

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2005

SUBJECT: MICROPROCESSORS AND EMBEDDED SYSTEMS
CODE: SCS2202

INSTRUCTION TO CANDIDATES

This question paper consists of Five questions. Answer any Four questions.
Each question carries 25 marks.

Time: 3 hours

QUESTION ONE

- a) Compare and contrast stack implementation in a microcontroller Intel 8051 and the Motorola microprocessor [6]
- b) Describe five transducers classes based on their transduction methods. [10]
- c) Describe any two-microprocessor synchronisation techniques [4]
- d) What are the design problems that can be faced if a microcontroller is replaced by a microprocessor [5]

QUESTION TWO

- a) Draw the pinout of the General Purpose Interface Bus (GPIB) and explain the functions of each pin [10]
- b) Describe the addressing modes of an Intel 8051 microcontroller [5]
- c) What are the hardware and software constraints imposed on embedded system design [5]
- d) Describe the pins invoked when the MC6800 is reading data from a memory location [5]

QUESTION THREE

- a) Describe the internal architecture of the Intel 8051 microcontroller [15]
- b) What is the rationale of having so many Special Function Registers in a microcontroller? [3]
- c) Give a brief outline of on-chip microcontroller resources and facilities [5]
- d) State the Sampling Theorem (Nyquist Sampling Rate) [2]

QUESTION FOUR

- a) Outline the operating characteristics of the Peripheral Component Interconnect bus system (PCI) [10]
- b) A microprocessor is a general-purpose device. Why do you think these are not commonly used in embedded systems instead we have microcontrollers and picocontrollers [5]
- c) Give four examples of instructions under the following Instruction set classification
 - i) Data transfer [2]
 - ii) Data manipulation [2]
- d) Carefully explain the stages involved in handling the SWI instruction. Use diagrams to illustrate your answer. [6]

QUESTION FIVE

- a) Give a detailed outline of interrupt system organization in a microcontroller system [15]
- b) Describe memory organisation in an Intel 8051 microcontroller [5]
- c) Write an MC6800 program to count the number of bits with value one in a given data byte [5]

END OF QUESTION PAPER

