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UNIVERSITY EXAMINATIONS  
2023/2024 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS  
YEAR THREE SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF  
BACHELOR OF SCIENCE COMPUTER SCIENCE

COURSE CODE : CSC 351 E

COURSE TITLE : MICROPROCESSORS SYSTEMS  
DESIGN

DATE: ~~11~~<sup>6</sup> / 12 / 2023

TIME: 14:00 HRS – 16:00 HRS

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INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO

**QUESTION ONE [COMPULSORY] [30 MARKS]**

- a) Explain the functions of the following pins of 8085uP
- i) INTR [1 Mark]
  - ii) READY [1 Mark]
  - iii)  $\overline{INTA}$  [1 Mark]
  - iv) Reset out [1 Mark]
- b) Clearly distinguish between Von Neumann and Harvard architecture models. [4 Marks]
- c) Give two advantages of each of the architectural models in question 1b above. [4 Marks]
- d) Name and explain the two types of Programmable Input/Output data transfer techniques [4 Marks]
- e) Write an Assembly Language Program to divide contents of accumulator by contents of B register. The resulting quotient be stored in C register while the remainder be stored in D register. Let your program reside from memory address 2040. [5 Marks]
- f) Identify the type of instruction in each of the instructions below:
- i) ANI 80H [1 Mark]
  - ii) LDAX D [1 Mark]
  - iii) JC 4100H [1 Mark]
  - iv) SIM [1 Mark]
- g) A 512KB memory chip has 8 pins for data. Find:
- i) The organization [1 Mark]
  - ii) The number of address pins for this memory chip. [2 Marks]
  - iii) The address range of the chip [2 Marks]

**QUESTION TWO [20 MARKS]**

- a) Determine the addressing mode in each of the assembly instruction below:
- 1. ADD B [1 Mark]
  - 2. LXI SP, 20B0H [1 Mark]
  - 3. LDAX B [1 Mark]
  - 4. ORA D [1 Mark]
  - 5. STA 4030H [1 Mark]
  - 6. MOV C, B [1 Mark]
  - 7. RST 4 [1 Mark]
  - 8. NOP [1 Mark]
- b) Below is a Hexcode for a certain program. Write its equivalent Assembly Language.  
3AH 10H 30H 47H 3AH 11H 30H 80H 32H 12H 30H 76H [5 Marks]
- c) Name and discuss any three techniques of Direct Memory Access [7 Marks]

### QUESTION THREE [20 MARKS]

- a) Show the contents of the accumulator and the status of the flag bits after each of the following operations:
- i)  $36H+45H$  [4 Marks]
  - ii)  $20H - 20H$  [3 Marks]
  - iii)  $78H-A9H$  [3 Marks]
- b) A certain program is needed to count from 255 to zero, then upwards from zero to F0H. For every count it gives an output at PORT 21H. Write a program to achieve this task. Let the program run in an endless loop. [10 Marks]

### QUESTION FOUR [20 MARKS]

- a) A 8-bit memory requires 3KB of RAM and 1KB of ROM. Draw the memory map assuming ROM starts from 0000h and is followed by RAM [5 Marks]
- b) i) Write an algorithm of a program to exchange the contents of memory locations 2000H and 4000H [3 Marks]
- ii) Write an assembly program to achieve the task based on your algorithm. [4 Marks]
- c) Define the tools below as used in programming languages
- i) A loader [2 Marks]
  - ii) A linker [2 Marks]
  - iii) Compiler [2 Marks]
  - iv) Assembler [2 Marks]

### QUESTION FIVE [20 MARKS]

- a) What is an interrupt? [2 Marks]
- b) Identify five events that may lead to generation of an interrupt [5 Marks]
- c) Distinguish between hardware interrupt and software interrupt, giving examples [4 Marks]
- d) Discuss the procedures that takes place in checking and servicing of an interrupt [9 Marks]