

## BE1-R4: EMBEDDED SYSTEMS

### NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) Which is the modeling diagrams used in UML?
  - b) What is the meaning of System-on-chip (SOC)? How will the definition of an embedded system change with a system-on-chip?
  - c) Write an 8051 assembly code to reverse bits in a given byte.  
For example, convert from:  

D7	D6	D5	D4	D3	D2	D1	D0
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 to 

D0	D1	D2	D3	D4	D5	D6	D7
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  - d) Differentiate RISC and CISC terms. Which one is preferred for embedded application? Justify it.
  - e) Discuss watchdog timer with its typical applications.
  - f) Differentiate between power-on reset and watchdog timer reset?
  - g) Explain Application Specific (ASIP) processor. Compare general purpose processor and single purpose processor.  
(7x4)
  
2.
  - a) For following 'C' statement, write ARM assembly codes:  

```
int a, b, c, x, y, z;  
x= (a+b) - c;  
y=b*(a - c);  
z= (a<<2) | (c&15);
```
  - b) Compare interrupt driven and DMA (Direct Memory Access) driven data transfer.
  - c) Enlist all the functions of Kernel (Basic unit of OS).  
(6+6+6)
  
3.
  - a) What are the levels of abstraction from top to bottom in the design process of embedded system? What are the challenges faced in designing an embedded system?
  - b) Explain an example of priority inversion problem and deadlock situation during multiprocessing (multitasking) execution.
  - c) Describe the CAN protocol. Which features of it make suitable for an embedded application particularly in automobiles?  
(6+6+6)
  
4.
  - a) Explain internal architecture of USB.
  - b) Explain preemptive scheduling with example.
  - c) What are the various encoding schemes used in IrDA?  
(6+6+6)
  
5.
  - a) Explain architecture of PIC microcontroller.
  - b) What is debugging? Why debugging is required in embedded applications?
  - c) "Bluetooth is the preferable choice for short range data communication", justify the sentence with brief note on Bluetooth.  
(6+6+6)

**6.**

- a) Briefly define following types of memory:  
EPROM, EEPROM, SRAM, DRAM, Flash EEPROM, NVRAM.
- b) What are the advantages of C++ language used in an embedded system?
- c) When does a programming needed in Java? How J2ME (JAVA 2 Micro Edition) is more useful in an embedded programming?

**(6+6+6)**

**7.**

- a) By drawing a general flowchart, explain the components of a digital camera embedded system.
- b) Give basic features of RTOS VxWorks which are essential in sophisticated embedded system.
- c) How does a typical microcontroller differ from a microprocessor? What are the typical architectural blocks present in a microcontroller?

**(7+7+4)**