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10CS72

Seventh Semester B.E. Degree Examination, June/July 2018

Embedded Computing Systems

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define design methodology. Explain embedded system design process. **(12 Marks)**

b. List and explain the challenges of embedded computing system design. **(08 Marks)**

2 a. What is cache? How it relates to memory system mechanism? Explain different types of cache mill. **(08 Marks)**

b. Solve the following:

i) What is the average memory access time of machine whose hit rate 93% with cache access time of 5 ns and main memory access time of 80 ns?

ii) Calculate cache hit rate, if the cache access time is 5 ns, average memory access time is 6.5 ns and main memory access time is 80 ns. **(05 Marks)**

c. What is an interrupt? Explain with neat diagram the interrupt mechanism. **(07 Marks)**

3 a. Assume that the bus has 1 MHz bus clock period, width is 2 bytes per transfer, data transfer itself takes 1 clock cycles, address and handshaking signals before data is 2 clock cycles and sending ACK after data is 1 clock cycles:

i) What is the total transfer time in clock to transfer of total 612000 bytes of data?

ii) What is the total burst mode transfer time in clock cycle, if B = 2 byte with 2 byte wide?

iii) Calculate the total real time to transfer data. **(08 Marks)**

b. What is bus? Write the major components of bus protocol. Explain burst read transaction with timing diagram. **(08 Marks)**

c. Explain components of embedded programs. **(04 Marks)**

4 a. Sketch and explain data flow and control data flow (CDFG) graph for programming model. **(10 Marks)**

b. Consider the following 'C' code statement

```
if (a + b > 0)
    X = 5;
else
    X = 7;
```

i) Write CDFG for above C statement.

ii) Generate the ARM Assembly code for the above C statement. **(06 Marks)**

c. Explain briefly types of performance measures on programs. **(04 Marks)**

PART – B

5 a. Define process. With neat diagrams, explain memory organization and state transition of a process. **(10 Marks)**

b. What is multitasking? Explain the types of multitasking. **(04 Marks)**

c. Distinguish between process and thread. **(06 Marks)**

6 a. Define IPC. Explain the IPC mechanism adopted by different operating systems. **(10 Marks)**
b. Explain system architecture of telephone answering machine. **(05 Marks)**
c. Write digital telephone answering machine requirement form. **(05 Marks)**

7 a. Explain Hardware and Software Architectures of distributed system. **(06 Marks)**
b. Explain multihop communication with a neat diagram. **(05 Marks)**
c. Explain IP packet structure and internet service stack with neat diagram. **(09 Marks)**

8 a. Explain various hardware debugging tools used in embedded product development. **(08 Marks)**
b. Explain Monitor program based firmware debugging and In Circuit Emulator (ICE) based firmware debugging. **(12 Marks)**

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