Engineering Answers

1. *Note: Synchronous motors are utilized in applications in which constant speed is essential, or where the power factor of a system must be maintained at a high level. Large machines that are in continuous service for long periods of time operate more efficiently when driven by synchronous motors.*

A. reduce eddy current losses — Incorrect answer. To reduce eddy current losses, the core of the synchronous motor stator is built up from many thin steel sheets that are insulated from each other with a coating of varnish.

B. produce a higher power factor — Incorrect answer. To adjust the power factor of a synchronous motor, a DC exciter varies the amount of current to the rotor field windings. Low values of field current result in less hold-in strength and a lagging (lower) power factor. Conversely, high values of field current result in greater hold-in strength and a leading (higher) power factor.

C. provide a means for starting — Correct answer. The amortisseur winding is a squirrel-cage winding consisting of copper bars embedded in the rotor pole faces, and is used to start and accelerate the synchronous motor to near synchronous speed.

D. eliminate arcing between the stator and the rotor — Incorrect answer. Any arcing would occur at the DC exciter circuit breaker when opened. To prevent this, a "field-discharge resistor" converts the energy stored in the magnetic field of the rotor to heat energy that is harmlessly dissipated to the atmosphere.

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2. A. manually operated ball check valve — Incorrect answer. 46 CFR 56.50-85(a)(7)(i) states: "A ball check valve where the ball float, normally in the open position, will float up and close under the action of a submerging wave." A ball float check valve that will float up and close under the action of a submerging wave is an automatically operated valve.

B. automatically operated hinged closure — Correct answer. 46 CFR 56.50-85(a)(7)(ii) states: "A hinged closure normally open on the outlet of the return bend, which must close automatically by the force of a submerging wave …"

C. permanently installed canvas hood — Incorrect answer. A permanently installed canvas hood over the vent would prevent proper venting of the ballast and/or fuel oil tank under normal operating conditions.

D. corrosion-resistant wire screen — Incorrect answer. A corrosion-resistant wire screen is a permeable material, and would not prevent the entrance of water into the ballast and/or fuel oil tank from a submerging wave or other source.

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3. *Note: Boiler blowdown is the removal of water from a boiler to control boiler water parameters within prescribed limits to minimize scale, corrosion, and carryover.*

A. regulate the density or salinity of boiler water — Correct answer. A continuous blow, as the term implies, is the continuous removal of water from the boiler via a tapped connection close to the boiler water surface. A continuous blow allows for the regulation of the salinity of the boiler with minimal loss of water and heat from the boiler.

B. remove scum from the surface of boiler water — Incorrect answer. A surface blow is used to remove scum and light solids from the surface of the boiler water via a tapped connection at the boiler water surface.

C. permit air to escape while raising steam in a cold boiler — Incorrect answer. Venting of the boiler through the "aircock" permits the escape of air from a cold boiler when raising steam. The "aircock" is a high-pressure globe valve installed at the highest point of the steam drum.

D. remove sludge from the bottom of the water drum — Incorrect answer. A bottom blow is used to remove heavy solids and sludge via a tapped connection at the bottom of the water (mud) drum.

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4. A. centrifugal purifier system — Incorrect answer. The centrifugal purifier filtering system is a "sump"-type filtering system. The purifier is supplied lubricating oil from the engine sump, purifies same, and then discharges the clean oil back to the engine sump.

B. bypass system — Incorrect answer. In a "bypass"-type filtering system, a portion of the oil discharged by the lube oil supply pump is continuously passed through filter(s) and then discharged back into the sump. To ensure that sufficient oil is supplied to the engine bearings, the amount of oil passed through the filter(s) is limited through the use of a flow-restricting orifice.

C. shunt system — Correct answer. In a shunt-type filtering system, oil taken from the engine sump by the lube oil supply pump is discharged first into a strainer, then through a filter and cooler, and finally to the high-pressure discharge (supply) manifold. To ensure that an adequate flow of oil will be delivered to the engine at all times, the filter and strainer are fitted with pressure relief valves.

D. batch system — Incorrect answer. The "batch" system of filtering lubricating oil is a reclamation process performed periodically. When the engine oil has become too contaminated, it is drained and the system refilled with fresh oil. After the drained oil has been permitted to settle, any water or contaminants are removed through filtering and/or centrifuging. After the reclamation process is complete, the oil is stored for reuse.