



UNIVERSITY EXAMINATIONS

EXAMINATION FOR JANUARY/APRIL 2023/2024 CERTIFICATE IN INFORMATION TECHNOLOGY

COURSE CODE: RCT 008.

COURSE TITLE: COMPUTER ORGANIZATION

DATE -- / -- /2024

TIME: 2 HOURS

GENERAL INSTRUCTIONS:

Students are NOT permitted to write on the examination question paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

SPECIAL INSTRUCTIONS:

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

1. PLEASE start the answer to EACH question on a NEW PAGE.
2. Keep your phone(s) switched off at the front of the examination room.
3. Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material during the course of the examination.
4. ALWAYS show your working.
5. Marks indicated in parenthesis i.e. () will be awarded for clear and logical answers.
6. Write your REGISTRATION No. clearly on the answer booklet(s).
7. For the Questions, write the number of the question on the answer booklet cover page in the order you answered them.
8. DO NOT use your PHONE as a CALCULATOR.
9. YOU are ONLY ALLOWED to leave the exam room 1 hour to the end of the Exam.
10. DO NOT write on the QUESTION PAPER. Use the back of your BOOKLET for any calculations or rough work.
11. Calculators may be required.
12. Microprocessor Instruction sets will be provided.

SECTION A (COMPULSORY)

Question (1) - (30Marks)

- a) Describe the following terms as used in computer systems. **(10 Marks)**
- i. I.S.A.
 - ii. Cache.
 - iii. C.P.U.
 - iv. B.I.O.S.
 - v. P.O.S.T.
 - vi. Software.
 - vii. Hardware.
 - viii. Firmware.
 - ix. Utility Software.
 - x. System Software.
- b) Discuss the purposes following components. **(6 Marks)**
- i. Compiler.
 - ii. Interpreter.
 - iii. Assembler.
- c) If a computer system has 18-bit control buses, 38 bits address buses, & 64 bits data buses.
- i. How much memory can the system handle? **(2 Marks)**
 - ii. What is the maximum size of word, the system can handle? **(2 Marks)**
- d) Describe **FOUR** major components found inside a microprocessor, stating their purposes. **(4 Marks)**
- e) What will be the effect of executing the following intel 8085 instructions. **(4 Marks)**
- i. **LXI H, FFFF H**
 - ii. **LHLD 2000 H**
 - iii. **STA 2500 H**
 - iv. **XCHG**
- f) Explain what the term Addressing Mode means as use in Low level Programming languages. **(2 Marks)**

SECTION B (Answer Any Two Questions)

Question (2) - (15 Marks).

- a) State the purposes of the following I/O ports as used in PC (personal computer) system. **(6 Marks)**
- i. Ethernet Port.
 - ii. Firewire Port.
 - iii. e-SATA Port.
 - iv. PS/2 Port.
 - v. VGA Port.
 - vi. DVI Port.
- b) Compare high-level programming languages and Low-level Programming. **(4 Marks)**
- c) List **THREE** differences between the Harvard computer architectures and the Von Neumann computer architectures? **(3 Marks)**
- d) Differentiate between Parallel Processing and Multiprogramming. **(2 Marks)**

Question (3) - (15 Marks).

- a) In **details**, discuss, the complex Fetch Execute Cycle process, as implemented during the instruction's executions. **(7 Marks)**
- b) State **FIVE** categories / types of instructions based on their functionality. **(5 Marks)**
- c) Name three major types of primary buses used by a computer system and hence describe their functionalities. **(3 Marks)**

Question (4) - (15 Marks).

- a) State and explain **FOUR** major *hardware* related factors that have an impact, on computer performance. **(4 Marks)**
- b) Outline / list **FIVE** major differences between R.I.S.C. and C.I.S.C as referenced in microprocessors. **(5 Marks)**
- c) State and Describe **SIX** major types of registers used found in a microprocessor (CPU). **(6 Marks)**

Question (5) - (15 Marks).

- a) Describe all the flag register bits of the Intel 8085 microprocessor. **(5 Marks)**
- b) Discuss **FIVE addressing modes** used in the Intel 8085 microprocessor instruction sets, site an example, for each of the addressing mode. **(5 Marks)**
- a) Write a program to multiply two numbers stored in the memory locations 2000_{hex} & 2001_{hex} respectfully, and then store the results from the operation into the memory location 2010_{hex} . **(5 Marks)**
(Refer to the instruction set for Intel 8085 provided on page 5 and 6).

Intel's 8085 Microprocessors Instruction Set summary provided in the next two pages.

INTEL 8085 MICROPROCESSOR INSTRUCTION SET

Hex	mnemonic	Hex	mnemonic	Hex	mnemonic	Hex	mnemonic
CE	ACI 8-Bit	3F	CMC	2B	DCX H	01	LXI B,16-Bit
8F	ADC A	BF	CMP A	3B	DCX SP	11	LXI D,16-Bit
88	ADC B	B8	CMP B	F3	DI	21	LXI H,16-Bit
89	ADC C	B9	CMP C	FB	EI	31	LXI SP,16-Bit
8A	ADC D	BA	CMP D	76	HLT	7F	MOV A A
8B	ADC E	BB	CMP E	DB	IN 8-Bit	78	MOV A B
8C	ADC H	BC	CMP H	3C	INR A	79	MOV A C
8D	ADC L	BD	CMP	04	INR B	7A	MOV A D
8E	ADC M	BE	CMP M	0C	INR C	7B	MOV A E
87	ADD A	D4	CNC 16-Bit	14	INR D	7C	MOV A H
80	ADD B	C4	CNZ 16-Bit	1C	INR E	7D	MOV A L
81	ADD C	F4	CP 16-Bit	24	INR H	7E	MOV A M
82	ADD D	EC	CPE 16-Bit	2C	INR L	47	MOV B A
83	ADD E	FE	CPI 8-Bit	34	INR M	40	MOV B B
84	ADD H	E4	CPO 16-Bit	03	INX B	41	MOV B C
85	ADD L	CC	CZ 16-Bit	13	INX D	42	MOV B D
86	ADD M	27	DAA	23	INX H	43	MOV B E
C6	ADI 8-Bit	09	DAD B	33	INX SP	44	MOV B H
A7	ANA A	19	DAD D	DA	JC 16-Bit	45	MOV B L
A0	ANA B	29	DAD H	FA	JM 16-Bit	46	MOV B M
A1	ANA C	39	DAD SP	C3	JMP 16-Bit	4F	MOV C A
A2	ANA D	3D	DCR A	D2	JNC 16-Bit	48	MOV C B
A3	ANA E	05	DCR B	C2	JNZ 16-Bit	49	MOV C C
A4	ANA H	0D	DCR C	F2	JP 16-Bit	4A	MOV C D
A5	ANA L	15	DCR D	EA	JPE 16-Bit	4B	MOV C E
A6	ANA M	1D	DCR E	E2	JPO 16-Bit	4C	MOV C H
E6	ANA 8-Bit	25	DCR H	CA	JZ 16-Bit	4D	MOV C L
CD	CALL 16-Bit	2D	DCR L	3A	LDA 16-Bit	4E	MOV C M
DC	CC 16-Bit	35	DCR M	0A	LDAX B	57	MOV D A
FC	CM 16-Bit	0B	DCX B	1A	LDAX D	50	MOV D B
2F	CMA	1B	DCX D	2A	LHLD 16-Bit	51	MOV D C

Hex	mnemonic	Hex	mnemonic	Hex	mnemonic	Hex	mnemonic
52	MOV D D	71	MOV M C	E5	PUSH H	9E	SBB M
53	MOV D E	72	MOV M D	F5	PUSH PSW	DE	SBI 8-Bit
54	MOV D H	73	MOV M E	17	RAL	22	SHLD 16-Bit
55	MOV D L	74	MOV M H	1F	RAR	30	SIM
56	MOV D M	75	MOV M L	D8	RC	F9	SPHL
5F	MOV E A	3E	MVI A 8-Bit	C9	RET	32	STA 16-Bit
58	MOV E B	06	MVI B 8-Bit	20	RIM	02	STAX B
59	MOV E C	0E	MVI C 8-Bit	07	RLC	12	STAX D
5A	MOV E D	16	MVI D 8-Bit	F8	RM	37	STC
5B	MOV E E	1E	MOV E 8-Bit	D0	RNC	97	SUB A
5C	MOV E H	26	MVI H 8-Bit	C0	RNC	90	SUB B
5D	MOV E L	2E	MVI L 8-Bit	F0	RP	91	SUB C
5E	MOV E M	36	MVI M 8-Bit	E8	RPE	92	SUB D
67	MOV H A	00	NOP	E0	RPO	93	SUB E
60	MOV H B	B7	ORA A	0F	RRC	94	SUB H
61	MOV H C	B0	ORA B	C7	RST 0	95	SUB L
62	MOV H D	B1	ORA C	CF	RST 1	96	SUB M
63	MOV H E	B2	ORA D	D7	RST 2	D6	SUI 16-Bit
64	MOV H H	B3	ORA E	DF	RST 3	EB	XCHG
65	MOV H L	B4	ORA H	E7	RST 4	AF	XRA A
66	MOV H M	B5	ORA L	EF	RST 5	A8	XRA B
6F	MOV L A	B6	ORA M	F7	RST 6	A9	XRA C
68	MOV L B	F6	ORI 8-Bit	FF	RST 7	AA	XRA D
69	MOV L C	D3	OUT 8-Bit	C8	RZ	AB	XRA E
6A	MOV L D	E9	PCHL	9F	SBB A	AC	XRA H
6B	MOV L E	C1	POP B	98	SBB B	AD	XRA L
6C	MOV L H	D1	POP D	99	SBB C	AE	XRA M
6D	MOV L L	E1	POP H	9A	SBB D	EE	XRI 8-Bit
6E	MOV L M	F1	POP PSW	9B	SBB E	E3	XTHL
77	MOV M A	C5	PUSH B	9C	SBB H		
70	MOV M B	D5	PUSH D	9D	SBB L		

END