

MSE 426
Heat Treatment of Materials
(2024-2025 FALL)
 Assignment 3

- 1- Choose the correct statement about pure iron
 - ☐ It is a soft and ductile material
 - ☐ Its crystal structure at room temperature is BCC and the crystal structure changes with temperature
 - ☐ Small additions of C, Mn, Mo, Cr, etc. enhance the mechanical properties
 - ☐ Melting point is 1535°C
 - ☐ all of them

- 2- Choose the odd one out of the followings
 - ☐ Heat treatment of steels includes austenitization followed by cooling at different cooling rates
 - ☐ To predict the microstructure, phase diagrams are used if the steel is cooled in equilibrium conditions (slowly)
 - ☐ To predict the microstructure, TTT are used if the steel is cooled in non-equilibrium conditions (relatively faster)
 - ☐ By heat treatment, type and amount of phases don't change
 - ☐ α (ferrite), Fe₃C(cementite), γ (austenite), martensite, bainite phases are some of the phases that can be formed as a result of heat treatment in steels

- 3- Which one of the followings is not true about equilibrium phase diagrams
 - ☐ For one component system like water, it tells us the stable phases at different temperatures and pressures
 - ☐ For two component system like iron-carbon, it tells us the stable phase at different temperatures and composition at constant pressure.
 - ☐ Type and relative amounts of phases formed under equilibrium conditions can be calculated using phase diagrams
 - ☐ Type of phases can be predicted after fast cooling from high temperatures
 - ☐ Melting point of substances or elements can be predicted from phase diagram

- 4- Choose the odd one out
 - ☐ Low carbon steels contain less than 0.3 wt.% carbon
 - ☐ High carbon steels are the hardest, but least ductile group of steel and can be used in tool and die steels
 - ☐ High carbon steels contain about 2.2 wt.% carbon
 - ☐ Carbon content of the medium carbon steel changes between 0.3 and 0.6 wt.% C.
 - ☐ For automobile body components, low carbon steel is preferred

- 5- Carbon can dissolve in pure iron crystal structure and can form solid solution of α (ferrite) phase at room temperature **T** **F**

- 6- Maximum solubility of carbon in ferrite occurs at°C and its amount is.....wt.% C, while in austenite maximum solubility of carbon iswt.% and occurs at.....°C.