# 2015

## Embedded Systems
### (AEIE 5204)

**Time Allotted : 3 hrs**                                    **Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

### Group – A
### (Multiple Choice Type Questions)

1. Choose the correct alternative for the following:                    **10 x 1=10**

(i) When 8051 wakes up then 0×00 is loaded to which register?
    (a) DPTR         (b) SP         (c) PC         (d) PSW.

(ii) What is the address range of SFR Register bank?
    (a) 00H-77H     (b) 40H-80H     (c) 80H-7FH     (d) 80H-FFH.

(iii) The total amount of external code memory that can be interfaced to the 8051 is:
    (a) 64K         (b) 32K         (c) 128K     (d) 4K.

(iv) The I/O ports that are used as address and data for external memory are:
    (a) ports 0 and 2     (b) ports 1 and 2     (c) ports 3 and 2     (d)ports 0 and 3.

(v) Which of the following is the incorrect statement?
    (a) All array variables have same type
    (b) An array is the collection of variables
    (c) Array variables can be used individually
    (d) None of these.

(vi) Identify which one of these is real-time application scenario:
    (a) An on-line bus ticketing system
    (b) Printing of annual report of a company's annual report
    (c) Reconciling a day's transactions in an account book of a small company
    (d) An aircrafts' yaw control system.

(vii) Which of the following strategy is employed for overcoming the priority inversion problem?
    (a) Abandon the notion of priorities altogether
    (b) Have only two priority levels
    (c) Allow for temporarily raising the priority of lower level priority process
    (d) Use pre-emptive policies strictly based on priorities.

(viii)  Which one of the following RTOSs is used widely in embedded application?
      (a) Linux      (b) Windows CE      (c) Mindows NT      (d) Vx works.

(ix)  How many times the following *for* loop will be executed?
```c
#include<stdio.h>
int main()
{
   int i=0;
   for(;;)
      printf("%d",i);
   return 0;
}
```
      (a)  0      (b)  1      (c)  10      (d) Infinite.

(x)  Guess the output of the following program
```c
#include<stdio.h>
int main()
{
   int a = 100, b = 200, c = 300;
   if( !a >= 500)
         b = 300;
   c = 400;
   printf("%d,%d,%d",a, b, c);
   return 0;
}
```
      (a)  100, 200, 300      (b)    100, 200, 400
      (c)  100, 300, 300      (d)    100, 300, 400.

**Group – B**

2.(a)  Draw a schematic interfacing diagram of 8051 microcontroller and DB 9 connector using RE232 interfacing standard. Justify your answer

(b)  What is the role of TH1 in 8051 in deciding the baud rate for data communication? Find the TH1 value needed to have the following Baud rates (i) 9600 (ii) 1200.
                                          **(2+3)+(3+2+2)=12**

3.(a)  Program the 8051 to receive bytes of data serially and put them in P1. Set the baud rate at 4800, 8-bit data and 1 stop bit showing the control word in TH1.

(b)  Explain framing and de-framing of information in serial communication. Explain.
                                              **(6+2)+(4)=12**

**Group – C**

4.(a)  With proper labelling draw a complete schematic diagram of interfacing between external programmable ROM with microcontroller.

  (b)  Write the functions of control pins in 8051 for interfacing with external code memory.
**6+6=12**

5.(a)  Draw the complete schematic diagram of interfacing ADC with 8051 microcontroller where ADC is connected to a thermocouple for temperature display.

  (b)  What do you mean by a look-up table? Mention its importance.
**10+(1+1)=12**

**Group – D**

6.(a)  Explain goto statement in C. What is the limitation of *goto* statement? How is it overcome by *continue* and *break* statements?

  (b)  A LED is connected to port pin RB7 of a PIC18F45K22 microcontroller. Write a program to flash the LED such that the ON time is 5s and the OFF time is 3s.
**(3+1+2)+6=12**

7. Design a prototype model of an embedded system based temperature controller required to control a greenhouse or similar outdoor enclosure at a temperature of 25–30°C using electric heaters and a cooling fan. Outline the programming of this temperature controller.
**(6+6)=12**

**Group – E**

8.(a)  Explain a simple microcontroller memory map.

  (b)  Why static memory map is not suitable in many applications?

  (c)  Describe dynamic memory allocation scheme of a microcontroller with diagrams.
**4+2+(4+2)=12**

9.(a)  What is thread?  How many type of threads are there? Explain with examples.

  (b)  Describe the states of threads with the help of a diagram.

  (c)  Describe the Linux file system.
**(1+1+2)+4+4=12**