

**MSE 426**  
**Heat Treatment of Materials**  
**(2024-2025 Springer)**  
Assignment 4

1- Choose the correct statement

- Ferrite ( $\alpha$ ) phase is a solid solution and it is formed by carbon dissolution in BCC crystal of iron
- Austenite ( $\gamma$ ) phase is a solid solution and it is formed by carbon dissolution in FCC crystal of iron
- Martensite is a kind of super saturated solid solution which has body centered tetragonal crystal structure
- Pearlite and bainite are the phase mixtures containing ferrite and cementite phases
- all of them

2- Choose the odd one out

- First step in heat treatment of steel is austenitization ( $\gamma_{tn}$ )
- Annealing is the heat treatment in which the steel is slowly cooled after austenitization
- Normalizing is the heat treatment in which the steel is cooled in air
- Correct austenitization temperature is the temperature at which first austenite forms
- Quenching can be done by dropping of steel in water or oil after austenitization

3- Which one of the followings is true about mechanical properties of phases seen in steels

- ferrite is soft and ductile
- austenite has high toughness
- both martensite and cementite phases are hard and brittle
- hardness of an annealed steel changes with the relative amounts of ferrite and cementite phases
- none of them

4- Which one of the following heat treatment would you prefer to get highest hardness from a eutectoid steel?

- Austenitization at 780°C followed by water quenching
- Austenitization at 728°C followed by air cooling
- Austenitization at 780°C followed by annealing
- Austenitization at 780°C followed by water quenching and then heating at 250°C for 2h
- Do nothing

5- In eutectoid reaction, austenite transforms into ferrite and cementite..... **T F**

6- In hypoeutectoid steels, carbon content is higher than 0.76 wt.% carbon..... **T F**