



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN ELECTRICAL & ELECTRONICS ENGINEERING

TEE 4311: MICROPROCESSOR & INTERFACING.

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2 HOURS

DATE: July 2025

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 in addition attempt any other TWO questions.

Do not write on the question paper.

QUESTION ONE

- a) Define the following memory terminologies
 - i. Volatile memory
 - ii. Memory Address

2 marks
- b) With the aid of a block diagram of a microprocessor controlled system, describe the function of each block and its highways bus system

10 marks
- c) With aid of a diagram of a typical DMA configuration explain the functions of the following registers
 - i. Address register
 - ii. Word count register
 - iii. Control register

8 marks

QUESTION TWO

- a) Implement a memory expansion for system that requires a memory capacity of 3072×8 and yet the available memory chips capacity is $\frac{1}{2}K \times 8$

10 marks
- b) Write both assembly language and machine code for a program segment beginning at 4F20 H to perform the following sequence of tasks.
 - Move the data 1FH into register B increment it then output it to output port 00H
 - Move the data at input port 01H to the register E and Logically AND it with the content of the accumulator

- Add the data 3BH to that of register D and store the sum at memory location 4FC7H and end the program 10 marks

QUESTION THREE

- a) Describe the operation of the THREE types of Assembler 6 marks
- b) Explain the function of any FOUR flags in the status register 4 marks
- c) Outline the FOUR fields that characterize a typical Intel 8085 microprocessor instruction, 2 marks
- d) Describe any FOUR significant parameters that you would consider when writing a program for a given type of microprocessor. 8 marks

QUESTION FOUR

- a) Describe any FOUR addressing modes stating a typical instruction in each case as applied to Intel 8085 microprocessor 8 marks
- b) Distinguish between the following microcontroller and a microprocessor 4 marks
- c) Explain the function of any FOUR dedicated registers in microprocessor. 8 marks

QUESTIO FIVE

- a) Explain the function of the following software development tools and in each case outlining the resulting program file
 - i. interpreter
 - ii. Loader
 - iii. Compiler
 - iv. Editor
 - v. Assembler 10 marks
- b) Write a machine code program starting at address 3000H to add TWO numbers, 3AH and 72H loaded in the accumulator and register C respectively, the sum is first incremented then a data value 7BH is subtracted from it, the difference is complemented then stored at a memory location 2D07H as well as delivered to output port 01H to end the program 10 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	28	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,D8	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	B0	ORA B	D8	IN	D8	
05	DCR B	30	SIM	5B	MOV E,E	86	ADD M	B1	ORA C	DC	CC	Adr	
06	MVI B,D8	31	LXI SP,D16	5C	MOV E,H	87	ADD A	B2	ORA D	DD	-		
07	RLC	32	STA Adr	5D	MOV E,L	88	ADC B	B3	ORA E	DE	SBI	D8	
08	-	33	INX SP	5E	MOV E,M	89	ADC C	B4	ORA H	DF	RST 3		
09	DAD B	34	INR M	5F	MOV E,A	8A	ADC D	B5	ORA L	E0	RPO		
0A	LDAX B	35	DCR M	60	MOV H,B	8B	ADC E	B6	ORA M	E1	POP	H	
0B	DCX B	36	MVI M,D8	61	MOV H,C	8C	ADC H	B7	ORA A	E2	JPO	Adr	
0C	INR C	37	STC	62	MOV H,D	8D	ADC L	B8	CMP B	E3	XTHL		
0D	DCR C	38	-	63	MOV H,E	8E	ADC M	B9	CMP C	E4	CPO	Adr	
0E	MVI C,D8	39	DAD SP	64	MOV H,H	8F	ADC A	BA	CMP D	E5	PUSH	H	
0F	RRC	3A	LDA Adr	65	MOV H,L	90	SUB B	BB	CMP E	E6	ANI	D8	
10	-	3B	DCX SP	66	MOV H,M	91	SUB C	BC	CMP H	E7	RST 4		
11	LXI D,D16	3C	INR A	67	MOV H,A	92	SUB D	BD	CMP L	E8	RPE		
12	STAX D	3D	DCR A	68	MOV L,B	93	SUB E	BE	CMP M	E9	PCHL		
13	INX D	3E	MVI A,D8	69	MOV L,C	94	SUB H	BF	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	ED	CPE	Adr
16	MVI D,D8	41	MOV B,C	6C	MOV L,H	97	SUB A	C2	JNZ	Adr	EC	-	
17	RAL	42	MOV B,D	6D	MOV L,L	98	SBB B	C3	JMP	Adr	EE	XRI	D8
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	D8	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,D8	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	D8
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 A,B	A3	ANA E	CE	ACI	D8	F9	SPHL	
23	INX H	4E	MOV C,M	79	MOV A,C	A4	ANA H	CF	RST	1	FA	JM	Adr
24	INR H	4F	MOV C,A	7A	MOV A,D	A5	ANA L	D0	RNC		FB	EI	
25	DCR H	50	MOV D,B	7B	MOV A,E	A6	ANA M	D1	POP	D	FC	CM	Adr
26	MVI H,D8	51	MOV D,C	7C	MOV A,H	A7	ANA A	D2	JNC	Adr	FD	-	
27	DAA	52	MOV D,D	7D	MOV A,L	A8	XRA B	D3	OUT	D8	FE	CPI	D8
28	-	53	MOV D,E	7E	MOV A,M	A9	XRA C	D4	CNC	Adr	FF	RST 7	
29	DAD H	54	MOV D,H	7F	MOV A,A	AA	XRA D	D5	PUSH	D			
2A	LHLD Adr	55	MOV D,L	80	ADD B	AB	XRA E	D6	SUI	D8			

D8 = 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.

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