1) Shot peening, ultrasonic peening or laser shock peening – all these processes employ the common strengthening mechanism of:

- a. Martensitic transformation
- b. Pearlitic transformation
- c. Work hardening
- d. Age hardening

No, the answer is incorrect.
Score: 0
Accepted Answers:
c. Work hardening

2) Residual state of stress after shot peening, ultrasonic peening or laser shock peening usually is:

- a. Tensile
- b. Compressive
- c. Neutral
- d. Torsional

No, the answer is incorrect.
Score: 0
Accepted Answers:
b. Compressive

3) The following property is likely to improve after laser shock peening:

- a. Ductility
- b. Toughness

No, the answer is incorrect.
Score: 0
Accepted Answers:
4) Ultrasonic peening may improve surface hardness of:
   a. All metallic alloys
   b. Only steel and ferrous alloys
   c. Only non-ferrous alloys
   d. Only superalloys

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   a. All metallic alloys

5) Buffing, cleaning, polishing and grinding differ from each other in terms of:
   a. Depth of surface hardening
   b. Level of surface reflectivity/luster
   c. Amount of abrasives used
   d. Degree of material removal

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   d. Degree of material removal

6) Degree of hardness and residual stress created is most effective or the maximum after
   identical duration of:
   a. Laser shock peening
   b. Ultrasonic peening
   c. Shot peening
   d. Skin pass rolling

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   a. Laser shock peening

7) The principal reason for improving hardness and residual stress in any peening process is
   the increase in the density of the following type of defect:
   a. Point defects
   b. Line defects
   c. Surface defects
   d. Volume defects

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   b. Line defects

8) Diameter of steel shots used for shot peening is typically:
   a. 0.005 mm
   b. 0.05 mm
   c. 0.5 mm
   d. 5.0 mm
9) Identify the group employing the same mechanism of surface hardening:
   - a. Skin pass rolling, ultrasonic peening, flame hardening
   - b. Induction hardening, hammer peening, needle peening
   - c. Ultrasonic peening, flame hardening, induction hardening
   - d. Shot peening, needle peening, hammer peening

No, the answer is incorrect.
Score: 0
Accepted Answers:
c. 0.5 mm

10) Suggest a possible technique from the following which is useful for improving endurance limit of a small and sophisticated gear for wrist watch:
   - a. Laser shock peening
   - b. Hammer peening
   - c. Needle peening
   - d. Skin pass deformation

No, the answer is incorrect.
Score: 0
Accepted Answers:
a. Laser shock peening

11) Induction hardening is considered more precise than flame hardening because:
   - a. Hardness is more
   - b. Residual stress produced is more
   - c. Temperature of heating is more
   - d. Depth of heating is inversely related to frequency

No, the answer is incorrect.
Score: 0
Accepted Answers:
d. Depth of heating is inversely related to frequency

12) Induction hardening is not applicable to maraging steel because:
   - a. It does not undergo precipitation hardening
   - b. It does not contain alloying elements
   - c. It does not respond to electromagnetic induction
   - d. It does not contain carbon

No, the answer is incorrect.
Score: 0
Accepted Answers:
d. It does not contain carbon

13) Aluminum alloys are not amenable to flame hardening like steel because they:
   - a. Do not undergo shear transformation on cooling

No, the answer is incorrect.
14) Mention which of the following may harden the surface of steel without changing composition?

- a. Carburizing
- b. Carbonitriding
- c. Induction hardening
- d. Calorizing

No, the answer is incorrect.

Score: 0

Accepted Answers:
- c. Induction hardening

15) Surface melting (confined to the near surface region) may increase strength and wear resistance by:

- a. Increasing dislocation density
- b. Grain refinement
- c. Diffusive transformation
- d. Non-diffusive transformation

No, the answer is incorrect.

Score: 0

Accepted Answers:
- b. Grain refinement

16) Carburizing is done above $A_C^3$ temperature because:

- a. Diffusion is faster
- b. Reaction is safer
- c. Solubility is higher
- d. Transformation kinetics are faster

No, the answer is incorrect.

Score: 0

Accepted Answers:
- c. Solubility is higher

17) Carburizing is ideal for plain carbon steels with:

- a. 0.1 – 0.2 wt. % carbon
- b. 0.3 – 0.6 wt. % carbon
- c. 0.4 – 0.8 wt. % carbon
- d. > 0.8 wt. %

No, the answer is incorrect.

Score: 0
18. Carbon content of a steel axle subjected to induction hardening will typically be:

- 0.1 – 0.2 wt. % carbon
- 0.2 – 0.3 wt. % carbon
- 0.3 – 0.4 wt. % carbon
- > 0.4 wt. %

No, the answer is incorrect.
Score: 0

Accepted Answers:
- d. > 0.4 wt. %

19. Hardening associated with pack carburizing:

- Requires a separate heat treatment
- Requires no separate heat treatment
- Requires air cooling after carburizing
- Requires water slow cooling after carburizing

No, the answer is incorrect.
Score: 0

Accepted Answers:
- a. Requires a separate heat treatment

20. Hardening of carburized layer is due to:

- Pearlite
- Bainite
- Martensite
- Cementite

No, the answer is incorrect.
Score: 0

Accepted Answers:
- c. Martensite

21. Tempering of carburized and hardened steel is required for:

- Additional hardening
- Precipitation hardening
- Restore dimensional accuracy
- Restore machinability

No, the answer is incorrect.
Score: 0

Accepted Answers:
- d. Restore machinability

22. Identify the factor which does not affect induction hardening:

- Composition of steel
- Diameter of the component
- Frequency of induction
- Carbon content of steel

Score: 0

Accepted Answers:
- b. Diameter of the component
State of residual stress after carburizing and hardening is:

- a. Compressive at the surface but tensile in the core
- b. Tensile at the surface but compressive at the core
- c. Compressive throughout the component
- d. Tensile throughout the component

No, the answer is incorrect.
Score: 0
Accepted Answers:

Identify the component not suitable for shot peening

- a. Crank shaft
- b. Gear wheel
- c. Turbine blade
- d. Cold roll

No, the answer is incorrect.
Score: 0
Accepted Answers:

c. Turbine blade

Surface temperature rises in electrolytic surface hardening due to:

- a. Induction heating
- b. Hydrogen film formation pulses
- c. Resistance heating
- d. Joule heating

No, the answer is incorrect.
Score: 0
Accepted Answers:

b. Hydrogen film formation pulses