ST. XAVIER'S COLLEGE
KOLKATA
(AUTONOMOUS)

2nd SEMESTER EXAMINATION
JUNE - JULY 2021
M. Sc. COMPUTER SCIENCE

CMSM4223

MICROPROCESSORS AND MICRO CONTROLLERS

Friday, June 25, 2021
1:00 PM to 4:00 PM
3 hours
Full Marks : **80**

PLEASE READ THESE INSTRUCTIONS BEFORE YOU START WRITING:

1. Of the questions attempted, the answers to only the first required number of questions (as stipulated in the question paper) will be evaluated. **So please do not attempt extra questions**.
2. Use fountain pen or ball-point pen of **blue** or **black ink**.
3. Write **(not type)** the answers legibly, in your own words as far as practicable, on A4 size sheets.
4. Save the pages of your answer sheets (hand-written document) to a single PDF file and name the document accurately i.e. **Roll No_Paper Code.PDF** (example: 147_PH36141T).
5. Send the PDF file to the following email address **(in REPLY mode) within 30 minutes of the completion of the examination**: **cmsm42232021@sxccal.edu**
6. In the subject field of your email, please write "**Answer Script – Roll No, Paper Code**" (example: "Answer Script – 147, PH36141T").
7. The scanned answer scripts should have **enough clarity** to enable evaluation.
8. On top of each page **handwrite** the following information: **Name, Roll Number, Paper Code , Date,** and **Page Number**
9. No multiple submissions would be allowed.

The marks are given in **brackets [ ]** at the end of each question or part question.

The question paper consists of **2** pages.

Of the questions attempted, the answers to only the first required number of questions (as stipulated in the question paper) will be evaluated.
So, PLEASE DO NOT ATTEMPT EXTRA QUESTIONS.

ANSWER QUESTION 1 AND ANY FOUR FROM THE REST.

1. Answer **ANY FOUR** questions: **[4×5=20]**
   a) How does Von Neumann architecture simplify design of a system? Explain with proper diagram.
   b) Write the format of flag register present in 8086 and explain the purpose of each bit.
   c) Write the purpose of LOCK' and RESET pin of 8086.
   d) Explain software and hardware control of timers with proper diagram.
   e) What is the purpose of a pre-fetcher queue in a microprocessor? Explain the purpose of QS1 and QS0 bit of 8086.
   f) Which serial mode functions as a shift register in 8051? Explain with proper diagram.

Answer **ANY FOUR** questions: **[4×15=60]**

2. State the addressing mode, number of bytes, number of machine cycles and the working of the following instructions with proper examples– **[3×5]**
   i) ORL C, BIT **ii)** DIV AB **iii)** SWAP A

3. a) Find the baud rate of serial data transfer when crystal frequency is 16MHz, and value loaded into the TH1 register is F2H and F7H. **[5]**
   b) Explain the Mode 2 operation of UART in 8051. **[5]**
   c) Explain the purpose of IE register and the corresponding bits. **[5]**

4. a) Give an example of a 2byte 2 machine cycle instruction and Draw the timing diagram for the same. **[8]**
   b) Write a short note on 8086 register set. **[7]**

5. a) Explain how logic 0 and 1 are written to ports in 8051in Port 0. **[10]**
   b) Write an assembly language program to count the number of 0's and 1's separately in a byte. Save the results into register R0 and R1 of register bank 1. **[5]**

6. a) Write a program to generate a rectangular wave with an ON and OFF time of 5ms on pin P0.0. Assume XTAL = 12 MHz. **[9]**
   b) Discuss the difference between following two instructions with proper examples –
   1) DEC A **2)** SUBB A,#01H **[6]**

7. a) Write the instructions to perform the following operations: **[2+3+3]**
   1) Mask bit D7 of R2
   2) Set upper three bits at address 30H
   3) Exchange the nibbles of R2
   b) Show how the swap operation is realized using rotate instructions with proper examples. **[3]**
   c) ADD -20d with -25d in binary using 8051. After the addition reflect and explain the status of the flag registers. **[4]**

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