

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**ORGANISATION OF ISLAMIC COOPERATION (OIC)****Department of Computer Science and Engineering (CSE)****MID SEMESTER EXAMINATION****SUMMER SEMESTER, 2019-2020****DURATION: 1 Hour 30 Minutes****FULL MARKS: 75****CSE 4619: Peripherals, Interfacing and Embedded Systems****Programmable calculators are not allowed. Do not write anything on the question paper.**There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

1. a) What are the main reasons to use microcontroller? What is the maximum clock speed for ATmega16 and how it can be implemented at ATmega16 microcontroller? How many registers are there at ATmega16? 3+4+3
- b) Differentiate between Tiny, Mega and Xmega AVR microcontrollers. Based on the size of the flash memory, ATmega16 and ATmega328 microcontrollers belong to which category? 7+3
- c) Draw a block diagram using the specific ports pin numbers of ATmega16 microcontroller; where, you need to connect 2 input peripherals and 2 output peripherals. 5
2. a) Why do we need Nyquist Law? What are the important points to achieve better accuracy in ADC? Is it possible to get the same analog signal after implementing ADC and DAC one after another? Justify your answer. 3+3+4
- b) With respect to circuit design, Flash ADC and Weighted Sum DAC have an opposite similarity. Explain with appropriate diagrams. 10
- c) Suppose, you are given an analog quantization size of 0.75 Volt, where $V_{\min}=0$ Volt and $V_{\max}=12$ Volt. Calculate the desired number of bits for an A/D converter. 5
3. a) Suppose, an 8086 microprocessor is asked to address a control word at the control register of 8255 PPI. Consider that in 8255, Port-A is in Mode-2, Port-B is in Mode-1 as an output port and Port-C is working for handshaking signals. Now, derive the binary values of A0 and A1 pins and draw the control word format for 8255 PPI. 2+8
- b) Draw the sequential timing diagram for Port-A considering the handshaking and data signals (**Hint:** You have to consider the scenario of Question 3a). 10
- c) How does an asynchronous data transfer mode handle errors? Explain with a figure. 5
4. a) Consider that an 8-bit control word is to be written to an 8254 PIT, where the control command asks for a 16-bit binary-counting value from Counter # 3 using a rate generator. Now, derive the Control Logic pin values and draw the control word parameters. 13
- b) Differentiate between the followings: 6+6
 - i. Rate generator mode and Square-wave generator mode of 8254 PIT.
 - ii. 8253 and 8254 Programmable Interval Timer.