Name of the Program: B.Sc. in CSE/B.Sc. in TVE **16 September 2021**
Semester: Winter 2020-2021 **Time: 2:30 pm – 4:00 pm**

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

Semester Final Examination **Winter Semester: 2020-2021**
Course Number : CSE 4503/4573 **Full Marks: 75**
Course Title : Microprocessors and Assembly Language **Time: 1.5 Hours**

There are **3 (three)** questions. Answer all of them. Figures in the right margin indicate marks. The examination is **Online** and **Open Book**. Marks of each question and corresponding **CO** and **PO** are written in the brackets.

Write **Student ID** and **Name** top of the **first page** and write **student ID** and **page no** in every page of the answer script. Submission pdf of the answer script should be named as **Full_Student_ID<space>Course Code.pdf**

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1. a) What are real mode and protected mode? Which microprocessor(s) does first implement the protected mode and how? — 10 (CO4) (PO1)

   b) How does thread ensure faster processing? Discuss in the context of multi-core processor system? — 10 (CO1) (PO1)

   c) 'Utilization of parallel processors can be achieved through parallel programming'. How? Prove with appropriate example. — 5 (CO1) (PO1)

2. a) Which memory locations are reserved for 8086 Interrupt Vector Table? Derive the specific memory locations where the CS and IP values of the following Interrupt Types can be found: — 10 (CO4) (PO2)
   i. `INT 10B`
   ii. `INT 3`

   b) Let, in an assembly language code data segment is initialized at `0700h:0000h` memory location of 8086 and variables are declared as follows: — 10 (CO1) (PO1, PO2)

```
.DATA
A db 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
B db 'IUTOIC'
C dw 1234
D db 'Exam Date is 16 September, 2021','$'
```

   Now, using appropriate instructions derive and store the initial offsets of variable A, B, C and D at SI, DI, BX, BP registers, respectively. Also, derive the DS register value.

   c) Write an assembly language code to take a single-character (digits 0 to 9 only) as an *input* and display the previous character (as in ASCII table) as an *output* in the new line with carriage return. — 5 (CO1) (PO1)

3. a) Draw the details of WRITE Bus timing diagram showing all the necessary/required signals of 8086. You should consider that the write operation will be made in the I/O port address of `1111h` and there are 3-T states used in WAIT state. — 10 (CO4) (PO2)

   b) Let, in 8086 based system current SP value is `FFFAh` and the CS, IP and FL values are `7000h`, `1000h` and `1001h`, respectively. Now, if at that instance an interrupt occurs, then show the stack increase and decrease scenario along with changes in SP values and stack contents. — 10 (CO2) (PO1, PO2)

c) Define the following terms with appropriate example: 5 (CO2) (PO2)

i. Clock cycle

ii. Bus cycle

iii. Instruction cycle

iv. Machine cycle

v. ‘T’ duration (consider a microprocessor is having a clock speed of 12 MHz)