Modified Engine Exam Questions
as of August 15, 2008

Original Question: 223059-1

Pressure in the control tubing of a thermostatic expansion valve depends upon a direct relationship with the _____.

A. temperature in the box

B. amount of superheat at the outlet of the evaporator

C. compressor suction pressure

D. heat transferred from the saturated liquid in the evaporator

Correct Answer: B

Replacement Question: 223059-2

In a refrigeration system, the pressure in the control tubing of a thermostatic expansion valve depends upon the _____.

Note: The metering of refrigerant to the refrigerated space in a refrigeration system is controlled by the coil thermostatic expansion valve, or TXV. The TXV is essentially a pressure reducing valve that is designed to proportion the rate at which the refrigerant enters the evaporator coil to the rate of evaporation of the liquid refrigerant in the coil. A thermal sensing bulb connected to the TXV via control tubing, is clamped to the evaporator coil outlet, and regulates the amount of refrigerant entering the evaporator coil in relation to load. To ensure that no liquid refrigerant returns to the suction of the compressor, the TXV is set to maintain the temperature of the refrigerant leaving the evaporator coil 7 to 10 ° F above the saturation temperature (superheated).

A. temperature in the box

Incorrect Answer: The temperature and pressure of the refrigerant in the evaporator coil is dependent on the temperature in the box, or refrigerated space.

B. temperature of the evaporator coil outlet

Correct Answer: The pressure in the control tubing of a TXV is dependent on the temperature of the evaporator coil outlet. If the temperature of the refrigerant gas leaving the evaporator coil increases, the temperature of the attached thermal bulb increases, which results in an increase in pressure of the gas charge contained within the bulb assembly. The pressure signal is transmitted to the TXV via the control tubing, and the amount of refrigerant admitted to the evaporator coil is increased.

Conversely, if the evaporator coil temperature decreases, the temperature of the attached thermal bulb decreases, which results in a decrease in pressure of the bulb gas charge, and the amount of refrigerant, admitted to the evaporator coil is decreased.

C. compressor suction pressure

Incorrect Answer: Evaporator coil temperature determines the control tubing pressure.

D. heat transferred from the saturated liquid in the evaporator

Incorrect Answer: The pressure in the control tubing of a TXV is dependent on the temperature of the superheated gas at the evaporator outlet.

Original Question: 211650-1

The best hacksaw blade to use for cutting brass is the _____.

A. flexible blade

B. all-hard blade

C. all-soft blade

D. hollow core blade

Correct Answer: B

Replacement Question: 211650-2

The best hacksaw blade to use for cutting brass is the _____.

Note: A flexible hacksaw blade is one in which only the teeth of the blade are hardened, whereas the all-hard hacksaw blade is hardened throughout. The blades generally have a pitch of 14 to 32 teeth per inch. Course blades with fewer teeth per inch cut faster and are less liable to clog up with chips. Finer blades with more teeth per inch are utilized to cut thin material.

A. flexible blade-32 teeth pitch

   Incorrect Answer: A flexible blade with a pitch of 32 teeth per inch would be used to cut thin wall tubing and sheet metal.

B. all-hard blade-18 teeth pitch

   Correct Answer: An all-hard blade with a pitch of 18 teeth per inch would be used to cut solid stock of brass, tool steel, cast iron, and aluminum.

C. all-soft blade-24 teeth pitch

   Incorrect Answer: An all-soft-24 teeth pitch hacksaw blade does not exist.

D. hollow core blade-32 teeth pitch

   Incorrect Answer: A hollow core-32 teeth pitch hacksaw blade does not exist.

Original Question: 218137-1

The size of flexible hose used in a hydraulic system is indicated by _____.

Note: The inside diameter of a hydraulic hose is the numerical designation indicated on the skin of the hose. Both "A" and "B" can be considered correct.

A. the inside diameter of the tube

B. the numerical designation found on the 'skin' of the hose

C. a color code on the armor

D. the thickness of the tube wall

Correct Answer: B

Replacement Question: 218137-2

The size of flexible hose used in a hydraulic system is indicated by _____.

A. the outside diameter of the hose

   Incorrect Answer: The size of a flexible hose is identified by the number stamped on the "skin" of the hose, which is the inside diameter of the hose.

B. the numerical designation found on the 'skin' of the hose

   Correct Answer: The size of flexible hydraulic hose is indicated by a number which refers to the equivalent tubing size. Generally, the hose size, year of manufacture, and manufacturer's symbol are all stenciled on the outside (skin) of the hose.

C. a color code on the armor

   Incorrect Answer: A color code is not utilized to indicate the size of a flexible hose.

D. the thickness of the tube wall

   Incorrect Answer: The thickness of the tube wall is an indication of the pressure rating of the hose, and not the size of the hose. The thicker the tube wall thickness, the higher the pressure rating of the hose.

Original Question: 261217-1

In what type of turbine is the moving blade and the intervening fixed rows of blading shaped so as to form convergent-divergent nozzles?

A. Impulse

B. Reaction

C. Impulse-reaction

D. Curtiss

Correct Answer: B

Replacement Question: 261217-2

In what classification of steam turbines are the moving blades and the adjacent fixed rows of blades shaped to act as nozzles?

Note: Turbines are classified according to the method of steam expansion, direction of steam flow, and the manner of staging and compounding. Impulse and reaction are the terms used to describe the two basic methods of steam expansion through a turbine.

A. Impulse

Incorrect Answer: In a simple impulse turbine, a stage consists of one set of nozzles and a succeeding row of moving blades. The steam expands through the fixed nozzles, which results in a decrease in pressure, and increase in velocity. The steam then impinges against the moving blades resulting in rotor rotation. No expansion takes place as the steam flows through the moving blades.

B. Radial flow

Incorrect Answer: Radial flow is the term used to describe the direction of steam flow through a turbine. In a radial flow turbine, steam flows outward from the rotor shaft to the casing.

C. Reaction

Correct Answer: In a reaction turbine, one row of fixed blades and its succeeding row of moving blades constitute one stage. The steam expands as it passes through

both the fixed and moving blades, i.e. both the fixed and moving blades act as nozzles.

D. Helical flow

Incorrect Answer: Helical flow is the term used to describe the direction of steam flow through a turbine. In a helical flow turbine, steam enters at a tangent to the periphery of the rotor and impinges upon the moving blades. The blades are shaped in such a way that the direction of steam flow is reversed in each blade.

Original Question: 254213-1

Serious tube leaks in the air ejector condenser assembly will cause _____

A. clogged steam strainers

B. fouled nozzles

C. loss of vacuum

D. faulty steam pressure

Correct Answer: C

Replacement Question: 254213-2

Serious tube leaks in the air ejector after condenser assembly may cause _____

A. clogged steam strainers

   Incorrect Answer: tube leaks occurring in the after condenser will have no effect on the steam strainers of the steam line to the air ejector nozzles

B. fouled nozzles

   Incorrect Answer: fouled nozzles would be caused by defective steam line strainers in the steam line to the nozzles.

C. an overflow of the contaminated drain inspection tank

   Incorrect Answer: the steam condensed from the first stage air ejector nozzle in the inter condenser is directed to the main condenser and the condensed steam from the second stage nozzle in the after condenser is directed to the ADT. None of the air ejector drains are directed to the contaminated drain tank.

D. an overflow of the atmospheric drain tank

   Correct Answer: the after condenser normally condenses steam from the second stage nozzle and directs the condensate by gravity to the Atmospheric Drain Tank. A serious after condenser tube leak in this area may cause the ADT to overflow due to the increase in flow to the ADT as well as cause possibly flooding in the after condenser resulting in steam discharging from the vent due to the decreased cooling surface area in the after condenser.

Original Question: 217060-1

Propeller pumps are used primarily where there is a need to move a large volume of liquid. However, their use is limited by a maximum total head of _____.

A. 10 to 20 ft

B. 20 to 40 ft

C. 40 to 60 ft

D. 60 to 80 ft

Correct Answer: C

Replacement Question: 217060-2

Which type of pump would normally be used to transfer fairly large quantities of fluids at relatively low pressures?

A. propeller type

   Correct Answer: Propeller pumps are used primarily where there is a large volume of liquid with a relatively low total head requirement. The pump is usually limited to use where the total head does not exceed 40 to 60 feet. Though similar in construction to a centrifugal pump, the propeller pump pushes the liquid axially along the shaft, and does not have a volute like centrifugal pumps. The main circulating pump is an example of a propeller pump.

B. reciprocating type

   Incorrect Answer: Reciprocating type pumps moves liquids by means of a plunger or piston that reciprocates inside a cylinder. Reciprocating pumps are positive-displacement pumps, i.e. each stroke displaces a definite quantity of liquid, regardless of the resistance against which the pump is operating. Reciprocating pumps are capable of developing very high discharge pressures, and may be used to pump bilges, transfer fuel oil, and as an emergency or auxiliary feed pump.

C. gear type

   Incorrect Answer: The gear pump is a type of rotary pump. Rotary pumps, like reciprocating pumps, operate on the positive displacement principle, and deliver a definite quantity of liquid for each revolution. Gear pumps are primarily used to

pump non-viscous liquids and light oil at high speeds, and heavy, viscous liquids at low speeds.

D. screw type

Incorrect Answer: The screw pump is another type of rotary pump, and operates on the positive displacement principle. Screw pumps are primarily used for pumping viscous fluids.

Original Question: 297110-1

The volatility of a liquid is the tendency of a liquid to _____ .

A. ignite

B. explode

C. asphyxiate

D. vaporize

Correct Answer: D

Replacement Question: 297110-2

The volatility of a liquid is the tendency of a liquid to _____ .

A. percolate

   Incorrect Answer: In chemistry, percolation refers to the movement and filtering of fluids through porous materials.

B. explode

   Incorrect Answer: The tendency of a flammable liquid to explode is a function of the liquid's explosive or flammable range. Vapors from a flammable liquid when combined with sufficient oxygen in the air, can explode, provided a spark or source of ignition is present.

C. asphyxiate

   Incorrect Answer: Toxicity is the term generally applied to describe the tendency of a liquid to asphyxiate, the condition arising when the blood is deprived of oxygen which results in unconsciousness and/or death. The threshold limit value and time weighted average (TLV-TWA) is used to express the toxicity of vapors from a substance, and is expressed in parts per million (ppm) by volume of vapor in air.

D. vaporize

   Correct Answer: Volatility is the term used to describe the tendency of a liquid to vaporize, or evaporate. Once ignition has occurred, while the substance is on fire, the vapor given off by the substance burns, not the substance itself. In regards to a flammable liquid the volatility is measured substance under controlled laboratory conditions, and is expressed as Reid Vapor Pressure (RVP). The higher the RVP, the

more volatile the liquid, rapidly releasing a high percentage of the original amount of liquid as a vapor.

Original Question: 284808-2

Coast Guard Regulations (46 CFR) require that oil fired automatic steam boilers, and hot water boilers shall be equipped with a prepurge programming control that will assure at least _____.

A. 2 air changes

B. 3 air changes

C. 4 air changes

D. 5 air changes

Correct Answer: C

Replacement Question: 284808-3

Coast Guard Regulations (46 CFR) require that small automatic auxiliary boilers shall be equipped with a prepurge programming control that will assure at least _____.

A. 2 air changes

   Incorrect Answer: Choice "C" is the only correct answer.

B. 3 air changes

   Incorrect Answer: Choice "C" is the only correct answer.

C. 4 air changes

   Correct Answer: 46 CFR 63.25-1(b) states that small auxiliary boilers require "A prepurge period of a sufficient duration to ensure at least four changes in air in the combustion chamber and stack, but not less than 15 seconds. Ignition must occur only before or simultaneously with the opening of the fuel oil valve."

D. 5 air changes

   Incorrect Answer: Choice "C" is the only correct answer.

Original Question: 210858-1

Illustration: GS-0006

In the illustration, line "K" is a _____.

A. dimension line

B. leader line

C. cutting plane line

D. phantom line

Answer: D

Replacement Question: 210858-2

Illustration: GS-0006

In the illustration, line "D" is a _____.

A. center line

Incorrect Answer: The center line is "E" in the illustration. Center lines are used to indicate axis of symmetrical parts, circles, and paths of motion.

B. hidden line

Correct Answer: The hidden line is "D" in the illustration. Hidden lines are used to show features of the object not visible to the human eye.

C. cutting plane line

Incorrect Answer: The cutting plane line is "J" in the illustration. A cutting plane line is used to indicate where the imaginary cutting took place for a sectional view (SECTION-AA). The ends of cutting plane lines are bent at 90 degrees, and the arrowheads point in the direction of site necessary for viewing the section.

D. dimension line

Incorrect Answer: The dimension line is "C" in the illustration. Dimension lines are used to indicate the size and direction of dimensions and are terminated with arrowheads.

Original Question: 291051-2

When entering a burning compartment equipped with a fire hose and an all-purpose nozzle, you should first direct _____.

A. a straight stream into the center of the space

B. the high velocity fog into the center of the space

C. the high velocity fog at the overhead to absorb heat

D. the high velocity fog at the deck to cool it for entry

Answer: C

Replacement Question: 291051-4

When entering a burning compartment equipped with a fire hose and an all-purpose nozzle, you should first direct _____.

A. a straight stream aimed at the flames of the fire

   Incorrect Answer: A straight stream aimed at the flames of a fire is ineffective, and should be directed into the seat of a fire.

B. the high velocity fog into the center of the fire

   Incorrect Answer: A high velocity fog does not have the accuracy or reach of a straight stream, and can result in a dangerous blowback situation if directed at the center of a fire.

C. the high velocity fog at the deck to cool it for entry

   Incorrect Answer: The high velocity fog should be first directed towards the overhead, where the majority of the heat rises to.

D. the high velocity fog at the overhead to absorb heat

   Correct Answer: The high velocity fog should be first directed towards the overhead where the majority of the heat is concentrated. The fog spray quickly absorbs heat, which allows the firefighters to enter and advance to the fire.

Original Question: 210001-1

The mutual action between parts of a material to preserve their relative positions when external loads are applied to the material, which tends to resists deformation when subjected to external forces, is known as _____.

A. stress

B. strain

C. shear strength

D. ultimate tensile strength

Correct Answer: A

Replacement Question: 210001-2

The force exerted per unit area on a material is known as _____.

A. stress

   Correct Answer: The force exerted per unit area on a material is known as stress.

B. strain

   Incorrect Answer: Strain is the geometrical expression of deformation caused by the action of stress on a physical body.

C. shear strength

   Incorrect Answer: The maximum shear stress which a material can withstand without rupture.

D. ultimate tensile strength

   Incorrect Answer: Ultimate tensile strength is the maximum resistance to fracture.

Original Question: 243002-1

During maintenance of circuit breakers, _____.

A. always smooth roughened contact surfaces with a file

B. never pass more than rated breaker current through the overload heater element

C. inspect for wear and misalignment of main contacts

D. assume heater elements installed are of correct size

Correct Answer: C

Replacement Question: 243002-2

During maintenance of circuit breakers, _____.

A. always smooth roughened contact surfaces with a file

   Incorrect Answer: Contacts roughened by service should not be filed smooth unless large projections of metal or beads of metal, formed by arcing, prevent good contact.

B. never pass more than rated breaker current through the overload heater element

   Incorrect Answer: Breakers can be tested by passing a specified overcurrent through the overload heater element and recording the time for it to trip. The actual tripping time should be compared to the manufacturer's current-time characteristic. It is recommended that breakers be tested for proper tripping at 150, 300, and 600 percent of rated current.

C. inspect for wear and misalignment of main contacts

   Correct Answer: Circuit breakers should be inspected for wear and misalignment. Alignment can be checked by obtaining an impression of the contacts utilizing carbon paper. If less than three-fourths of the normal area of the contacts is touching, an adjustment is required.

D. always apply a thin film of oil on contact surfaces

   Incorrect Answer: The contact surfaces should be maintained smooth and dry, and a thin film of oil should not be applied to the surfaces at any time.

Original Question: 236603-1

Reduced voltage applied to a motor during the starting period will _____.

A. result in decreased acceleration time only

B. lower the starting current and increase accelerating time

C. cause a greater starting torque

D. increase the starting current and pump capacity

Correct Answer: B

Replacement Question: 236603-2

Reduced voltage applied to an AC induction motor during the starting period will

_____.

A. result in decreased acceleration time only

   Incorrect Answer: Reduced voltage applied to an induction motor will result in a decrease in starting current and an **increase** in acceleration time. See explanation for "B".

B. lower the starting current and increase accelerating time

   Correct Answer: The current through an induction motor is directly proportional to the applied voltage, and the torque developed by the motor is directly proportional to the **square** of the applied voltage. Reducing the voltage applied to the motor during the starting period will decrease the starting current and torque. The decrease in torque results in an increase in the accelerating time.

C. cause a greater starting torque

   Incorrect Answer: The starting torque is reduced when a reduced voltage is applied to a motor during the starting period.

D. increase the starting current and pump capacity

   Incorrect Answer: Current is directly proportional to voltage, and a decrease in voltage will result in a **decrease** in starting current. Pump capacity will decrease until the motor is up to rated speed.

Original Question: 216802-3

A simplex pump making 60 pumping strokes per minute has a 10 inch stroke and a 6 inch diameter water cylinder, which is 75% full for each stroke. How many gallons of water are discharged per hour?

A. 1339 GPH

B. 3305 GPH

C. 4208 GPH

D. 6610 GPH

Correct Answer: B

Replacement Question: 216802-100

A simplex pump making 60 pumping strokes per minute has a 10 inch stroke and a 6 inch diameter water cylinder, which is 75% full for each stroke. How many gallons of water are discharged per hour?

A. 4208 GPH

"D" is the only correct answer.

B. 6610 GPH

"D" is the only correct answer.

C. 1339 GPH

"D" is the only correct answer.

D. 3303 GPH

Correct Answer:

Volume (75%) x Pumping Strokes Per Hour = GPH

Volume = Area x Stroke = $\prod r^2$ x L = $3.14(3)^2$ x 10 = 282.60 in.^{3}

Pumping Strokes Per Hour = 60 strokes/min. x 60 min./hr. = 3600 strokes/hr.

282.6 (.75) x 3600 = 763020 in.^{3}/hr.   1 Gal. = 231 in.^{3}

763020 ÷ 231 = 3303 GPH