SET- I **Roll No: ----------**

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, Oct, 2017

Program Name: B.Tech Mechatronics **Semester – VII**
Course Name : Embedded Systems **Max. Marks : 100**
Course Code : MEEL 411 **Duration : 3 Hrs.**
No. of page/s: 2

Section A: All Questions are compulsory

1 What are the different types of embedded systems? Classify with their application **[5]**

2 When a microcontroller starts up, output's voltage level is usually unknown. Is pull-up/down resistor necessary to avoid weird starting behavior? **[5]**

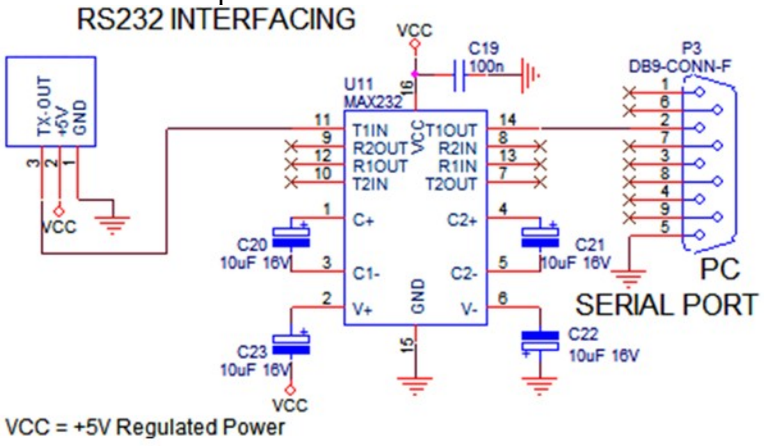
3 Define the different serial communication protocols. **[5]**

4 Categorized the various timers in embedded system and define that how it is executed to perform an application. **[5]**

Section B: Attempt All Questions.

5 Explain in detail, how is RTOS different from other OS? What are the rules you follow when you are writing a critical section of code? **[10]**

6 The circuit diagram mentioned below is for reading the data from the sensor and display it on terminal/HyperTerminal. Write syntax to read the data from the sensor and display it in LCD 16 × 2 using any microcontroller. Use RS232 protocol. **[10]**

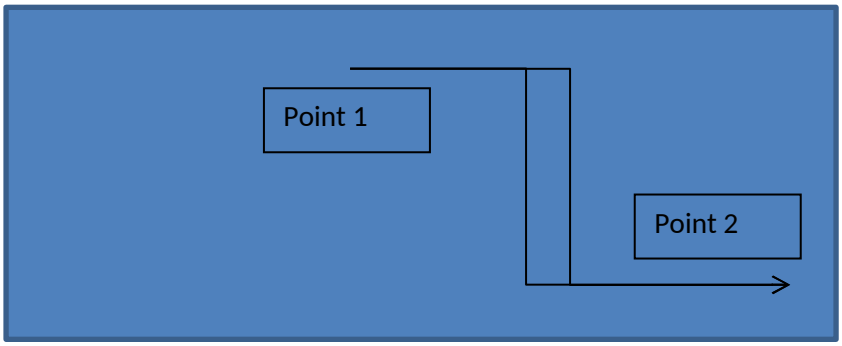


7 What is hardware/software co-simulation? What is the key method for speeding up such simulations? **[10]**

8 Generate the delay of 10 ms if the crystal frequency is 5 MHz. Also, write the corresponding algorithm for the same. **[10]**

Section C: Attempt All Questions

9 Consider the semi-autonomous robot moving in a closed indoor environment from point one to point 2 for the path given below. The robot is controlled by a joystick (potentiometer). Design a system for controlling DC motor speed using pulse width modulation technique with the help of joystick. **[20]**



10 Design an embedded system for the automatic water heater. The capacity of water heater is 25 liters. And the heating element is of 2000W. While design the embedded system, explain in detail the circuit diagram of automatic power cut-off when the water temperature reached 75°C. **[20]**

SET- II **Roll No: ----------**

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, Oct, 2017

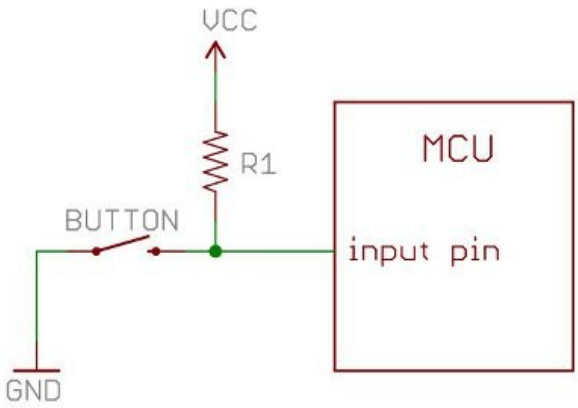
Program Name: B.Tech Mechatronics **Semester – VII**
Course Name : Embedded Systems **Max. Marks : 100**
Course Code : MEEL 411 **Duration : 3 Hrs.**
No. of page/s: 2

Section A: All Questions are compulsory

1 What is the real-time embedded system? Define the system with one **[5]**

application.

2 **[5]**



When the button is open what will be the input voltage to the microcontroller? Define it with reference to pull up and pull down concept.

3 Define the RS232 serial communication protocol with one application. **[5]**

4 What is hardware/software co-simulation? What is the key method for speeding up such simulations? **[5]**

Section B: Attempt All Questions.

5 Explain in detail, how is RTOS different from other OS? What are the rules you follow when you are writing a critical section of code? **[10]**

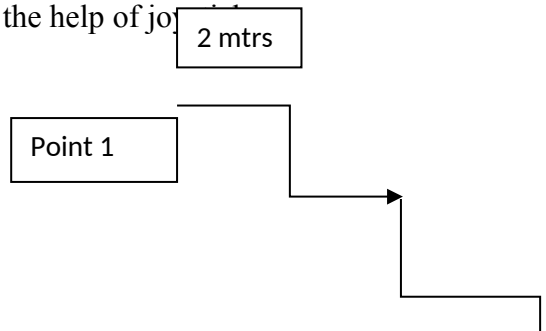
6 Give pseudocode for a pair of functions implementing send and receive communication constructs. You may assume that mutex and condition variables are provided. **[10]**

7 Given a 100 MHz crystal- controlled oscillation and a 32-bit and any number of 16-bit terminal-count timer, design a real-time clock that outputs the time down to milliseconds. **[10]**

8 Given a 120-step stepper motor with its own controller, write a function which rotates the stepper in desired rotation amount in degrees (between 0 and 360 degrees). **[10]**

Section C: Attempt All Questions

9 Consider the semi-autonomous robot moving in a closed indoor environment. The robot is controlled by a joystick. Design a system for controlling the speed of robot using pulse width modulation technique with the help of joy **[20]**



10 Design an embedded system for the automatic led bulb. The led bulb light up with the reference to the occupancy of the room. The led bulb is of 7W. While design the embedded system, explain in detail the circuit diagram of automatic on and off of led bulb. **[20]**