Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: IT401
Course Name: EMBEDDED SYSTEMS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.
Marks

1 a) What is the difference between an MCU and an MPU   (5)
   b) What is meant by GPIO   (2)
   c) Give a real world example of an embedded system. Justify your answer with   (8)
       suitable explanation
2 a) What is Flash Memory Cell? Explain the principle of Data storage in Flash   (7)
       memory.
   b) Describe communication using external buses USB and RS-232   (8)
3 a) How does a proximity/ range sensor works?   (7)
   b) Explain about Automotive buses   (8)

PART B
Answer any two full questions, each carries 15 marks.

4 a) Write a note on the basic peripherals required for Raspberry Pi   (4)
   b) Explain how Raspberry Pi deals with Digital-In with example.   (4)
   c) Discuss the requirements chart in embedded system design with an example   (7)
5 a) Explain how button controlled LED can be implemented for the following   (8)
       condition C1 and C2.
       C1: You read a digital input on a Raspberry Pi through a button
       C2: Control an LED ON/OFF when pressing button
   b)   Embedded system designers have a very clear performance goal in embedded   (7)
       computing. Why? Justify with your answer.
6 a) What is IDLE? Develop a Raspberry Pi project such that a Cron lamp timer to   (15)
       turn on light at 7 P M & Turn off it by 10 P M every day. Explain design
       methodology of this project in detail.

PART C
Answer any two full questions, each carries 20 marks.

7 a) Predict the output for the following code with its justification (5)

```
float  value = 1.1;
void setup() {  Serial.begin(9600); }
void loop()
   {  value = value - 0.1;
    if( value == 0)
           Serial.println("The value is exactly zero");
    else if(fabs(value) <  .0001)
           Serial.println("The value is close enough to zero");
    else
           Serial.println(value);
    delay(100); }
```

   b) What is IDE and label all components in Arduino IDE main window (5)

   c) Identify the key differences between hard real-time, soft real-time, and firm real- (10)
       time systems. Give at least one example of real-time tasks corresponding to these
       three categories. Identify the timing constraints in your tasks and justify why the
       tasks should be categorized into the categories you have indicated.

8 a) Develop a sketch to Interface 7-segment LED display with Arduino to display (10)
       numerical values from 0 to 9

   b) What does a Real-Time Operating System do? (5)

   c) Discuss some real-time scheduling algorithms. (5)

9 a) Develop a sample Arduino project for any application by including the following (10)
       phases

       i) State problem and design

       ii) prepare Arduino sketch

       iii) Specify components required

       iv) Expected output

   b) Explain ARM SoC- core with peripherals (5)

   c) How Processor and memory are organized in embedded system? (5)

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