Subject: EMBEDDED SYSTEMS

Time: 3 Hours **JUNE 2011** **Max. Marks: 100**

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. Which one of the following is not embedded system characteristics?

(A) Single functioned **(B)** Multifunctioned
(C) Tightly constrained **(D)** Reactive and real time

b. The percentage revenue loss is given by

(A) $\left(D\frac{(3W-D)}{2W^2}\right)*100\,\%$ **(B)** $\left(W\frac{(3D-W)}{2D^2}\right)*100\,\%$
(C) $\left(2W^2(3W-D)\right)*100\,\%$ **(D)** $\left(2D^2(3W-D)\right)*100\,\%$

c. Complex state diagram is referred as

(A) FSMD **(B)** FSM
(C) FSD **(D)** FMD

d. _____ is the last of mapping operations from the FSMD to allocated components.

(A) Binding **(B)** Scheduling
(C) State encoding **(D)** State minimization

e. _____ downloads a binary machine program from the development processor's memory into the target processor's memory.

(A) Device programmers **(B)** Emulators
(C) Debuggers **(D)** Virtual machines

f. Resolution ADC is given by

(A) $\frac{V_{ref}}{2^n-1}$ **(B)** $\frac{V_{ref}}{2^{n-1}}$
(C) n **(D)** 2^n

g. Which one is not cache replacement policy?

(A) Random **(B)** Least recently used
(C) First in first out **(D)** Write through

h. Which one of the following is not a wireless protocol?

(A) IrDA **(B)** Blue tooth
(C) IEEE 802.1 **(D)** RS232

i. Each task can be in one of the following three states

(A) Running, Ready, Blocked **(B)** Running, Interrupted, Ready
(C) Stopped, Blocked, Ready **(D)** None of the above

j. Semaphore's two associated functions are

(A) Take & Release **(B)** Take & Stop
(C) Run & Release **(D)** None of the above

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. What is an embedded system? Explain three main characteristics of Embedded systems that distinguish such systems from others computing systems? **(8)**

b. The design cost of a particular disk drive has an NRE cost of $100,000 and a wait cost of $20. How much will we have to add to the cost of each product to cover NRE cost, assuming we sell?
(i) 100 units (ii) 10,000 units
also define NRE cost. **(8)**

Q.3 a. Design a 2-bit comparator with a single output "less than" using combinational design technique. Start from a truth table, use K-maps to minimize logic and draw the final circuit? **(8)**

b. Answer the following:
(i) Why NAND and NOR gates are more common than AND and OR gate? **(2)**
(ii) What is the difference between combinational and sequential circuits? **(2)**
(iii) How NMOS and PMOS transistors differ? **(2)**
(iv) What is the difference between a synchronous and Asynchronous circuit? **(2)**

Q.4 a. Explain why general purpose processor could cost less than a single purpose processor? **(6)**

b. Explain the following:
(i) Linker (ii) Cross compiler
(iii) Device programmers (iv) Emulators
(v) Debuggers **(10)**

Q.5 a. Explain the functions of Timers, Reaction timers and Watchdog timers? **(8)**

b. A Watchdog timer uses two cascaded 16 bit up-counter is connected to an 11.981 MHz oscillator. A time out should occur if the function watch reset is not called within 5 minutes. What value should be loaded into the up counter pair when the function is called? **(8)**

Q.6 a. Briefly Explain the following:

(i) Flash EEPROM (ii) PSRAM
(iii) NVRAM (iv) SRAM
(v) EEPROM **(10)**

b. Sketch the internal design of 8×4 ROM and Explain. **(6)**

Q.7 a. Explain in brief serial protocols which are widely used. **(8)**

b. Explain briefly Priority & Daisy Chain arbitration. **(8)**

Q.8 a. Explain Reentrant function. Is the following function Reentrant? Justify your answer.

(i) **(8)**

```
int   CErrors;
void VCount Errors (int   CNewErrors)
 {
      CErrors+=CNewErrors;
 }
```

(ii)

```
int strlen (char *P_S2)
{ int iLength;
iLength=0;
while(*P_S2!='\0')
   {  ++iLength;
      ++P_S2;
    } return length;
    }
```

b. Explain in brief any two methods or ways to protect shared data? **(8)**

Q.9 a. Explain design steps involved in designing an adaptive cruise control system in a car with neat diagram. **(8)**

b. Explain in brief steps required to design Automatic chocolate vending machine system with neat diagram. **(8)**