

MATERIAL SCIENCE & ENGINEERING**OBJECTIVE QUESTIONS***A Focused Approach ▶▶▶*

25. A steel has tensile strength of 1.6 GPa. A large tensile piece of such a steel has crack of length 7 mm in the interior and fracture at 0.6 GPa. Calculate its fracture toughness.

Answers

1. *117.9 GPa*
2. *From the given lattice parameters (a) the corresponding radii for iron and chromium are 0.124 nm. and 0.125 nm which are nearly same so can easily form the crystal bonding. Stainless steel contains about upto 11% chromium.*
3. *The term isomorphous system is related to phase diagram, isomorphicity means having same crystal structure or complete solubility for all compositions. The copper nickel system is example of isomorphous system.*
4. *The melting point of copper is 1085°C. While the temperature at which it is drawn is 750°C which is 305°C less than melting point. As for hot working the working temperature should be about 50°C less than melting point, so working temperature (750°C) much more less (about 250°C) as required for hot working, so copper wire has been drawn by cold working.*
6. (a) *Remanence: (remnant induction Br) For a ferromagnetic or ferrimagnetic material, the magnitude of residual flux density that remains when magnetic field is removed is called remanence.*
 (b) *Coercivity: In materials science, the coercivity. also called the coercive field or coercive force, of a ferromagnetic material is the intensity of the applied magnetic field required to reduce the magnetization of that material to zero after the magnetization of the sample has been driven to saturation. Thus coercivity measures the resistance of a ferromagnetic material to becoming demagnetized.*
10. *TD nickel: TD Nickel is a recently developed alloy containing 2 volume percent thoria and the balance nickel (Ni-2ThO₂).*
The Thoria-dispersed nickel alloys (TD Nickel) contain thorium oxide additions (~2wt%) for increased elevated temperature strength upto 1200°C
The high temperature strength nickel alloys may be enhanced significantly by the addition of 3 volume % of Thoria (ThO₂) as finely dispersed particles. This material is known as thoria-dispersed (or TD) nickel.
11. *45°*
12. *6.467 GPa*
13. *Stress corrosion cracking (SCC) is the growth of crack formation in a corrosive environment. It can lead to unexpected sudden failure of normally ductile metals subjected to a tensile stress, especially at elevated temperature in the case of metals. SCC is highly chemically specific in that certain alloys are likely to undergo SCC only when exposed to a small number of chemical environments. The chemical*