AS-2795
(Microprocessors & Microcontrollers)
B.Sc.-V Sem Electronics Paper-First

Section-A

1(i) In timing diagram for I/O read operation, So pin should be (b) low.

(ii) Which operation is not used in subroutine?
(a) Push

(iii) The clock frequency range for 8086 microprocessor is (b) 5-10 MHz.

(iv) Sample and Hold circuit is used with A/D converter for: (a) constant voltage.

(v) If two hexadecimal numbers CB and E9 are added, sign status flag will be (a) high.

(vi) FORTRAN is a (c) Problem oriented language.

(vii) For a reference voltage of 10V, the 4-bit digital output for an analog voltage of 8.1V is:
(c) 1100.

(viii) In common anode-type 7-segment display, all 7 anodes for LED's are: (b) connected to +5V.

(ix) Memory addressing capability of a microprocessor depends on its number of (a) address lines.

(x) Which operating system uses DOS operating system? (a) Windows 95

Section-B

2. (i) MOV M,r [Move the content of register to memory].
(ii) DCX rp [Decrement register pair]
(iii) CMP M [Compare memory with accumulator]
(iv) RET [Return from subroutine]

3.

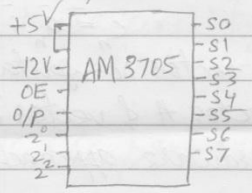
Mnemonics	Operands	[Program for 1's complement of a 16-bit number]
LXI	H, 2501H	
MOV	A, M	
CMA		

3.

Mnemonics	Operands
STA	2503H
INX	H
MOV	A, M
CMA	
STA	2504
HLT	

4. Features of AM3705 including Schematic diagram and Logic input table.

~~or features of A1~~



logic i/p 2^2	2^1	2^0	OE	i/p channel
L	L	L	H	S0
L	L	H	H	S1
L	H	L	H	S2
L	H	H	H	S3
H	L	L	H	S4
H	L	H	H	S5
H	H	L	H	S6
H	H	H	H	S7

5. Delay subroutine using two registers (loaded with FF&FF)

Label	Mnemonics	Operands	No: of execution	States (optional)
	MVI	B, FF	1	7X1
LOOP I	MVI	C, FF	255	7X255
LOOP II	DCR	C	255X255	4X255X255
	JNZ	LOOP II	255X255	10X(255-1)X255 + 7X255
	DCR	B	255	4X255
	JNZ	LOOP I	255	10X(255-1)+7X1
	RET		1	10X1

Total = 914954 states X 320nsec
= 0.29 sec.

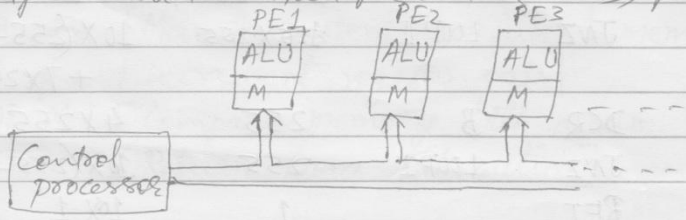
6. Types of µPs: Vector processor, Array processor, Scalar processor, Superscalar processor, RISC processor, CISC processor, Digital signal processor, symbolic processor, Bit-slice processor, transputers & Graphic processor.

Vector processor: A vector is an array of operands of the same type. Consider three vector:

vector $A(a_1, a_2, a_3, \ldots, a_n)$
vector $B(b_1, b_2, b_3, \ldots, b_n)$
vector $C(c_1, c_2, c_3, \ldots, c_n)$ where $c_1 = a_1 + b_1$
$c_2 = a_2 + b_2$
$c_n = a_n + b_n$

A vector processor is used for vector computations. It adds all the elements of vector A & vector B using a single instruction using hardware approach.

Array (SIMD) processor: Also designed for vector computation. Array processor employs a no: of processing elements to operate in parallel. Each processing element consists of a ALU and the local memory. It is also called a Single instruction multiple data (SIMD) processor.



Scalar processor: It executes scalar data i.e. only integer instruction using fixed-point operands.

Superscalar processor: It contains multiple pipelines to execute multi-instructions per clock cycle.

RISC processor: RISC stands for reduced instruction slt computer. It is hardware approach of the design of control unit of a microprocessor. A no: of control signals are generated by the control unit. Each signal comprising instructions is executed by separate electronic circuitry. RISC contains large no: of these circuitry to execute each instruction in one clock cycle.

CISC processor: (Complex instruction set computer). This is a software approach of designing a control unit of the processor. To execute an instruction, a micro-program is executed. A microprogram is written using micro-instructions using micro-circuitry. This approach is used when the no: of instructions are more.

7. High-level languages: Language ~~in~~ which are written in instructions called statements are called high-level language and language written in mnemonics are called assembly language. The statements more clearly resemble English and Mathematics. These high level language are procedure-oriented so while writing a program, there is no need of

knowing the computer architecture and register organizations. High level language are portable that means program written for one type of computer can easily run on another type of computer. Moreover high level language are easier and faster than writing of programs in assembly language. Examples of high level language are: FORTRAN, COBOL, BASIC, PASCAL, C language, PROLOG, LISP, JAVA, etc. Compiler and interpreter are the software programs that translate a high-level language program into machine language. A compiler is more powerful than assembler. Compiler translates entire a high-level language program at a time, whereas interpreter executes it statementwise. Therefore, an interpreter occupies less memory space, it is cheaper but slower than a compiler. Some high-level languages are:-

FORTRAN: (Formula Translation). It was developed by IBM in 1950s for scientific and engineering computation. FORTRAN IV was very popular version.

COBOL: (Common Business Oriented Language). It was introduced by US industry/ gavernment committee in 1960 for business applications such as hangling of ledgers, accounts and payroll files. COBOL-2002 is the latest version.

BASIC: (Beginners All-purpose Symbolic Instruction Code). It was introduced by Dartmouth College in 1965 for scientific and engineering computation. ~~But~~ It is less powerful than FORTRAN, but a simple and easy language. QBASIC is the recent version developed by Microsoft. VISUAL BASIC is a scripting language used to combine small programs written in BASIC language. VISUAL BASIC is used for developing Windows applications like creating menu, text boxes, command buttons, check boxes, scroll bars, etc.

PASCAL: It was developed by Nicklaus Wirth in 1970s, for both scientific and business applications. Thus it is called multipurpose language. Program compiled from PASCAL runs much faster than BASIC or FORTRAN as PASCAL is a compact language. Due ~~to~~ simple program design and debugging, PASCAL can manipulate vectors, matrices, strings & characters, sets, files, list, etc.

C language: It was developed by AT&T's Bell laboratories in 1972 by Dennis Ritchie and Brain Kernighan. C language are concise and can be translated efficiently into machine codes. It supports & uses

library functions which are equivalent to subroutines. C language was first used to develop Windows applications and to write UNIX operating system. It is used to write system software such as operating system, compilers, spreadsheet, word processing, dBASE management, etc. C++ is an extension to C language developed by Bjarne Stroustrup at Bell laboratories in 1980. C#, pronounced as 'see sharp', is a hybrid of C and C++ offering some features of another, widely used high level language JAVA.

8. MDS stands for Microcomputer Development System. It is a special equipment used in the laboratory by programmer for developing microprocessor-based systems. An MDS consists of peripherals, large memory, mass storage system, debugging facilities, etc. MDS have a no. of hardware and software supports listed as follows:-

Hardware support/devices are:

1. CPU
2. Memory (RAMs & ROMs)
3. CRT display
4. Keyboard
5. Floopy Disk system
6. Hard disk system
7. Printer
8. PROM programmer
9. Emulator
10. ROM simulator

Software support

1. Operating system
2. Monitor
3. Text editor
4. Assembler
5. Compiler

CPU: (Central Processing Unit) It is the brain of a computer. It executes user's programs, controls memory & controls input and output devices. The CPU fetches instructions of a program from the memory, decodes them and executes them one instruction at a time. Then CPU stores the intermediate results. The major components of CPU are: Arithmetic and Logic Unit (ALU), timing unit and control unit as well as general and special purpose registers.

Memory: Memory is needed to store programs, data and results. A computer uses basically three memory devices: semiconductor, magnetic and optical memory. Semiconductor memory is a static device. It holds information as long as power supply is ON. Cache memory (with access time of about 10nsec) and primary or main memory (with access time of about 50 n/sec) are semiconductor memories. RAM (Random Access Memory) and ROM (Read Only memory) are two main types of semiconductor memory. Magnetic memory (with access time of about 5-10msec) is permanent memory used as a secondary or backup memory in a system. Hard disks, Floopy disks and Magnetic tapes are types of magnetic memory. Optical memory (with access time of about 80msec) is also a non-volatile memory. Optical disks (CD-ROM, DVD) are optical memory device.

CRT (Cathode Ray Tube) display and printer are output device.

Keyboad is a input device.

PROM Programmer: (Programmable ROM) The user can write permanent programs in a PROM using PROM programmer. Erasable PROM can also be programmed using EPROM programmer. Universal PROM programmer and microprocessor-kits such as Vinytics are used.

Emulator: It allows a microprocessor-based system to be directly attached to an MDS system for testing or debugging.

ROM Simulator: A ROM simulator behaves as ROM for the user's system when ROM does not exist in the system.

Operating system: It is a program or collection of programs usually stored on disks to perform various tasks such as: to create disk files, to write programs, to read data from files, to link subroutines with the main program, to execute program after loading them and to debug the programs. Some of the standard programs of operating systems are: file manager, linker, locator, loader, debugger and assembler.

Monitor: A monitor is a program stored in ROM or PROM which carries out initialisation of the system, loading programs into RAM, control input and output devices, display & modify the memory contents and execution of program of RAM or ROM.

Text Editor: A text editor is a program which allows user to write assembly or high level language program into RAM.

Assembler: An assembler is a program which translates an assembly language program into machine language program.

Compiler: A compiler is a program that translates a high level language program into a machine language program. A compiler is more powerful than assembler. It checks all kinds of limits, errors, etc.