

FACULTY OF ENGINEERING

B.E. 4/4 (CSE) I – Semester (Old) Examination, November 2013

Subject : Principles and Applications of Embedded Systems

Time : 3 hours

Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. What are the characteristics of embedded system applications? (3)
2. Mention different types of 8051 interrupts. (3)
3. What are the applications of embedded system? (2)
4. Write assembly code for 8051 controller to square the contents of R5 and store the result in R0(high byte) and R1(low byte)? (3)
5. Distinguish between is Pipe and Queue. (3)
6. What is the purpose of a Semaphore? (2)
7. What is a cross compiler? (2)
8. What are in circuit emulators? (2)
9. Distinguish between ARM and SHARC processor. (3)
10. What is meant by scaffold code? (2)

PART – B (5 x 10 = 50 Marks)

- 11.a) Explain in detail the block diagram of Embedded system. (5)
- b) Discuss the applications of Embedded systems. (5)
- 12.a) Explain the design process of Embedded systems. (5)
- b) Give the detailed description of timers and counters of 8051. (5)
- 13.a) Discuss the shared data problems and methods to protect them. (6)
- b) Explain the addressing modes of 8051 with examples. (4)
- 14.a) Explain with examples logical and data transfer (JUMP AND CALL) instructions. (7)
- b) Move bit-4 of RAM location 30h should be bit3 to accumulator. (3)
- 15.a) Explain interfacing of 8051 with keyboard. (5)
- b) What is Re-entrant function? What are the roles of Re-entrant function? (5)
- 16.a) Explain the memory organization in ARM and SHRC processor. (5)
- b) Explain CAN bus protocol in detail and what are its applications. (5)
17. Write short notes on :
 - a) Debugging Techniques (5)
 - b) 12C Bus (5)

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1. List any three differences between Harvard and John Vonn Neuman Architectures. (2)
2. Write the characteristics of an instruction set. (2)
3. Write the steps in 4-cycle Hand-shake Protocol used for Bus organization. (3)
4. Write the H/W Architecture of a typical computing platform. (2)
5. What is priority inversion? Write the uses of it. (3)
6. Why pipes are called as Byte oriented task communication technique? Give one example. (3)
7. Write the parameters of CPU usage metric. Write the relation between them and impact of each. (3)
8. Write the uses of Grid based, distributed embedded systems. (2)
9. What is a cross compiler? Give one example by listing its uses. (3)
10. List the basic techniques for testing and debugging of embedded software. (2)

PART – B (50 Marks)

- 11.(a) Explain the characteristics of an Embedded computing application. (4)
- (b) Explain the TOP-Down and Bottom-up approach of an embedded system design process with example. (6)
12. Explain the advantages of interrupt driven I/O programming over busy – wait – I/O with suitable I/O program. (10)
- 13.(a) what is ISR? Explain various rules of ISR with example. (6)
- (b) Explain various real-time scheduling considerations for saving memory with example. (4)
14. Explain the following algorithm for priority based task scheduling: (10)
 - a) Rate monotonic scheduling (RMS)
 - b) Earliest deadline first (EDF)
 - c) RMS versus EDF.
- 15.(a) Write the goals of embedded S/W testing process. Explain few basic techniques for testing. (5)
- (b) Explain the tool chain process for embedded S/W development. (5)
- 16.(a) Explain various techniques for getting embedded software into target system with example. Suggest the best method for this. (5)
- (b) Explain the process of scheduling and allocation of jobs on a distributed embedded system with example. (5)
17. Write about any two of the following:
 - a) What is shared data problem? Explain the solution for it with example. (5)
 - b) Explain the process of BUS read and write by DMA with timing diagram. (5)
 - c) Write the following procedure call using ARM instructions. (5)


```
Void f2 (int X)
{
    int y;
    y = y+1;
}
Void f1 (int a)
{
    f(a);
}
```