) Write about DMA controller.

9) Write the BSR control word of 8255 to set bit 0 of port C

10) Define PPI.

11) Write the various interrupts supported by 8051 with priority level and vector address

12) Draw the data format used while asynchronous serial data transmission/reception is done using 8251.
13) What is the internal operating frequency of the 8279? How can you derive it from any available clock signal?

14) Draw the command word format for 8251.

15) Specify the bit of a control word for the 8255. Which differentiates between I/O mode and BSR mode?

16) Specify the two types of serial communication.

PART – B

1) How to interface an LCD display with microcontroller? Explain how to display a character using LCD display. [8] [NOV/DEC 2014]

2) Explain the interrupt structure of 8051 microcontroller with suitable diagrams. [8] [NOV/DEC 2014]

3) [i] $V_{in}=2.25\, V$, $V_{ref}=5\, V$, Number of data lines are 5. Convert the given analog quantity into its equivalent output digital quantity. [8] [MAY/JUN 2014]
   [ii] Explain the different techniques to convert a digital quantity into its equivalent analog quantity. [8]

4) [i] How do you interface 8051 microcontroller with keyboard? Explain in detail. [8] [NOV/DEC 2013]

5) [ii] How a DAC is interfaced with 8051? [6] [MAY/JUN 2013]

6) [i] Explain how an LCD and keyboard is interfaced with 8051. [10] [MAY/JUN 2013]
   [ii] Describe about serial port interface of 8051. [4]

7) Discuss briefly about keyboard/display controller. [16] [MAY/JUN 2013]

8) What is timer/counter? Explain the 16-bit timer mode and 8-bit auto-reload mode of 8051 microcontroller. [8] [NOV/DEC 2012]

9) [i] How to interface and display an LCD with microcontroller? [8] [NOV/DEC 2012]
   [ii] How to transfer data between a PC and microcontroller using serial communication? Draw the necessary diagrams and explain. [8]

10) [ii] Draw the circuit diagram to interface an LCD with microcontroller and explain how to display the data using LCD. [8] [MAY/JUN 2012]

11) [i] Draw the circuit diagram to interface a keyboard with microcontroller and explain how microcontroller recognizes the key-press. [8]
   [ii] Program the on-chip timer in 8051 to be an event counter. Use model and display the binary count on P1. Set the initial count to be Zero. [8]

12) Write brief notes on ADC and DAC along with their interface details. [8]

13) Write a program to make the stepper motor to rotate both clockwise and anticlockwise directions.

14) Write a program to generate the square, triangular and trapezoidal waveforms using 8051 microcontroller.

15) Write a program to interface a sensor device with 8051 microcontroller.