Assignment 11

MCQ:

1. Register sharing leads to
   A. Grouping variables with overlapping lifetimes.
   B. Increases connectivity cost.
   C. Both A and B
   D. None of the above

Solution: Option A. Grouping variables with overlapping lifetimes.

Explanation: Register sharing reduces connectivity cost which can be analyzed using a compatibility graph.

2. Which data structure will help to synthesize and minimize a datapath?
   A. Comparability graph
   B. Compatibility graph
   C. Petri nets
   D. None of the above

Solution: Option B. Compatibility graph

Explanation: Fact

3. Suppose I have 4 tasks. Which scheduling algorithm should I use to schedule the tasks so as to reduce the amount of resources used?
   A. ALAP
   B. ASAP
   C. Both use same resources
   D. None of the above

Solution: Option A. ALAP

Explanation: ALAP reduces the cost of resources than ASAP and hence should be used.

4. Which of the following are non-constraint scheduling algorithms?
   A. ASAP
   B. ALAP
   C. Both A and B
   D. None of the above

Solution: Option C. Both A and B

Explanation: Both ASAP and ALAP deal with improving the overall latency of the system and hence do not care about the resource constraint.

5. The ASAP algorithm runs in _____ time.

A. Linear
B. Quadratic
C. Exponential
D. Logarithmic

Solution: Option A. Linear
Explanation: For a system with V nodes and E arcs, the time complexity of ALAP on the system will be O(|V|+|E|).

6. Which of the following algorithms is used to compress an image to jpeg format?

A. DWT
B. FFT
C. DFT
D. None of the above

Solution: Option D. None of the above
Explanation: DCT is used in compression to jpeg.

7. The ratio of quantisation error to resolution bits is

A. 1:2
B. 2:1
C. 3:5
D. None of the above.

Solution: Option A. 1:2
Explanation: Quantisation error = Resolution bits / 2

8. DCT uses about _____ floating-point operations per pixel transformation.

A. 170
B. 200
C. 260
D. 350

Solution: Option C. 260
Explanation: Fact

9. Which of the following can be used to store data temporarily ?

A. Buffer
B. Register
C. Cache
D. RAM

Solution: Option A. Buffer
Explanation: Register is a unit of memory. Cache is a high speed and fast access memory unit in the system. RAM is the main memory unit in a system.

10. Time constraint scheduling is a/an
    A. NP hard problem
    B. NP complete problem
    C. P problem
    D. None of these

Solution: Option A. NP hard problem.

Explanation: When time is made the constraint, the overall latency becomes the basis of scheduling which also leads to minimizing cost in terms of resources. The ILP formulation is exact but not in polynomial-time. Hence it is an NP hard problem.

Short-Answer type(Alphanumeric answers only):

11. For the ILP formulation of a graph with 5 nodes and 3 arcs, find the number of 0-1 variables required.

Solution: 15

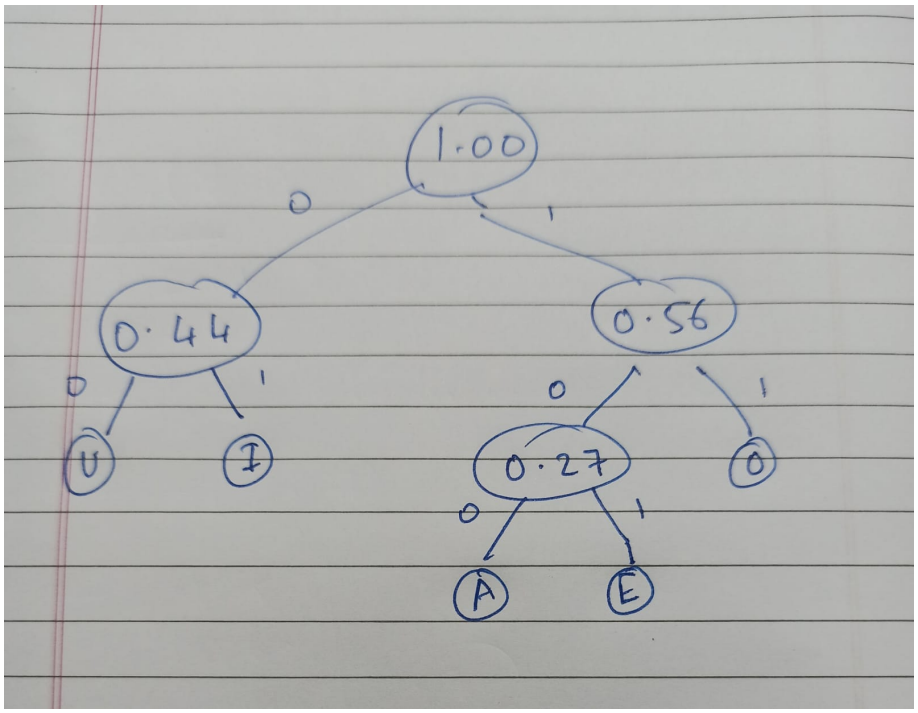
Explanation: For the ILP formulation of a graph with n nodes and v arcs, find the number of 0-1 variables required is n*v = 5*3 = 15.

12. A Huffman Tree is constructed for the following data (A,E,I,O,U) with a frequency of (0.11,0.16,0.25,0.29,0.19). Find the encoding of the word AIUOEA.

Solution: 100010011101100

Explanation:

Huffman tree-



Therefore the individual binary encoding:

Letter	Encoding
A	100
E	101
I	01
O	11
U	00

Therefore, AIUOEA encodes to 100010011101100.