

University of Ruhuna
Bachelor of Science General Degree Level III (Semester II) Examination
December-2013

Subject: Physics
Course Unit: PHY3282

PART B - 01 hour & 15 minutes

Answer question No.1 and any other 04 questions only.

All symbols have their usual meaning

Use given data sheets to answer questions

1. You have to construct a dc voltmeter by using a PIC16F877A microcontroller and three common cathode Seven Segments Display (SSD) units. (take voltage range of the voltmeter as 0.00 V to 5.00 V).
 - (a) Draw the complete hardware diagram (clearly show the connections of the Seven Segment Display modules and other components)
 - (b) Draw the flow chart for the system.
 - (c) Write down the complete C program in order to operate the above system.

2. Answer the following parts with respected to the architectures and programming process of the microcontrollers.
 - (a) Describe hardware programmer and software programmer.
 - (b) Discuss the important pins and their functions during the programming process of a PIC16F877A microcontroller.
 - (c) Describe, briefly, program memory and data memory

3. You have to construct a display system in order to display last four digits of your student number using a PIC16F877A microcontroller and a LMB 162ABC Liquid Crystal Display (LCD) with the following requirements.
 - Crystal frequency = 4MHz
 - Interfacing mode = 8 bit
 - (a) Clearly show that the hardware connections between a microcontroller and a Liquid Crystal Display
 - (b) Draw the flow chart in order to operate the above system

4. Consider the EEPROM and interrupts included in a PIC16F877A microcontroller.
- What special function registers and bits are important for EEPROM?
 - Write down necessary steps in order to perform the EEPROM reading and writing purposes in a PIC16F877A microcontroller.
 - Write down the necessary steps in order to activate the TMRI overflow interrupt.
5. Answer the following parts with respect to the timer modules in the PIC16F877A microcontroller.
- Describe, briefly, operation of the TMR2 module
 - Write down the C program in order to generate 1 kHz square wave signal on PORTB.0 pin by using the TMR2 module.
6. You have to construct a room temperature indicator by using a PIC16F877A microcontroller, LM35 Temperature sensor and a Light Emitting diode (LED) in order to turn on the LED when room temperature is exceeded 25 °C. Assume that LED and LM35 are connected to PORTB.0 and AN0 pins of the microcontroller respectively. Draw a flow chart in order to implement above mentioned system. (Clearly show all assumptions you have made).
7. Answer the following parts with respected to the asynchronous serial communication
- Explain Start bit, Stop bit, Baud rate and MAX 232.
 - Write down the necessary steps in order to dial the number 0123456789 using a standard GSM modem and PIC16F877A microcontroller. The communication between the modem and the microcontroller has to be maintain under the asynchronous serial communication with following specifications.
 - Baud rate=9600
 - Numbers of data bits = 8
 - No. of parity bits = 0
 - Crystal frequency = 4MHz