- Attempt to solve only 5 Questions.
- 10 Marks for each Question.
- Write the programs and functions in any programming language.

Q1) Write an expert system program to classify Laptop PC (only 5 types) using Backward chaining.

Q2) Find the weight of Hopfield NN for the following samples.

```
1 0 1 0 1
1 0 1 1 1
1 1 1 0 0
0 0 0 1 1
1 1 0 0 1
```

Then trace the sample “1 0 1 1 0”.

Q3) Write a natural language processing program to parse the following English sentences.

“I have a nice laptop computer but it is not high speed”
“How can I help you in this case?”

Q4) A) Find the certainty value of (C3) in the following tree.

```
  C3
 /   \
0.1   0.2 0.5
 /   /   /
C1 C2 E5  \
/   /   /   \\
E1 E2 E3 E4
0.4 0.4 0.3 0.3
```

Note: all rules are reversible.
B) Write the main steps of Genetic Algorithm to solve traveling salesman problem with simple example.

Q5) A) Write a function to compute the weight of BAM NN.

B) Write the Finite State Automata (FSA) to parse the following sentences.
   "We will go to school by bicycle"
   "Ahmed drive a nice silver car"

Q6) Trace the following Back-Propagation NN (only one iteration).

\[
\begin{align*}
W_1 &= \begin{pmatrix}
0.1 & 0.2 & 0.3 & 0.4 \\
0.1 & 0.2 & 0.3 & 0.4 \\
0.1 & 0.2 & 0.3 & 0.4 \\
0.1 & 0.2 & 0.3 & 0.4 \\
\end{pmatrix}, \\
W_2 &= \begin{pmatrix}
0.1 & 0.2 \\
0.1 & 0.2 \\
0.1 & 0.2 \\
0.1 & 0.2 \\
\end{pmatrix}
\end{align*}
\]

Where learning rate = 0.65, error ratio = 0.1 and the activation function is Sigmoid.

Good luck