1. What is the primary function of a helical compression spring?
a) To store and release mechanical energy
b) To provide tension in a mechanical system
c) To transmit rotational motion
d) To dampen vibrations

Answer: a) To store and release mechanical energy
Explanation: Helical compression springs are designed to store mechanical energy when compressed and release it when the compression force is removed, making them ideal for applications where shock absorption or energy storage is required.

2. Which of the following factors should be considered in the design of helical tension springs?
a) Diameter of the spring
b) Number of coils
c) Material strength
d) All of the above

Answer: d) All of the above
Explanation: The design of helical tension springs requires consideration of factors such as the diameter of the spring, the number of coils, and the material strength to ensure the spring can withstand the intended tension forces.

3. Leaf springs are commonly used in which type of mechanical systems?
a) Suspension systems
b) Clock mechanisms
c) Hydraulic systems

d) Electrical circuits

Answer: a) Suspension systems
Explanation: Leaf springs are commonly used in suspension systems of vehicles to provide support and absorb shocks from the road surface.

4. What type of loading is typically experienced by torsion springs?
a) Axial loading
b) Tension loading
c) Torsional loading
d) Bending loading

Answer: c) Torsional loading
Explanation: Torsion springs are designed to withstand torsional (twisting) loading, where the applied force causes the spring to twist about its axis.

5. Surge in a spring refers to:
a) Sudden increase in load
b) Sudden decrease in load
c) Oscillation in load over time
d) Creep deformation under constant load

Answer: c) Oscillation in load over time
Explanation: Surge in a spring refers to the phenomenon of load oscillating over time due to various factors such as external vibrations or changes in operating conditions.

6. Which of the following is NOT a special type of spring?
a) Constant force spring

b) Belleville washer
c) Coil spring
d) Wave spring

Answer: c) Coil spring
Explanation: Coil springs are a common type of spring and not considered a special type. Constant force springs, Belleville washers, and wave springs are examples of special springs with unique characteristics for specific applications.

7. In the design of a power screw, what is the function of the power nut?
a) To provide rotational motion
b) To convert rotary motion into linear motion
c) To lock the screw in place
d) To reduce friction between the screw and the load

Answer: b) To convert rotary motion into linear motion
Explanation: The power nut in a power screw assembly is designed to translate the rotary motion of the screw into linear motion, allowing it to move along the length of the screw shaft.

8. What distinguishes a compound screw from a simple screw?
a) Number of threads
b) Pitch of the threads
c) Diameter of the screw
d) Presence of multiple starts or leads

Answer: d) Presence of multiple starts or leads

Explanation: A compound screw has multiple starts or leads, meaning there are multiple threads wrapped around the screw shaft, allowing for faster linear motion compared to a simple screw.

9. What is the primary purpose of a screw jack?
a) To lift heavy loads vertically
b) To provide rotational motion
c) To secure objects in place
d) To transmit power between shafts

Answer: a) To lift heavy loads vertically
Explanation: Screw jacks are commonly used to lift heavy loads vertically by converting rotary motion into linear motion through the rotation of a screw shaft.

10. What type of loading should be considered in the design of a power screw to prevent failure due to fatigue?
a) Tensile loading
b) Compressive loading
c) Shear loading
d) Repeated cyclic loading

Answer: d) Repeated cyclic loading
Explanation: Fatigue failure in power screws can occur due to repeated cyclic loading, where the screw experiences alternating stresses over time, leading to eventual failure if not properly designed to withstand such loading conditions.

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