



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED & HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN APPLIED PHYSICS

EEE 4451: MICROPROCESSOR SYSTEM & APPLICATIONS.

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: SEPTEMBER 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Question ONE is Compulsory attempt any other TWO questions.

Do not write on the question paper.

Question ONE

- a) With the aid of a block diagram explain the functions of key units of a digital computer [12 marks]
- b) With aid of diagrams explain the **THREE** bus system organization in digital systems. [8 marks]
- c) Write instructions for the Intel 8085 microprocessor to perform the following tasks
- Load byte **5AH** in register **C**.
 - Exchange H and L with D and E
 - 2080H** in register pair **H, L**.
 - Copy contents of register **B** to the Accumulator.
 - Store a byte of data at memory location 27E5H
 - End program execution
- [6 marks]
- d) Explain the functions of each of the following registers:
- Memory buffer register
 - Accumulator

[4 marks]

Question TWO

- a) Distinguish between the following terminologies
- Top-down and bottom -up approach software systems design and implementation
 - Synchronous and asynchronous serial communication interface 8 marks
- b) With the aid of a block diagram describe the functions of the basic elements of a general PIO interface 8 marks
- c) Explain the need to carry out the following microprocessor system testing.
- White box
 - Acceptance 4 marks

Question THREE

- a) With the aid of a flowchart, describe the software interrupt polling approach 12 marks
- b) Define the following addressing modes as applied to Intel 8085 microprocessor stating a typical example in each case
- Immediate
 - Direct
 - Register Indirect
 - Implied 8 marks

Question FOUR

- a) Explain the function of the following software development tools
- Assembler
 - Editor
 - Debugger 6 marks
- b) Explain any FOUR functions of an interface on microprocessor based system 8 marks
- c) Outline the FOUR characteristics of a fiber optic sensor. 4 marks

Question FIVE

- a) Outline the FIVE phases of a modular programming process and state any THREE advantages of modular programming 8 marks
- b) Let the accumulator and register D contain the value 6CH and E9H respectively, Determine the value in the accumulator after each of the following instructions have been executed
- ANA D
 - XRA D
 - ORA D 6marks
- c) Define the following memory terms
- Cell
 - Data transfer time
 - Settling time
 - latency 8 marks

8085A CPU INSTRUCTIONS IN OPERATION CODE SEQUENCE

Table 5-2

OP CODE	MNEMONIC	OP CODE	MNEMONIC	OP CODE	MNEMONIC	OP CODE	MNEMONIC	OP CODE	MNEMONIC	OP CODE	MNEMONIC	OP CODE	MNEMONIC
00	NOP	2B	DCX H	56	MOV D,M	81	ADD C	AC	XRA H	D7	RST 2		
01	LXI B,D16	2C	INR L	57	MOV D,A	82	ADD D	AD	XRA L	D8	RC		
02	STAX B	2D	DCR L	58	MOV E,B	83	ADD E	AE	XRA M	D9	-		
03	INX B	2E	MVI L,DB	59	MOV E,C	84	ADD H	AF	XRA A	DA	JC	Adr	
04	INR B	2F	CMA	5A	MOV E,D	85	ADD L	80	ORA B	DB	IN	DB	
05	DCR B	30	SIM	5B	MOV E,E	86	ADD M	81	ORA C	DC	CC	Adr	
06	MVI B,DB	31	LXI SP,D16	5C	MOV E,H	87	ADD A	82	ORA D	DD	-		
07	RLC	32	STA Adr	5D	MOV E,L	88	ADC B	83	ORA E	DE	SBI	DB	
08	-	33	INX SP	5E	MOV E,M	89	ADC C	84	ORA H	DF	RST 3		
09	DAD B	34	INR M	5F	MOV E,A	8A	ADC D	85	ORA L	E0	RPO		
0A	LDAX B	35	DCR M	60	MOV H,B	8B	ADC E	86	ORA M	E1	POP	H	
0B	DCX B	36	MVI M,DB	61	MOV H,C	8C	ADC H	87	ORA A	E2	JPO	Adr	
0C	INR C	37	STC	62	MOV H,D	8D	ADC L	88	CMP B	E3	XTHL		
0D	DCR C	38	-	63	MOV H,E	8E	ADC M	89	CMP C	E4	CPO	Adr	
0E	MVI C,DB	39	DAD SP	64	MOV H,H	8F	ADC A	8A	CMP D	E5	PUSH	H	
0F	RRC	3A	LDA Adr	65	MOV H,L	90	SUB B	8B	CMP E	E6	ANI	DB	
10	-	3B	DCX SP	66	MOV H,M	91	SUB C	8C	CMP H	E7	RST 4		
11	LXI D,D16	3C	INR A	67	MOV H,A	92	SUB D	8D	CMP L	E8	RPE		
12	STAX D	3D	DCR A	68	MOV L,B	93	SUB E	8E	CMP M	E9	PCHL		
13	INX D	3E	MVI A,DB	69	MOV L,C	94	SUB H	8F	CMP A	EA	JPE	Adr	
14	INR D	3F	CMC	6A	MOV L,D	95	SUB L	C0	RNZ	EB	XCHG		
15	DCR D	40	MOV B,B	6B	MOV L,E	96	SUB M	C1	POP	B	EC	CPE	Adr
16	MVI D,DB	41	MOV B,C	6C	MOV L,H	97	SUB A	C2	JNZ	Adr	ED	-	
17	RAL	42	MOV B,D	6D	MOV L,L	98	SBB B	C3	JMP	Adr	EE	XRI	DB
18	-	43	MOV B,E	6E	MOV L,M	99	SBB C	C4	CNZ	Adr	EF	RST 5	
19	DAD D	44	MOV B,H	6F	MOV L,A	9A	SBB D	C5	PUSH	B	F0	RP	
1A	LDAX D	45	MOV B,L	70	MOV M,B	9B	SBB E	C6	ADI	DB	F1	POP	PSW
1B	DCX D	46	MOV B,M	71	MOV M,C	9C	SBB H	C7	RST	0	F2	JP	Adr
1C	INR E	47	MOV B,A	72	MOV M,D	9D	SBB L	C8	RZ		F3	DI	
1D	DCR E	48	MOV C,B	73	MOV M,E	9E	SBB M	C9	RET	Adr	F4	CP	Adr
1E	MVI E,DB	49	MOV C,C	74	MOV M,H	9F	SBB A	CA	JZ		F5	PUSH	PSW
1F	RAR	4A	MOV C,D	75	MOV M,L	A0	ANA B	CB	-		F6	ORI	DB
20	RIM	4B	MOV C,E	76	HLT	A1	ANA C	CC	CZ	Adr	F7	RST 6	
21	LXI H,D16	4C	MOV C,H	77	MOV M,A	A2	ANA D	CD	CALL	Adr	F8	RM	
22	SHLD Adr	4D	MOV C,L	78	MOV M,B	A3	ANA E	CE	ACI	DB	F9	SPHL	
23	INX H	4E	MOV C,M	79	MOV M,C	A4	ANA H	CF	RST	1	FA	JM	Adr
24	INR H	4F	MOV C,A	7A	MOV M,D	A5	ANA L	D0	RNC		FB	EI	
25	DCR H	50	MOV D,B	7B	MOV M,E	A6	ANA M	D1	POP	D	FC	CM	Adr
26	MVI H,DB	51	MOV D,C	7C	MOV M,H	A7	ANA A	D2	JNC	Adr	FD	-	
27	DAA	52	MOV D,D	7D	MOV M,L	A8	XRA B	D3	OUT	DB	FE	CPI	DB
28	-	53	MOV D,E	7E	MOV M,A	A9	XRA C	D4	CNC	Adr	FF	RST 7	
29	DAD H	54	MOV D,H	7F	MOV M,A	AA	XRA D	D5	PUSH	D			
2A	LHLD Adr	55	MOV D,L	80	ADD B	AB	XRA E	D6	SUI	DB			

DB = constant, or logical/arithmetic expression that evaluates to an 8-bit data quantity.

D16 = constant, or logical/arithmetic expression that evaluates to a 16-bit data quantity.

Adr = 16-bit address.