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Q715 - Motor Plants

1. At a given pressure, erosion of steam piping and machinery will be minimized by utilizing _____.

- wet steam
- **superheated steam**
- saturated steam
- desuperheated vapor

Note:

Superheated steam minimizes erosion because it lacks liquid droplets, preventing the sandblasting effect caused by wet or saturated steam.

2. The greatest resistance to heat transfer from the fireside to the waterside of a water-tube boiler takes place in the _____.

- soot buildup directly on the tube exterior
- **gas film layer surrounding the tube**
- moving water and steam inside the tube
- steel tube wall itself

Note:

The greatest resistance to heat transfer in a water-tube boiler occurs within the gas film layer surrounding the tube, due to its significantly lower heat-transfer coefficient compared to the tube wall, water, and steam.

3. The bore of a diesel engine cylinder describes the _____.

- swept volume of the cylinder
- **inside diameter of the cylinder**
- piston displacement in the cylinder
- length of the piston stroke

Note:

The bore of a diesel engine cylinder is defined as its inside diameter. This measurement, representing the cylinder's internal diameter, distinguishes it from stroke, swept volume, and piston displacement, which are related but distinct concepts.

4. The cubic inch (or liter) displacement of a cylinder is determined by the diameter of the piston and the _____.

- length of the crankshaft
- volume of the clearance space
- weight of the piston
- **length of the stroke**

Note:

Cylinder displacement is calculated using the piston's diameter and the length of the stroke; it represents the volume displaced as the piston moves from top dead center to bottom dead center.

5. Opposed-piston diesel engines are classified as _____.

- two-stroke cycle single acting
- two-stroke cycle double acting
- four-stroke cycle single acting
- four-stroke cycle double acting

Note:

Opposed-piston diesel engines are classified as two-stroke, single-acting due to their design: two pistons per cylinder with combustion pressure acting on one face of each piston, and a cycle completed in two strokes using port-controlled scavenging rather than valves.

6. The ratio of the brake horsepower to the indicated horsepower of a diesel engine is its _____.

- thermal efficiency
- mechanical efficiency
- brake thermal efficiency
- volumetric efficiency

Note:

Mechanical efficiency is defined as the ratio of brake horsepower to indicated horsepower.

7. The most important factor in engine performance is the actual power output at the end of the crankshaft available for doing work. This is known as _____.

- indicated horsepower
- brake horsepower
- net horsepower
- friction horsepower

Note:

Brake horsepower is the correct answer; it represents the usable power measured at the crankshaft and available for external work, accounting for internal mechanical losses. Indicated horsepower is theoretical power, friction horsepower represents power losses, and 'net horsepower' is an imprecise term not referring to crankshaft output.

8. The average pressure exerted on a piston during each power stroke is termed _____.

- indicated horsepower
- mean effective pressure
- exhaust back pressure
- compression pressure

Note:

Mean effective pressure is the average pressure acting on the piston during the power stroke, derived from the indicator diagram. It represents a hypothetical constant pressure that would produce the same work as the actual varying pressure during that stroke. This distinguishes it from indicated horsepower, which is a measure of power, and compression and exhaust pressures, which occur during other phases of the engine cycle.

9. In a diesel engine, after ignition of the fuel occurs, but before the piston reaches TDC, there is little change in the cylinder _____.

- temperature
- volume
- energy
- pressure

Note:

The piston's movement is minimal between ignition and TDC, resulting in a negligible change in cylinder volume. Pressure, temperature, and energy all increase rapidly during this period.

10. A diesel engine operating at a light load, when compared to operating at heavy load has an air/fuel ratio that is _____.

- higher
- lower
- equal
- directly proportional

Note:

At light load, a diesel engine consumes less fuel with a nearly constant amount of air, resulting in a higher air/fuel ratio compared to operation at heavy load.
