Assignment 12

MCQ:

1. A complete hardware implementation of a system leads to
   A. Fast working of the system.
   B. Increased cost.
   C. Increased power consumption.
   D. All of the above.

Solution: Option D. All of the above.

Explanation: This is the reason a hardware software co-design is preferred as the hardware aspect increases speed and the software aspect reduces cost and power consumption.

2. Which of the following operations help in optimization of the design of a system?
   A. Merging tasks
   B. Splitting tasks
   C. Both A and B
   D. None of the above

Solution: Option C. Both A and B

Explanation: Merging tasks with the same resources help to reduce cost and complexity of code. Splitting tasks having critical sections prone to deadlock, avoid priority inversion and makes the system free from delay.

3. Which facts about splitting tasks are true?
   A. Removes blocking of resources.
   B. Leads to less flexible scheduling
   C. Decreases overall efficiency
   D. All of the above

Solution: Option A. Removes blocking of resources.

Explanation: Splitting tasks increases flexibility of scheduling and possibly makes the system more efficient.

4. A system design can be validated using
   A. Simulation softwares
   B. Petri Nets
   C. State Machines
   D. All of the above

Solution: Option D. All of the above

Explanation: Fact.

5. Match the following:

Language	Storing multidimensional arrays
1. C	a. Column-major order
2. FORTRAN	b. Row-major order
3. Python	c. Table of tables
4. MATLAB	d. List of lists

A. 1-a;2-b;3-c;4-d
B. 1-d;2-b;3-c;4-c
C. 1-b;2-a;3d;4-a
D. None of the above

Solution: Option C. 1-b;2-a;3d;4-a
Explanation: Multidimensional arrays are stored in row or column major form to store the matrix form of data in a linear storage space like RAM. The spatiality locality of reference is exploited by the cache memory which prompts the usage of such techniques.

6. “The looping in DSPs is hardwired.”

A. True
B. False
C. Cannot be determined

Solution: Option A. True
Explanation: DSPs have hardwired looping units in order to reduce the overheads and ensure a fast and smooth computation.

7. Statement 1: “Simulation is very slow.”
Statement 2: “The complex circuits have a huge test bench that requires a lot of test runs making the simulation slow.”

A. Statement 1 is true and Statement 2 is the correct explanation of Statement 1.
B. Statement 1 is true and Statement 2 is not the correct explanation of Statement 1.
C. Both statements are false.

Solution: Option A. Statement 1 is true and Statement 2 is the correct explanation of Statement1.
Explanation: Fact

8. Suppose I build a calculator but the operations, addition and subtraction are swapped by mistake. Which of the following are correct?

A. The device does not pass verification.
B. The device does not pass validation.
C. The device passes verification but not validation.
D. None of the above.

Solution: Option A. The device does not pass verification.
Explanation: Verification checks if the product works according to specifications. Validation checks if the product to be built would complete the task at hand. The calculator performs the calculation hence the device is validated but the output is wrong and therefore the device does not pass verification.

9. Which of the following are parts of a DSP?

A. Address Generating Unit
B. Virtual memory
C. Both A and B
D. None of the above.

Solution: Option A. Address Generating Unit
Explanation: Virtual memory is absent in DSP since it increases the time of context switching and it affects performance.

10. “Two FSMs are equivalent when they take in the same input and for the same input, they produce the same output.”

A. True
B. False
C. Cannot be determined

Solution: Option A. True
Explanation: Fact

Short-Answer type(Alphanumeric answers only):

11. Optimize the following piece of code:
a = 2^k (^ refers to the exponent operator)

Solution: a = 1 << k
Explanation: << is the left shift operator and has a faster execution time than the ^ operator.

12. Optimize the following piece of code:

```
i = 12
if(i>13){
        i = i-1;
}
```

Solution: i = 12

Explanation: The if-block is a piece of dead code, which does not get executed since the value of i = 12 which is less than 13.