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# Indian Institute of Engineering Science and Technology, Shibpur

**B. Tech. (CST) 5$^{th}$ Semester End-Term Examination, November, 2023**

Microprocessor Based Systems (CS 3101)

Full Marks: 50 Time: 3 Hours

- **Attempt any five (5) questions.**
- **Answers should be precise, to the point, and in your own words as far as practicable.**
- **If not explicitly mentioned, assume Intel 8085A as the base microprocessor.**
- **Make your own assumptions, if necessary, and state them at proper places.**

1. (a) What is program relocation? Explain how the segmented memory model of 8086 microprocessor facilitates program relocation in comparison with 8085 microprocessor.

   (b) Explain with suitable example(s) how, in an IBM PC (running MSDOS), DOS calls provide a higher level functions over BIOS calls while providing printing (displaying) and input (from keyboard) support. [5+5]

2. Write 8085 assembly language source code for the subroutines as specified below. Write supporting calling programs too.

   (a) Write a subroutine which is functionally similar to the C function "**int strcmp(const char *s1, const char *s2)**" that compares the two null-terminated strings **s1** and **s2**. It returns an integer less than, equal to, or greater than zero if **s1** is found, respectively, to be less than, to match, or be greater than **s2**.

   (b) Write a subroutine which is functionally similar to the C function "**char *strchr (const char *s, char c)**" that returns a pointer to the first occurrence of the character **c** in the null terminated string **s**, or NULL (0000H) if the character **c** is not found in string **s**. [6+4]

3. Say, there are two 8085 System Development Kits (SDKs, like the ones you have used in the laboratory courses). The idea is to transfer a block of bytes from a particular memory address of one kit to a particular memory address of the other kit using SID, SOD pins of 8085 microprocessors. Propose a scheme to achieve this showing how the SDKs will be connected and write the programs to be executed by them. Make your own assumptions, if necessary, and state them in clear terms. [10]

4. Say, in a house there are two rooms R1 and R2. In each room, there are 2 electrical appliances (one fan and one light) to be powered on/off using GPIO pins of a NodeMCU (total 2 NodeMCUs in 2 rooms). Propose a complete design (both hardware and software) of a system where the residents of the house can power on/off the lights and fans using one unified (single) web interface (webpage). [10]

5. (a) Weigh up (assess) 8085 microprocessor and 8051 microcontroller in the context of designing a microprocessor based system.

   (b) Explain with suitable example(s) how stack can be used in a microprocessor based system. [6+4]

6. Write short notes on the following.

   (a) Assembler Directives

   (b) Interrupt related instructions in 8085 [5+5]