



# **MURANG'A UNIVERSITY OF TECHNOLOGY**

## **SCHOOL ENGINEERING AND TECHNOLOGY**

DEPARTMENT OF ENGINEERING AND TECHNOLOGY

UNIVERSITY ORDINARY EXAMINATION

2021/2022 ACADEMIC YEAR

**FOURTH YEAR SECOND SEMESTER BACHELOR OF TECHNOLOGY**

EET 400– MICROPROCESSORS AND EMBEDDED SYSTEMS

DURATION: 2 HOURS

### **INSTRUCTIONS TO CANDIDATES:**

1. Answer Question one and Any other two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

## SECTION A

### QUESTION ONE: COMPULSORY (30 MARKS).

- a) Explain the phrase “Embedded system”) outlining the main components of such a system. (3marks)
- b) Outline any 6 (six) key features of 8051 microcontroller. (3marks)
- c) Explain any three ways in which microcontrollers can be classified. (3marks)
- d) Discuss any three factors that affect choice of microcontrollers for a given application. (4marks)
- e) Explain any two differences between CISC and RISC systems. (4marks)
- f) Identify content of register “A “and the status of the carry flag, Auxiliary carry and parity flags after the addition of 4D<sub>H</sub> and E7<sub>H</sub> after the following instructions in 8051 microcontrollers. (4marks)
- g) Explain the following types of multitasking as applies to embedded systems. (4marks)
  - (i) Co-operative multitasking
  - (ii) Preemptive multitasking
- h) Study the following assembly programme and answer the questions that follows  
MOV R5, #36h  
MOV RT # 45H  
MOV A, # 0  
ADD A, R7  
ADD A, # 12H  
SUMP HERE  
EMD
  - (i) Indicate the content of registers A and R 7 when this programme is executed. (2marks)
  - (ii) Explain what happens after MOV R7, # 34 H, MOVA, # O and ADD A, R7 instructions. (3marks)

## SECTION B: ANSWER ANY TWO QUESTIONS.

### QUESTION TWO: (20 MARKS)

- a) State any three characteristics of embedded system. (3marks)
- b) Explain the structural units in an embedded processor and how processors are selected for an embedded application. (8marks)
- c) Explain the possible steps involved in the building process of embedded control systems. (9marks)

### QUESTION THREE: (20 MARKS)

- a) Explain briefly any THREE addressing modes of 8051 with an example for each. (6marks)
- b) Discuss how the interrupt routines are handled by RTOS and illustrate how the features of Vx works in embedded systems. (10marks)
- c) Differentiate between CISC and RISC architecture in microcontrollers. (4marks)

### QUESTION FOUR: (20 MARKS)

- a) Write program instructions to load a byte in memory location 9000 H and increment the contents of the memory location. (5marks)
- b) Explain the interrupts of 8051 microcontroller indicating their vector addresses. (6marks)
- c) Draw the architecture of 8051 microcontroller and explain the memory mapping of 8051. (9marks)