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**UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR FOUR SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE OF
(COMPUTER SCIENCE)**

COURSE CODE : CSC 453E

**COURSE TITLE : COMPUTER SYSTEMS
ENGINEERING**

DATE: 19/12/2023

TIME: 09:00 HRS – 11:00 HRS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a) With regard to microcontroller;
- i. Name two categories of inbuilt memories [2 Marks]
 - ii. Highlight the function of each memory stated in part (i) above [4 Marks]
- b) Highlight the process involved in each of the following [4 Marks]
- i. Microprogramming
 - ii. microoperation
- c) What is a microcode? [3 Marks]
- d) Highlight three characteristics of the thick-client server architecture. [3 Marks]
- e) Discuss the following addressing modes in 8051 microcontroller system and give an example of an instruction that uses the mode of addressing: [9 Marks]
- i. Immediate addressing
 - ii. Register addressing
 - iii. Bit addressing
- f) Write a program to increment R1 of register bank 1 and send the output to port 3. [5 Marks]

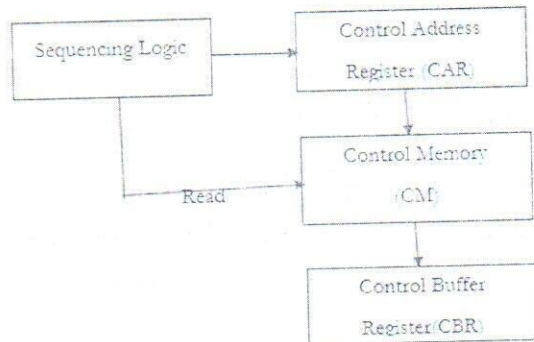
QUESTION TWO [20 MARKS]

- a) Discuss the function of each of the following pins of an 8051uC [10 Marks]
- i. P2.0 (A8) to P2.7 (A15)
 - ii. RST
 - iii. P3.2 ($\overline{INT0}$)
 - iv. P3.4 (T0)
 - v. P3.7 (\overline{RD})
- b) Figure below shows a register byte of the Interrupt Enable register. State the function of any five bits in the register. [10 Marks]

EA	-	-	ES	ET1	EX1	ET0	EX0
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QUESTION THREE [20 MARKS]

- a) Figure below shows an implementation of a microprogrammed Control Unit. Discuss the significance of each element. [10 Marks]



- b) Explain three considerations that might influence a designer to choose microprogrammed CU over hardwired. [6 Marks]
- c) Outline four limitations of microprogrammed approach [4 Marks]

QUESTION FOUR [20 MARKS]

- a) What is meant by instruction set architecture? [2 Marks]
- b) Describe the three ISA below: [9 Marks]
- Stack architecture
 - Accumulator architecture
 - Register-set architecture
- c) With an illustrative diagram, clearly show how an external 64K RAM can be interfaced with an 8051 MCU. [9 Marks]

QUESTION FIVE [20 MARKS]

- a) Write an 8051 MCU assembly language program to divide two numbers: one in R4 of register bank 00 by that in R5 of register bank 01. [6 Marks]
- b) Describe the client-server architectures below: [10 Marks]
- 2-tier
 - 3-tier
 - N-tier
- c) Distinguish between fine-grained lock and course-grained lock techniques in memory management design [4 Marks]