BOOK	Question Number	Answer	Question	Choice A	Choice B	Choice C	Choice D	Illustration
12	1	C	As shown in the illustration, which of the listed types of motor controllers and starters is indicated?	Across-the-line	Capacitor	Autotransformer	Part-winding	See illustration number(s): EL-0012
12	2	B	The full torque electric brake on an electric cargo winch functions to _____.	act as a backup brake in the event the mechanical brake should fail	automatically hold the load as soon as current to the machine is shut off	automatically govern the lowering speed of the load	automatically govern the hoisting speed of the load	
12	3	D	You are performing an out-of-circuit test on the semi- conductor shown in the illustration. Using an ohmmeter on 'low power' setting and with leads properly inserted, which of the listed results would indicate a good Emitter-Base junction?	A low reading with red lead on "A" and black lead on "C"; and a high reading with the leads reversed.	A low reading with red lead on "A" and black lead on "B"; and a high reading with the leads reversed.	A low reading with black lead on"A" and red lead on "B"; and a high reading with the leads reversed.	A low reading with black lead on "A" and red lead on "C"; and a high reading with the leads reversed.	See illustration number(s): EL-0068
12	4	A	When troubleshooting most electronic circuits, "loading effect" can be minimized by using a voltmeter with a/an _____.	input impedance much greater than the impedance across which the voltage is being measured	input impedance much less than the impedance across which the voltage is being measured	sensitivity of less than 1000 ohms/volt	sensitivity of more than 1000 volts/ohm	
12	5	A	On a vessel with turbo-electric drive, which of the following conditions would indicate that the propulsion motor had dropped out of synchronization with the propulsion generator?	Excessive vibration of the vessel	Tripped main motor interlocks	Overheated crosstie busses	Closed contact in the field circuits	
12	6	B	On some diesel-electric ships, the DC propulsion motor will only attain half speed when the generator fields are fully excited. Speeds above this are obtained by _____.	rotating brush alignment	raising the generator engine speed	lowering the generator engine speed	decreasing excitation	
12	7	A	In a diesel electric plant, raising the generator's field excitation will cause the DC propulsion motor to _____.	increase in speed	decrease in speed	affect generator speed only	affect main motor speed if done in conjunction with higher generator engine speeds	
12	8	C	Electric propulsion coupling excitation is reduced at slow speeds to _____.	increase speed control	increase shaft torque	prevent coupling overheating	prevent coupling slippage	
12	9	A	An electric tachometer receives the engine speed signal from a _____.	small generator mounted on the engine	bimetallic sensing device	stroboscopic sensing device	vibrating reed meter generating a voltage proportionate to engine speed	
12	10	B	A three-phase alternator is operating at 450 volts with the switchboard ammeter indicating 300 amps. The kw meter currently indicates 163.6 KW, with a power factor of 0.7. If the power factor increases to 0.8, the KW meter reading would increase by _____.	17.8 KW	23.2 KW	30.6 KW	37.8 KW	
12	11	B	A semiconductor that decreases in resistance with an increase in temperature is known as a _____.	resistor	thermistor	diode	thermopile	
12	12	A	The shunt used in an ammeter should be connected in _____.	series with the load and in parallel with the meter movement	parallel with the load and in series with the meter movement	parallel with the load and in parallel with the meter movement	series with the load and in series with the meter movement	
12	13	D	Brushless generators are designed to operate without the use of _____.	brushes	slip rings	commutators	all of the above	
12	14	C	An operating characteristic appearing on the name plates of shipboard AC motors is _____.	the type of winding	input kilowatts	temperature rise	locked rotor torque	

12	15	C	Low horsepower, polyphase, induction motors can be started with full voltage by means of _____.	compensator starters	autotransformer starters	across-the-line starters	primary-resistor starters	
12	16	D	Which of the listed devices may be installed on a large turbo-electric alternating current propulsion generator?	Temperature detector coils inserted in the stator slots for measuring stator temperature.	A CO2 fire extinguishing system.	Electric space heaters to prevent condensation of moisture.	All of the above.	
12	17	D	Moisture damage, as a result of condensation occurring inside of the cargo winch master switches, can be reduced by _____.	installing a light bulb in the pedestal stand	coating the switch box internals with epoxy sealer	venting the switch box regularly	using strip heaters inside the switch box	
12	18	A	Which of the following conditions will occur if the solenoid coil burns out on a cargo winch with an electrical brake?	The brake will be set by spring force.	The motor will overspeed and burn up.	The load suspended from the cargo boom will fall.	Nothing will happen; the winch will continue to operate as usual.	
12	19	C	Which of the listed battery charging circuits is used to maintain a wet-cell, lead-acid, storage battery in a fully charged state during long periods of disuse?	Normal charging circuit	Quick charging circuit	Trickle charging circuit	High ampere charging circuit	
12	21	C	A ground can be defined as an electrical connection between the wiring of a motor and its _____.	shunt field	circuit breaker	metal framework	interpole	
12	22	C	External shunts are sometimes used with ammeters to _____.	increase meter sensitivity	permit shunts with larger resistances to be utilized	prevent damage to the meter movement from heat generated by the shunt	enable the construction of a compact meter with a virtually unlimited range	
12	23	B	The output voltage of a 440 volt, 60 hertz, AC generator is controlled by the _____.	prime mover speed	exciter output voltage	load on the alternator	number of poles	
12	24	C	Any electric motor can be constructed to be _____.	short proof	ground proof	explosion proof	overload proof	
12	25	C	Which of the following statements represents the main difference between a relay and a contactor?	Contactors control current and relays control voltage.	A relay is series connected and a contactor is parallel connected.	Contactors can handle heavier loads than relays.	Contactors are made from silver and relays are made from copper.	
12	26	A	Which of the following statements is true concerning a polyphase synchronous propulsion motor?	The motor is started as an induction motor.	Resistance is gradually added to the rotor circuit.	The starting current is held below the rated current.	The field winding is energized for starting purposes only.	
12	27	C	Where a thermal-acting breaker is required to be used in an area of unusually high, low, or constantly fluctuating temperatures, an ambient compensating element must be used. This element consists of a _____.	cylindrical spring on the contact arm	conical spring on the contact arm	second bimetal element	second electromagnet	
12	28	A	Which of the following statements represents an application of a silicon controlled rectifier?	To provide DC power for a main propulsion motor.	For use as a voltage reference diode.	For sensing flame in an automated burner.	To eliminate power supply hum.	
12	29	B	The electrolyte used in a nickel-cadmium battery is distilled water and _____.	diluted sulfuric acid	potassium hydroxide	lead sulfate	zinc oxide	
12	30	D	Which of the damages listed can occur to the components of a winch master control switch, if the cover gasket becomes deteriorated?	Overheating of the winch motor.	Contamination of lube oil.	Sparking at the winch motor brushes.	Rapid corrosion of switch components.	
12	31	B	An accidental path of low resistance, allowing passage of abnormal amount of current is known as a/an _____.	open circuit	short circuit	polarized ground	ground reference point	
12	32	C	A resistance in a circuit of unknown value is to be tested using the voltmeter/ammeter method. Therefore, the meters should be connected with _____.	both meters in series with the resistance	both meters in parallel with the resistance	the ammeter in series and the voltmeter in parallel with the resistance	the ammeter in parallel and the voltmeter in series with the resistance	

12	34	C	In general, polyphase induction motors can be started on full line voltage by means of _____.	compensator starters	autotransformer starters	across-the-line starters	primary-resistor starters	
12	35	B	Which of the following statements concerning the maintenance of solid-silver contacts in relays and auxiliary control circuits is correct?	When necessary, they should always be dressed with a wire wheel.	They should be filed with a fine-cut file when projections extend beyond the contact surface.	When black silver oxide is present, it should always be removed from the contact surface with coarse sandpaper.	If necessary, they should be held together with moderate pressure while emery paper is drawn between the contacts.	
12	36	A	While starting a main propulsion synchronous motor, the ammeter pegs out at maximum and then returns to the proper value after synchronization. This indicates the _____.	motor has started properly	field windings are grounded	slip rings are dirty	power transmission cables are grounded	
12	37	D	The purpose of a short circuit forcing module (short time trip) installed in a branch line is to provide _____.	high speed clearance of low impedance short circuits in the branch	continuity of service on main bus under short circuit conditions in a branch	isolation of short circuits by selective tripping of branch circuit breakers	all of the above	
12	38	B	Which of the symbols shown in the illustration represents an NPN type transistor?	A	B	C	D	See illustration number(s): EL-0078
12	39	D	Which of the following electric motors would be the safest and most reliable to use on the main deck of a vessel in foul weather conditions?	Sealed motors	Drip proof motors	Enclosed motors	Watertight motors	
12	40	C	You are performing an out-of-circuit test of the semi-conductor shown in the illustration. Using an ohmmeter on 'low power' position and with leads properly installed, which of the listed results would indicate a good Collector-Base junction?	A low reading with red lead on "A" and black lead on "C"; and a high reading with the leads reversed.	A low reading with red lead on "A" and black lead on "B"; and a high reading with the leads reversed.	A low reading with black lead on "A" and red lead on "B"; and a high reading with the leads reversed.	A low reading with black lead on "A" and red lead on "C"; and a high reading with the leads reversed.	See illustration number(s): EL-0068
12	41	B	A direct current passing through a wire coiled around a soft iron core is the description of a simple _____.	magnetic shield	electromagnet	piezoelectric device	electromagnetic domain	
12	42	B	To properly use a hook-on-type volt/ammeter to check current flow, you must FIRST _____.	de-energize the circuit to allow connection of the instrument in series	hook the jaws of the instrument around the insulated conductor	connect the voltage test leads to the appropriate terminals	short the test leads and calibrate the instrument to zero	
12	43	A	The use of four diodes, in a full-wave bridge rectifier circuit, will _____.	provide unidirectional current to the load	allow a very high leakage current from the load	convert direct current to alternating current	offer high opposition to current in two directions	
12	44	A	Autotransformer starters or compensators are sometimes used with polyphase induction motors to _____.	reduce the voltage applied to the motor during the starting period	increase the voltage for "across-the-line starting"	provide a backup means of voltage regulation for emergency starting	allow the voltage to be either stepped up or down, depending on the application, to ensure full torque	
12	46	A	In an AC synchronous motor electric propulsion plant, propeller speed is controlled by varying the _____.	prime mover speed	electric coupling field strength	number of energized main motor poles	propulsion generator field strength	
12	47	C	A molded-case breaker provides protection against short circuits by using a/an _____.	shading coil	arc quencher	electromagnet	holding coil	
12	48	D	The method used to produce electron emission in most vacuum tubes is known as _____.	photoelectric emission	secondary electric emission	cold cathodic electric emission	thermionic emission	
12	49	B	You are performing an out-of-circuit test of the semi-conductor shown in the illustration. Using an ohmmeter on 'low power' position and with leads properly installed, which of the listed results would you expect the Emitter-Collector connections of a good component?	A low reading with red lead on "B" and black lead on "C"; and a low reading with the leads reversed.	A high reading with red lead on "B" and black lead on "C"; and a high reading with the leads reversed.	A low reading with red lead on "A" and black lead on "C"; and a high reading with the leads reversed.	A high reading with red lead on "B" and black lead on "A"; and a low reading with the leads reversed.	See illustration number(s): EL-0068

12	50	D	When troubleshooting electronic equipment, you should use a high impedance multimeter _____.	to prevent excess current flow through the meter that would damage it	for AC measurements only and a low resistance meter for DC measurements	whenever a low impedance meter is not available, regardless of the components being tested	so as not to load down the circuit and obtain erroneous voltage readings	
12	51	A	Which of the listed devices is used to measure pressure and convert it to an electrical signal?	Transducer	Reducer	Transformer	Rectifier	
12	52	D	Grounds occurring in electrical machinery as a result of insulation failure may result from _____.	deterioration through extended use	excessive heat	extended periods of vibration	all of the above	
12	53	D	The amount of voltage induced in the windings of an AC generator depends on _____.	the number of conductors in series per winding	the speed at which the magnetic field passes across the winding	the strength of the magnetic field	all of the above	
12	54	C	A motor using a rheostat in the motor circuit to vary the speed is called a _____.	squirrel-cage induction motor	regenerative braking motor	wound-rotor induction motor	synchronous motor	
12	55	B	Which of the illustrations listed below is representative of a motor controller's "schematic" or "elementary" diagram?	EL-0023	EL-0007	EL-0037	EL-0058	
12	56	C	Which of the following precautions should you take when securing propulsion generators and motors for an extended period of time?	Disconnect the brush pigtails from their contacts and circulate air through the units.	Disconnect the brush pigtails from their contacts and discharge carbon dioxide into the units to keep them dry.	Lift the brushes from commutator collector rings and use the built-in heater to prevent moisture accumulation.	Lift the brushes from commutator collector rings and circulate cool dry air through the units.	
12	58	A	Which of the illustrations listed below is representative of a motor controller's "wiring" or "connection" diagram?	EL-0023	EL-0024	EL-0037	EL-0058	See illustration number(s): Book
12	59	B	When reading electrical motor controller diagrams, it helps to know that _____.	current paths in the control circuit are drawn as heavy lines and in the power circuit as lighter lines	current paths in the power circuit are drawn as heavy lines and in control circuit as lighter lines	circuits subject to 500 volts or greater are drawn as heavy lines and below 500 volts as lighter lines	circuits subject to 500 volts or greater are drawn as light lines and below 500 volts as heavy lines	
12	60	A	Which of the following precautions should be taken when troubleshooting various power circuits using a common solenoid-type mechanical voltage tester (wiggins)?	Never use this tester on circuits greater than 60 Hz, as the coil's resultant high impedance lowers current and magnetic pull. The tester may not register dangerous voltages.	Always remember that the unit is polarity sensitive and if used on DC circuits reversing the leads may result in high temperatures within the tester.	Never connect the device to circuits where potentials greater than 120 volts may be present, as the coil's extremely fine wire cannot withstand more than a few amps.	Always pre-set the meter to the next higher range than the amount of voltage expected in the circuit in order to prevent damage from an off-scale reading.	
12	61	B	The device that most commonly utilizes the principle of electromagnetic induction is the _____.	diode	transformer	transistor	rheostat	
12	62	D	A tubular fuse should always be removed from a fuse panel with _____.	a screwdriver	a pair of insulated metal pliers	any insulated object	fuse pullers	
12	63	B	One factor that determines the frequency of an alternator is the _____.	number of turns of wire in the armature coil	number of magnetic poles	strength of the magnets used	output voltage	
12	64	A	The variable resistance placed in the rotor circuit of a wound-rotor induction motor provides for _____.	speed control	frequency control	voltage control	use as a split-phase motor	
12	65	C	Which of the motors for the devices listed below is fitted with an instantaneous overload relay?	Fan	Pump	Winch	Machine tool	

12	66	B	In the illustration circuit, A, B, C, and D are each 12 volts. What is the voltage at the output lead connected to "A" and "B" with respect to the output lead connected to "C" and "D"?	(+) 48 volts	(-) 24 volts	(-) 48 volts	(+) 24 volts	See illustration number(s): EL-0039
12	67	A	A molded-case circuit breaker provides protection against short circuits by using a/an _____.	electromagnet	shading coil	arc quencher	burn away strip	
12	68	A	Which of the following statements concerning analog and digital devices are correct?	The variables in digital systems are fixed quantities, and the variables in analog systems are continuous quantities.	There are no basic differences between the two systems.	Analog devices are superior in accuracy compared to digital devices.	Operations in a digital device are performed simultaneously.	
12	69	C	The number of cells in a 12 volt lead-acid battery is _____.	three cells	four cells	six cells	twelve cells	
12	70	D	In the illustration circuit, A, B, C, and D are each 12 volts. What is the voltage of the lead connected to C and D with respect to the lead connected to A and B?	(+) 48 volts	(-) 24 volts	(-) 48 volts	(+) 24 volts	See illustration number(s): EL-0039
12	71	C	The Wheatstone bridge is a precision measuring instrument utilizing the principle of changes in _____.	inductance	capacitance	resistance	amperage	
12	72	B	The greatest detrimental effect on idle electrical equipment, such as cargo pump motors, is the _____.	loss of residual magnetism	absorption of moisture in the insulation	insulation varnish flaking	dirt collecting on the windings	
12	73	A	The frequency output of an operating alternator is controlled by the _____.	relative speed of the rotor poles	number of turns of wire in the armature coil	strength of the magnets used	output voltage	
12	74	A	Which of the following physical characteristics does a wound-rotor induction motor possess that a squirrel cage motor does not?	Slip rings	End rings	A centrifugal switch	End plates	
12	75	D	The current at which a magnetic-type overload relay tends to trip may be decreased by raising the plunger further into the magnetic circuit of the relay. This action _____.	reduces magnetic pull on the plunger and requires more current to trip the relay	reduces magnetic pull on the plunger and requires less current to trip the relay	increases magnetic pull on the plunger and requires more current to trip the relay	increases magnetic pull on the plunger and requires less current to trip the relay	
12	76	B	If the line voltage to the controller shown in the illustration is 440 volts, what voltage is applied across the motor when contacts "S" close?	110 volts	220 volts	440 volts	660 volts	See illustration number(s): EL-0080
12	77	B	Protection against sustained overloads occurring in molded-case circuit breakers is provided by a/an _____.	overvoltage release	thermal acting trip	thermal overload relay	current overload relay	
12	78	B	Which of the listed logic gates is considered to be a BASIC building block (basic logic gate) used in logic diagrams?	NAND	OR	NOR	All of the above.	
12	79	A	When choosing a battery for a particular application, major consideration should be given to the battery's _____.	amp-hour capacity	terminal polarity	stability under charge	ambient temperature rise	
12	80	D	What operational characteristics do the components labeled as "S" and "R" represent in the motor controller diagram shown in the illustration?	Standard and Reverse directions	Stop and Restart features	Subnormal and Regular loading	Start and Run functions	See illustration number(s): EL-0080
12	81	B	The rated temperature rise of an electric motor is the _____.	average temperature at any given latitude	normal temperature rise above the standard ambient temperature at rated load	average temperature rise due to resistance at 10% overload	permissible difference in the ambient temperature of the motor due to existing weather conditions	

12	82	C	Which of the following represents the accepted method of cleaning dust and foreign particles from electrical equipment while limiting damage to electric components?	Carefully wiping off the components with a soft cotton rag.	Blowing a high velocity stream of compressed air rapidly across the components.	Using a vacuum cleaner to remove debris from the components.	Using carbon tetrachloride as a cleaning solvent to clean the components.	
12	83	B	Regarding an AC generator connected to the main electrical bus; as the electric load and power factor vary, a corresponding change is reflected in the generator armature reaction. These changes in armature reaction are compensated for by the _____.	governor speed droop setting	voltage regulator	balance coil	phase-balance relay	
12	84	C	In an induction motor, rotor currents are circulated in the rotor by _____.	slip rings and brushes	an armature and brushes	inductive reaction of the rotating stator field	external variable resistors	
12	85	D	An electrical device which prevents an action from occurring until all other required conditions are met is called a/an _____.	limit	monitor	modulator	interlock	
12	86	B	The diagram shown in the illustration represents a _____.	dual speed, 2-winding motor controller	navigation running light circuit	single phase, 2-motor selectable starter	common fluorescent lighting circuit	See illustration number(s): EL-0058
12	87	B	A circuit breaker and a fuse have a basic similarity in that they both _____.	can be reset to energize the circuit	should open the circuit when overloaded	will burn out when an over current flow develops	all of the above	
12	88	B	Which two components, shown in the illustration, acting together will disconnect the motor from the line in case of a sustained motor overload?	"G" and "H"	"E" and "I"	"F" and "H"	"E" and "G"	See illustration number(s): EL-0080
12	89	C	The electrolyte in a lead-acid storage battery consists of distilled water and _____.	hydrogen chloride	calcium chloride	sulfuric acid	muriatic acid	
12	90	C	The devices marked "T" in the illustration are _____.	trouble alarm units whose contacts activate when problems arise either on starting or stopping of the motor	topping lift direction indicators which show alternately whether the motor is hoisting or lowering the load	timing relay components whose contacts open or close depending on the setting of their pneumatic adjustment	thawing contactor parts whose contacts start and stop the defrosting cycle of the compressor driven by the motor	See illustration number(s): EL-0080
12	91	A	The torque produced by a motor when its shaft will not turn, even though rated voltage is applied to the stator, is known as _____.	locked-rotor torque	pullout torque	breakdown torque	torque margin	
12	92	C	Electrical leads and insulation on a motor should be painted with _____.	heat-resisting acrylic	heat-resisting aluminum	insulating varnish	insulating white lead	
12	93	D	Voltage generated by most AC generators is fed from the machine to the bus by means of _____.	brushes on a commutator	brushes on slip rings	slip rings on a commutator	direct connections from the stator	
12	94	D	A degree of control over the speed of a slip ring induction motor can be obtained by _____.	adjusting governor linkage	changing the number of phases to the motor	inserting resistance into the stator circuit	inserting resistance into the rotor circuit	
12	95	C	As shown in the illustration, what happens when "A" is closed, "B" is in position '2' and component "E2" burns out?	"H" energizes and "D" makes contact.	"F" goes out allowing "G" to disconnect.	"G" sounds an alarm and "F" illuminates.	"C" opens causing "A" to also open.	See illustration number(s): EL-0058
12	96	D	Which of the listed types of lighting circuits does the diagram shown in the illustration represent?	High pressure sodium	Low voltage quartz	Mercury vapor	Standard fluorescent	See illustration number(s): EL-0081
12	97	D	A circuit breaker differs from a fuse in that a circuit breaker _____.	melts and must be replaced	is enclosed in a tube of insulating material with metal ferrules at each end	gives no visual indication of having opened the circuit	trips to break the circuit and may be reset	
12	98	A	Heat sinks are frequently used with _____.	power transistors	vacuum tubes	tunnel rectifier diodes	all of the above	
12	99	C	During start-up of the circuit shown in the illustration, it is noted that the ends of component "C" alternately glow and become dark without the tube illuminating. The most probable cause for this is that _____.	component "D" is loose and due to the ship's vibrations makes and breaks contact	the power system's voltage is fluctuating in and out of the range necessary for proper operation	component "A" is shorted and therefore unable to produce the high voltage required to start the lamp	component "B" contacts are opening and closing thus prohibiting sufficient current flow	See illustration number(s): EL-0081

12	100	D	Incandescent lamps are classified according to _____.	shape of bulb and type of service	size and style of base	operating voltage and wattage	all of the above	
12	101	D	The alarm system for an engine order telegraph uses small selsyn motors attached to the indicators. The alarm sounds when the rotors are _____.	in synchronous position, no current is flowing, and the relays are open	in synchronous position, no current is flowing, and the relays are closed	not synchronized, current is flowing, and the relays are open	not synchronized, current is flowing, and the relays are closed	
12	102	B	As a general rule, the first troubleshooting action to be taken in checking faulty electric control devices is to _____.	draw a one line diagram of the circuitry	test all fuses and measure the line voltage	take megger readings	insulate the apparatus from ground	
12	103	B	An electrical device which employs a stationary armature and a rotating electromagnetic field is used aboard ship as a _____.	magnetic amplifier	ship's service alternator	three-wire DC generator	saturable core reactor	
12	104	C	The main purpose of the auxiliary winding on a split-phase, single-phase motor is to _____.	limit the starting voltage	increase the starting current	start the motor	keep the motor running in the event the main winding should fail	
12	105	A	As shown in the illustration, the same indication occurs when "C" opens as when _____.	"E2" burns out	"H2" opens	"G" opens	"F" burns out	See illustration number(s): EL-0058
12	106	B	The device shown in the illustration is a/an _____.	noise filtering choke	autotransformer	fluorescent light ballast	power factor correction inductor	See illustration number(s): EL-0083
12	107	A	The turns ratio of device "A" shown in the illustration is four to one and all taps are equally spaced. If 440 volts were applied between "H1" and "H4", what would appear across "X1" and "X4"?	110 volts	220 volts	440 volts	1760 volts	See illustration number(s): EL-0082
12	108	B	Which of the following statements describes the significance of ambient temperature in relation to the service life of electronic components?	Ambient temperature should be as high as possible to drive off moisture.	Increased ambient temperature decreases the service life of electronic components.	Ambient temperature is not significant as long as the relative humidity is kept low.	A reduced ambient temperature causes a corresponding reduced service life.	
12	109	C	The state of charge of a lead acid storage battery is best indicated by the _____.	testing of the individual cell voltages	ampere hour capacity of the battery	specific gravity of the electrolyte	total cell voltages	
12	110	B	What is indicated by gradual blackening at the ends of component "C" shown in the illustration?	The unit is in danger of exploding.	The tube is nearing the end of its useful life.	The circuit voltage is too high.	The circuit current is too high.	See illustration number(s): EL-0081
12	111	B	Which of the following statements is correct concerning the circuits in a sound powered telephone system?	The ringing circuit is composed of only one common wire to ground.	The common talking circuit is composed of two ungrounded wires.	The ringing circuit has two grounded wires connected to each station.	The talking and calling circuits are electrically dependent upon each other.	
12	112	B	The first requirement for logical troubleshooting of any system is the ability to _____.	collect all available data on a casualty	recognize normal operation	identify the probable cause of a symptom	isolate the faulty component	
12	113	D	The load sharing characteristics of two diesel generators operating in parallel are mostly dependent on their governor _____.	load limit settings	idle speed settings	speed limit settings	speed droop settings	
12	114	C	What type of rotor is used in split-phase motors?	Drum	Salient pole	Squirrel-cage	Wound-rotor	
12	115	A	Which device will stop the motor shown in the illustration in case of a short-circuit (high current) motor overload?	"F"	"G"	"H"	"I"	See illustration number(s): EL-0080
12	116	B	As shown in the illustration, what maintenance would be required of the circuit components?	Change out both "C" units monthly.	Clean the glass surrounding "E1" & "E2" as needed.	File the points at the upper end of "G" every six months.	Take megger readings on "E1" & "E2" windings quarterly.	See illustration number(s): EL-0058
12	117	C	Which component of the circuit shown in the illustration is the lamp?	A	B	C	D	See illustration number(s): EL-0081

12	118	B	Tightly knit metal braid wire can be used with a printed circuit board when _____.	conductor flexibility is required	desoldering components in the circuit	electrically produced magnetic fluxes would cause inaccuracies in adjacent components	reactance in the circuit must be kept to a minimum	
12	119	C	The open-circuit voltage of a fully charged lead-acid battery cell is _____.	1.5 volts	1.8 volts	2.0 volts	2.3 volts	
12	120	C	If the line voltage to the controller shown in the illustration is 440 volts, what is applied across the control circuit?	110 volts	220 volts	440 volts	660 volts	See illustration number(s): EL-0080
12	121	A	AC circuits possess characteristics of resistance, inductance, and capacitance. The capacitive reactance of a circuit is expressed in _____.	ohms	mhos	henrys	farads	
12	122	B	A low voltage source is being used for testing armature coils. A coil short circuit will be indicated by a _____.	high voltage reading, while the other coil readings will have an equal or lower value	low or zero voltage reading, while the other coils will have higher readings	fluctuating voltmeter reading, while the other coil readings are steady	steady voltmeter reading, while the other coil readings are fluctuating	
12	123	A	In an AC generator, direct current from a separate source is passed through the windings of the rotor _____.	by means of slip rings and brushes	by means of a commutator	by means of rotating bar magnet	to minimize the danger of arc over	
12	124	B	The purpose of a cage rotor winding placed on the rotor of a synchronous motor is to _____.	provide excitation to the DC field	start the machine as an induction motor	contribute extra torque at synchronous speed	prevent the machine from falling out of step	
12	125	B	Motor controllers are seldom troubled with grounds because _____.	the auxiliary contacts have a high resistance connection	the contactors and relays are mounted on a nonconducting panel	the resistor banks are composed of individual series-connected units	there are separate switches for the motor and the control	
12	126	D	As shown in the illustration, the circuit has been on the line for several days when component "E1" burns out. The operator receives an alarm, switches over "B" to energize the standby component "E2" and tells the electrician to renew "E1". The operator then attempts to return "E1" to service. At first, it seems to function normally; however, the alarm devices cannot be silenced or extinguished. The cause for this condition is that the new "E1" _____.	burned out rapidly due to an overused and overheated connection terminal which in turn led to "C" burning out	installation developed an accidental connection to "D" and short-circuited the main line resulting in overloaded fuses just after the master switch	is a 110 volt DC device being used in a 115 volt AC circuit and will conduct only on the positive half-cycle	is of a lower wattage rating than required for the circuit therefore limiting the current through the alarm relay which will not pick up	See illustration number(s): EL-0058
12	127	B	A delayed-action fuse is most frequently used in which of the listed circuits?	Lighting circuit	Motor circuit	Electric heater circuit	Radar circuit	
12	128	B	Which component of the circuit shown in the illustration is the starter?	A	B	C	D	See illustration number(s): EL-0081
12	129	D	The turns ratio of device "A" shown in the illustration is four to one and all the taps are equally spaced. If 120 volts were applied between "X1" and "X2", what would be indicated across "H1" and "H4"?	30 volts	120 volts	480 volts	1920 volts	See illustration number(s): EL-0082
12	130	A	The turns ratio of device "A" shown in the illustration is four to one and all taps are evenly spaced. If 120 volts were applied to terminals "H1" and "H3", what would appear at "X1" and "X2"?	15 volts	30 volts	480 volts	960 volts	See illustration number(s): EL-0082
12	131	D	The electrical energy necessary to transmit a person's voice over a sound-powered telephone circuit is obtained from _____.	dry cell batteries	the ship's service switchboard	the emergency switchboard	the speaker's voice	
12	132	C	Which of the listed procedures should be carried out to prevent moisture damage to electrical apparatus during extended periods of idleness?	Fill the motor housing with CO2 to inert the space.	Strap silica gel around the commutator.	Place heat lamps in the motor housings.	Cover the equipment with a canvas tarpaulin.	

12	133	C	A constant output voltage from an AC generator is maintained by the _____.	prime mover governor	exciter generator	voltage regulator	reverse power relay	
12	134	C	Amortisseur windings are installed in a synchronous motor to _____.	reduce eddy current losses	produce a higher power factor	provide a means for starting	eliminate arcing between the stator and the rotor	
12	135	C	Electric strip heaters are used in motor controllers to _____.	prevent freezing of movable contacts	keep the components at their design ambient temperature	prevent condensation of moisture	minimize resistance in internal circuits	
12	136	A	The purpose of the capacitor within component "B" of the circuit shown in the illustration is to _____.	prolong the life of the component's contacts	discharge the neon within the envelope	counteract the inductive reactance in the circuit	store power to operate the circuit should "D" open	See illustration number(s): EL-0081
12	137	A	A fuse that blows often should be replaced only with a fuse of _____.	the recommended current and voltage rating	higher current and voltage rating	higher current and lower voltage rating	lower current and higher voltage rating	
12	138	D	Which of the listed conditions is an advantage of a PN diode over a vacuum diode?	Longer life.	No warm up time.	Less delicate.	All of the above.	
12	139	B	The freezing point of the electrolyte in a fully charged lead-acid battery will be _____.	higher than in a discharged battery	lower than in a discharged battery	the same as in a discharged battery	higher than in a discharged battery, but the specific gravity will be less	
12	140	C	A load is connected to the secondary of the device illustrated and the current through the load is 10 amps. If the step-up ratio is 10 to 1 and the input voltage is 110 VAC, what will be the current flow through the primary?	1 amp	10 amps	100 amps	1000 amps	See illustration number(s): EL-0055
12	141	B	The heating of conductors as a result of resistance in a distribution circuit causes a power loss expressed as _____.	line droop	line loss	IR drop	hysteresis	
12	142	A	To repair a small electrical motor that has been submerged in saltwater, you should _____.	wash it with fresh water and apply an external source of heat	renew the windings	send it ashore to an approved service facility	rinse all electrical parts with a carbon tetrachloride cleaning solvent and then blow dry the motor with compressed air	
12	143	D	The output voltage of a three-phase alternator is regulated by the _____.	AC voltage to the armature	AC voltage to the field	DC voltage to the armature	DC voltage to the field	
12	144	C	The function of damper windings in a synchronous motor is to _____.	eliminate slippage	provide excitation	provide starting torque	increase efficiency	
12	145	A	A shading coil used in an AC magnetic controller, functions to _____.	reduce vibration and noise in the contactor	prevent flux buildup in the operating coil	eliminate arcing when the contacts close	energize the operating coil and "pull in" the contacts	
12	146	B	Which of the listed figures shown in the illustration represents devices connected in a three-phase wye-wye arrangement?	A	B	C	D	See illustration number(s): EL-0084
12	147	C	In a cartridge-type fuse, the metal element is contained in a _____.	porcelain window	thermal cut out	fiber tube	flasher device	
12	148	B	The illustrated lead acid battery is about to be placed in service. The positive plate labeled "D" is made of_____.	sponge lead (Pb)	lead peroxide (PbO_2)	lead sulfate ($PbSO_4$)	a depolarizing mix	See illustration number(s): EL-0031
12	149	A	The illustrated lead acid battery is about to be placed in service. The negitive plate, labeled "E", is made of_____.	sponge lead (Pb)	lead peroxide (PbO_2)	lead sulfate ($PbSO_4$)	zinc oxide (ZnO_2)	See illustration number(s): EL-0031
12	150	D	When maintaining the circuit shown in the illustration, what dangers are associated with component "C" should it become broken?	Glass fragments may cut a person's skin.	The contained mercury vapor is highly toxic.	The inside coating of phosphor is highly poisonous.	All of the above.	See illustration number(s): EL-0081

12	151	D	In process control terminology values which can change without distinct increments, such as temperature, pressure, or level are called _____.	binary values	digital values	bumpless values	analog values	
12	152	B	The proper way to apply plastic electrical tape to an electric cable splice is to _____.	apply tape to the braided cover, but avoid touching it	wind the tape so that each turn overlaps the turn before it	apply the tape in one non overlapping layer only	heat the tape with a soldering iron for good bonding	
12	153	A	Which of the following statements is true concerning all three-phase alternators?	Each has three separate but identical armature windings acted on by one system of rotating magnets.	Each has one armature winding acted on by three identical but separate systems of rotating magnets.	All three-phase alternators are designed to operate with a 0.8 leading power factor.	The three phases always provide power to the load through three sets of slip rings and brushes.	
12	154	A	In the illustration, the component labeled "G" is _____.	hard rubber, plastic or bituminous composition	porous inside to absorb excess positive ions	precharged for (-) and (+) in manufacturing	All the above	See illustration number(s): EL-0031
12	155	D	A low-voltage protection circuit is used in electric motor starting equipment to _____.	trip circuit contactors when the motor overspeeds due to low voltage	trip circuit contactors when the motor develops a short circuit due to low voltage	allow the motor to restart automatically on restoration of voltage without manually resetting	prevent the motor from restarting automatically on restoration of voltage	
12	156	A	The device shown in the illustration is being used _____.	in a step-down operation	in a step-up operation	in an isolation circuit	as a filter	See illustration number(s): EL-0083
12	157	C	Time delayed or delayed action-type fuses are designed to _____.	prevent grounds in branch circuits	prevent opens in motor circuits	permit momentary overloads without melting	guard lighting and electronic circuits	
12	158	D	Silicon diodes designed for a specific reverse breakdown voltage, become useful as an electronic power supply voltage regulator, called _____.	tunnel diodes	hot-carrier diodes	compensating diodes	Zener diodes	
12	159	D	The symbol in figure "A" shown in the illustration represents a _____.	diac	field effect transistor	silicon controlled rectifier	unijunction transistor	See illustration number(s): EL-0065
12	160	A	If the inputs to the diagram shown in the illustration were J=1, K=0, H=1, L=1, M=0, what logic levels would be indicated at points "X" and "Y" respectively?	0,0	0,1	1,0	1,1	See illustration number(s): EL-0089
12	161	B	Which of the following statements best describes the material known as varnished cambric?	Felted asbestos sealed with varnish.	Cotton cloth coated with insulating varnish.	Rubber insulation coated with a layer of tin.	Paper impregnated with mineral oil, specially wrapped with nonmetallic tape, and coated with varnish.	
12	162	A	Which component of the circuit shown in the illustration is the ballast?	A	B	C	D	See illustration number(s): EL-0081
12	163	B	Figure "B" of the diagram shown in the illustration represents a/an _____.	silicon controlled rectifier	junction field effect transistor	diac thyristor	IG or MOS field effect transistor	See illustration number(s): EL-0065
12	164	B	A synchronous motor maintains synchronism with the rotating field because _____.	field strength varies directly with rotor slip	DC current applied to the rotor coils causes the rotor magnets to lock in with the rotating flux of the stator	the stator poles are dragged around due to the flux created by the excitation current	the stator flux rotates in the opposite direction	
12	165	B	What is the maximum allowable primary current of a 2 KVA step-down transformer with a four to one turns ratio if connected across a 440 volt line?	1.1 amps	4.5 amps	18.1 amps	27.7 amps	

12	166	C	What is represented by the solid dots within components "B" and "C" of the diagram shown in the illustration? (See illustration EL-0081)	The fact that these parts are subject to wear and replacement.	An indication that they are for 110 volt AC operation only.	The particular components contain a gas such as neon or argon.	All of the above.	See illustration number(s): EL-0081
12	167	D	The part of a fuse that melts and opens the circuit is made of _____.	copper and antimony	steel and babbitt	aluminum or beryllium alloy	zinc or an alloy of tin and lead	
12	168	C	The leads of the device in figure "A" shown in the illustration are named the _____.	source, gate and drain	emitter, base and collector	emitter, base 1 and base 2	anode, cathode and gate	See illustration number(s): EL-0065
12	169	D	Component "CR1" shown in the illustration is called a/an _____.	avalanche diode	Zener diode	breakdown diode	all of the above	See illustration number(s): EL-0085
12	170	C	If 450 volts AC were measured across the load as shown in the illustration it would indicate a/an _____.	open winding between "H1" and "X1"	properly operating circuit	open winding between "X1" and "X4"	ground on one side of "Ep"	See illustration number(s): EL-0083
12	171	D	The cross-sectional area of shipboard electrical cable is expressed in _____.	millimeters	gage numbers	centimeters	circular mils	
12	172	C	To effectively clean a commutator in good physical condition, you should use _____.	trichloride ethylene	kerosene	a canvas wiper	a commutator stone	
12	173	B	What will be the phase angle relationship of a six-pole, three-phase, rotating field generator?	60°	120°	180°	360°	
12	174	C	The function of amortisseur, or damper windings in a synchronous motor is to _____.	eliminate slippage	provide excitation	provide starting torque	increase efficiency	
12	175	D	The main difference between a motor control circuit containing low voltage protection and low voltage release is that the latter contains _____.	a magnetic operating coil	normally open line contacts	thermal-overload protection	a momentary-contact start button	
12	176	B	Figure "A" of the diagram shown in the illustration has a turns ratio of four to one. If a three-phase 440 volt supply is connected to terminals "A-B-C", what voltage should develop across terminals "a-b-c"?	64 volts	110 volts	190 volts	762 volts	See illustration number(s): EL-0084
12	177	B	Fuses placed in series with a thermal trip-type circuit breaker are used for _____.	time-delay protection	short-circuit protection	short duration surge protection	sustained overload protection	
12	178	B	On an engine throttle control system, the auxiliary control circuits are provided with devices to prevent excessive overtravel of the pilot valve by the synchronous motor. These devices are called _____.	overlap sensors	limit switches	overtravel relays	proximity switches	
12	179	A	When charging lead-acid batteries, you should reduce the charging rate as the battery nears its full charge capacity to _____.	prevent excessive gassing and overheating	allow equalization of cell voltages	reduce lead sulfate deposits	increase lead peroxide formation	
12	180	B	Figure "D" shown in the illustration represents a _____.	silicon controlled rectifier	light emitting diode	photosensitive diode	Zener diode	See illustration number(s): EL-0067
12	181	B	Ammeters and voltmeters used in sinusoidal AC power systems indicate which of the following values of the waveforms measured?	Peak value	Root-mean-square value	Average value	Maximum value	
12	182	C	Before reassembling any machinery, you should _____.	replace all bearings regardless of length of service	apply a heavy coat of oil to all mating surfaces	clean any corroded surfaces and file all burrs smooth	coat all parts with alemite grease	
12	183	B	The purpose of the commutator and brushes on a DC generator is to _____.	transfer generated direct current voltage from the armature to the line	convert the alternating voltage generated within the armature to a direct voltage	provide a sliding contact method to excite the field	reduce sparking between the armature and the carbon brushes	
12	184	C	The most common source of excitation for synchronous motors is a/an _____.	low voltage battery	motor attenuator set	DC exciter generator	AC supply	

12	185	C	The type of feature afforded auxiliaries vital to the operation of propelling equipment, where automatic restart after a voltage failure would not create a hazard, is termed _____.	low voltage protection	high amperage protection	low voltage release	high amperage release	
12	186	D	During the start-up of the circuit shown in the illustration, it is noted that the ends of component "C" remain lighted but the tube does not illuminate. The cause of this problem is _____.	component "A" is open	component "D" is closed	component "C" is the wrong wattage	component "B" contacts are stuck closed	See illustration number(s): EL-0081
12	187	B	Since fuse elements are made of zinc or any alloy of tin and lead, the melting point of the fuse element must be _____.	higher than that of copper	lower than that of copper	equal to that of copper	reached when the conductor it is protecting becomes "white hot."	
12	188	B	Which of the following statements correctly applies to transistors?	NDN and PNP are the two basic types of transistors.	The three terminals are called the emitter, base, and collector.	The emitter separates the base and collector.	The collector separates the emitter and base.	
12	189	C	The turns ratio of device "A" shown in the illustration is four to one and all taps are evenly spaced. If 110 volts were applied to terminals "X1" and "X3", what would be indicated across "H1" and "H2"?	37.5 volts	55 volts	220 volts	440 volts	See illustration number(s): EL-0082
12	190	B	Figure "A" of the diagram shown in the illustration represents a/an _____.	silicon controlled rectifier	IG or MOS field effect transistor	triac thyristor	junction field effect transistor	See illustration number(s): EL-0078
12	191	D	The basic measuring unit of inductance is the _____.	coulomb	ohm	farad	henry	
12	192	D	Which of the listed precautions should be taken when cleaning the internals of a motor with compressed air?	Open the machine on both ends so as to allow the air and dust to escape.	Be certain that the circuit breaker is opened and tagged on the feeder panel.	Be certain that the air is clean and as dry as possible.	All of the above.	
12	193	B	The purpose of DC generator brushes is to _____.	neutralize armature reaction	conduct electric current to an outside circuit	convert DC current to AC current	provide excitation to a DC generator	
12	194	C	The most common source of excitation for synchronous motors is a/an _____.	stepup transformer	half-wave rectifier	DC supply	AC supply	
12	195	D	Which of the listed figures shown in the illustration represents devices connected in a three-phase wye-delta arrangement?	A	B	C	D	See illustration number(s): EL-0084
12	196	C	If the inputs to the diagram shown in the illustration were J=0, K=0, H=1, L=0, M=1, what logic levels would be indicated at points "X" and "Y" respectively?	0,0	0,1	1,0	1,1	See illustration number(s): EL-0089
12	197	D	Fuses are rated in _____.	voltage	amperage	interrupting capacity	all the above	
12	198	B	Which of the following statements comparing transistors and vacuum tubes is correct?	Both transistors and vacuum tubes have a cathode that must be heated to give off electrons.	A vacuum tube must have a heated cathode, where transistors do not.	Neither transistors nor vacuum tubes require heat for electrons to flow.	The anode of both transistors and vacuum tubes must be heated to give off electrons.	
12	199	C	Which of the following statements concerning nickel-cadmium batteries is true?	When mixing electrolyte always add acid to the water.	Nickel-cadmium batteries can be charged and discharged only a limited number of times without damage to the cells.	Nickel-cadmium batteries can be stored for a long time and still keep a full charge without additional charging.	The electrolyte of an idle nickel-cadmium battery must be replaced monthly to maintain battery condition.	
12	200	B	What is represented by the two parallel lines within component "A" of the circuit shown in the illustration?	A ground connection	An iron core	Ventilation openings	A mounting base	See illustration number(s): EL-0081
12	201	D	Power transformers are rated in _____.	kilowatts	ampere-turns	kilowatt-volts	kilovolt-amperes	

12	202	B	Which of the listed precautions should be observed before spraying liquid solvent on the insulation of an electric motor?	Slow the motor down to low speed.	Disconnect the motor from the power source.	Secure all ventilation in the area.	Preheat the insulation to assist in cleaning.	
12	203	A	The simplest method of controlling the terminal voltage of compound-wound DC generator is with a _____.	hand-operated field rheostat connected in series with the shunt field circuit	separate exciter in a series with the shunt field	carbon pile regulator in series with the load	balance coil diverting neutral current through the shunt field	
12	204	B	A damper winding is designed as part of a synchronous motor to _____.	increase efficiency	provide starting torque	provide excitation	eliminate slippage	
12	205	A	The type of control circuit that will not permit automatic restarting after power is restored, following a power failure is called _____.	low voltage protection	low voltage release	overload lockout	reduced voltage restart	
12	206	B	The turns ratio of device "B" shown in the illustration is two to one (total). If 440 volts were applied to terminals "H1" and "H2", what would be indicated across "X1,3" and "X2,4"?	55 volts	110 volts	220 volts	880 volts	See illustration number(s): EL-0082
12	207	B	What is the load voltage "Es" as shown in the illustration?	292 volts	360 volts	450 volts	810 volts	See illustration number(s): EL-0083
12	208	B	As shown in the illustration, which of the drawings depicts a typical transistor?	A	B	C	D	See illustration number(s): EL-0076
12	209	D	Local action in a nickel-cadmium battery is offset by _____.	separating the positive and negative plates with plastic spacers	separating the positive and negative plates with resin impregnated spacers	adding a small amount of lithium hydroxide to the electrolyte	trickle charging	
12	210	B	Which component will stop the motor shown in the illustration in case of an overload in the control circuit?	"E"	"G"	"H"	"I"	See illustration number(s): EL-0080
12	211	C	Alternating current circuits develop resistance, inductance and capacitance. The inductance of a coil is expressed in _____.	ohms	mhos	henrys	farads	
12	212	B	An insulation resistance test is performed on a particular piece of electric equipment. In addition to the resistance reading, what information listed below should be entered in the electrical log?	The maximum allowable operating temperature of the machine.	The temperature of the machine at the time the resistance reading was taken.	The normal temperature rise of the machine.	The complete nameplate data from the resistance test instrument used to obtain the reading.	
12	213	C	A compound generator has a no-load voltage of 250 volts and a full-load voltage of 230 volts, and therefore, is considered to be _____.	flat compounded	over compounded	under compounded	terminal compounded	
12	214	D	Which of the following types of motors is often designed for use in correcting power factor?	Polyphase	Wound-rotor	Induction	Synchronous	
12	216	D	When changing out component "B" of the circuit shown in the illustration, it is important to know that _____.	it is polarity sensitive and must be inserted as indicated on its base	there is a danger of phosphor poisoning should "B"'s bulb break	component "D" must be closed during the replacement to provide the capacitor's initial charge	it must match the circuit voltage and component "C" wattage	See illustration number(s): EL-0081
12	217	B	Electric cables are formed of stranded wire to _____.	increase the current carrying capability for a given size wire	increase their flexibility	decrease the weight for a given size wire	assure good conductivity at junction points	
12	218	D	A device which prints out a permanent record of the plant operating conditions is known as the _____.	analogger	bell logger	alarm logger	data logger	
12	219	B	A load with an impedance of 440 ohms is connected across the secondary of the device illustrated. If the input voltage is 110 VAC and the step-up ratio is 10 to 1, what will be the primary current?	2.5 amps	25 amps	250 amps	current cannot be determined with information given	See illustration number(s): EL-0055

12	220	B	Figure "B" of the diagram shown in the illustration has a turns ratio of four to one. If a three-phase 440 volt supply is connected to terminals "A-B-C", what voltage should develop across terminals "a-b-c"?	64 volts	110 volts	190 volts	762 volts	See illustration number(s): EL-0084
12	221	D	Alternating current circuits develop resistance, inductance, and capacitance. The capacitance of individual capacitors is expressed in _____.	ohms	mhos	henrys	farads	
12	222	B	One method of testing for a reversed shunt field coil in a DC generator or motor is by connecting the field to a direct current source, at reduced field rated voltage, and test for polarity using a/an _____.	iron bar across each field	magnetic compass placed near each field	test lamp across adjacent fields	copper jumper across the interpole connections	
12	223	A	Which of the following statements represents the important factor that must be considered when replacing a faulty diode in the exciter rectifier assembly?	Be certain that the replacement diode is the same polarity as the one removed.	Never alter the diode alignment to cause a change in the neutral plane.	Replacement of a diode also requires balancing of the rotor with a one-piece rotor lamination to be shrunk fit and keyed to the shaft.	The replacement diode must be dipped in varnish prior to installation to protect against humidity.	
12	224	C	The purpose of amortisseur windings in a synchronous motor is to _____.	reduce eddy current losses	produce a higher power factor	provide a means for starting	eliminate arcing between the stator and the rotor	
12	226	A	Since the characteristics of the device shown in figure "A" of the illustration includes a stable voltage and low current while operating, it can be suitably used in _____.	oscillators and SCR trigger circuits	class A and B amplifiers	generator rectifier and filtering supplies	all of the above	See illustration number(s): EL-0065
12	227	D	Which solid AWG wire size has the smallest physical cross-sectional area?	12	14	16	18	
12	228	B	As shown in the illustration, the direction of electron flow through the component is _____.	from terminal "B" to terminal "A"	from terminal "A" to terminal "B"	determined by the polarity of the applied voltage	opposite from that in a resistor	See illustration number(s): EL-0079
12	229	D	A lead-acid battery is considered fully charged when the _____.	electrolyte gasses freely	battery charger ammeter indicates a positive reading	terminal voltage reaches a constant value at a given temperature	specific gravity of all cells reaches the correct value and no longer increases over a period of 1 to 4 hours	
12	230	C	Which of the listed figures shown in the illustration represents devices connected in a three-phase delta-wye arrangement?	A	B	C	D	See illustration number(s): EL-0084
12	231	B	The opposition to the establishment of magnetic lines of force in a magnetic circuit is called the circuit's _____.	resistance	reluctance	impedance	inductance	
12	232	A	The insulation resistance of electric equipment and machinery should be tested for the lowest normal insulation values _____.	immediately after shutting down the machine	every time the brush rigging is adjusted	immediately after starting up the machine	every 30 days whether the machine is in use or not	
12	233	C	Which of the terms listed best describes a compound-wound DC generator having a higher voltage at no load than at full load?	Flat compounded	Over compounded	Under compounded	Terminal compounded	
12	234	A	The turns ratio of device "B" shown in the illustration is two to one (total). If 220 volts were applied to terminals "H1" and "H2", what would be indicated across "X3" and "X4"?	55 volts	110 volts	440 volts	880 volts	See illustration number(s): EL-0082
12	236	D	The purpose of squirrel-cage windings in a synchronous motor is to _____.	provide more precise balancing	produce a higher power factor	eliminate arcing between the stator and the frame	provide a means for starting	

12	237	D	If the inputs to the diagram shown in the illustration were J=1, K=1, H=0, L=1, M=1, what logic levels would be indicated at points "X" and "Y" respectively?	0,0	0,1	1,0	1,1	See illustration number(s): EL-0089
12	238	B	High vacuum diodes, gas-filled diodes, and germanium semiconductor diodes may all be used as _____.	potentiometers	rectifiers	power sources	photocells	
12	239	D	Local action in a dry-cell, or lead-acid storage battery is the process whereby _____.	hydrogen gas is liberated	the electrolyte compensates for overcharging	potassium hydroxide absorbs carbon dioxide from the air	the battery becomes discharged without being connected to a load	
12	240	C	An important characteristic of the device shown in figure "B" of the illustration as compared with conventional NPN or PNP transistors is its _____.	higher temperature sensitivity	higher power ratings	very high input resistance	all of the above	See illustration number(s): EL-0065
12	241	C	The RMS value of a sine-wave current may also be expressed as the _____.	average value	maximum value	effective value	instantaneous value	
12	242	A	On tank vessels with an electrically-driven capstan, the motor should be meggered periodically to test _____.	insulation resistance	eddy currents	capacitance	armature reactance	
12	243	C	A triac thyristor functions as a control device and is basically _____.	two NPN transistors in parallel with a common base lead	a diode in series with a temperature sensitive capacitor	two back-to-back SCR's with a common gate lead	a triode tube with an extra heavy grid element	
12	244	B	The speed of a squirrel cage induction motor is determined by the _____.	diameter of the stator	number of stator poles	rotor winding resistance	bar resistance of the conducting rotor	
12	246	C	What is the maximum current allowed to be drawn from the secondary of a 2 KVA step-down transformer with a turns ratio of four to one if connected across a 440 volt line?	1.1 amps	4.5 amps	18.1 amps	22.7 amps	
12	247	A	Large cable sizes are formed as individual conductors that may be comprised of several smaller strands to _____.	obtain the flexibility required for easy handling	reduce the overall weight of the wire run	reduce the number of supports needed for a horizontal overhead run	all of the above	
12	248	A	The conversion of the throttle command voltage to the signal necessary to achieve the desired shaft RPM is accomplished by the _____.	ahead or astern function generator of the throttle control circuit	feedback resistor of the summing amplifier circuit	operational amplifiers in the autorotation circuit	long time constant amplifier circuit	
12	249	C	Figure "C" shown in the illustration represents a _____.	silicon controlled rectifier	light emitting diode	photosensitive diode	Zener diode	See illustration number(s): EL-0078
12	250	A	The three devices which make up the circuit shown in the illustration are _____.	flip-flops	exclusive 'OR' gates	summing op amps	function generators	See illustration number(s): EL-0087
12	251	D	The apparent power in a purely inductive circuit is also known as _____.	true power	lead power	induced power	reactive power	
12	252	A	If you obtain a low resistance reading with a megohmmeter connected between terminals "A" and "C" of the three-phase, wye-connected winding shown in the illustration, there is _____.	no open circuit between "A" and "C"	no open circuit between "C" and "B"	an open circuit between "A" and "C"	an open circuit in both windings	See illustration number(s): EL-0074
12	253	C	The multiple prefix "giga" (G) means _____.	thousand (10 to the 3rd power)	million (10 to the 6th power)	billion (10 to the 9th power)	trillion (10 to the 12th power)	
12	254	D	Due to its construction, the component in figure "A" shown in the illustration has which of the listed advantages compared to bipolar devices?	Operates with higher voltages and currents allowing its use in high power amplifiers.	Its stable triggering voltage makes it useful in oscillators and timing circuits.	Makes use of inherent unidirectional qualities serving as a controllable rectifier.	Has very high input resistance and uses practically no gate current.	See illustration number(s): EL-0078
12	256	A	Figure "B" shown in the illustration represents a/an _____.	silicon controlled rectifier	junction field effect transistor	diac thyristor	IG MOS field effect transistor	See illustration number(s): EL-0067
12	257	C	Copper is often used as an electrical conductor because it _____.	has high resistance at low temperatures	has a highly polished surface	is able to pass current with little opposition	holds insulation together well	

12	258	A	Under which of the listed conditions can the engine room retake the throttle control from the bridge?	Any time it is deemed necessary.	Only with the master's permission.	After a 10 minute delay to the input command.	Only after the throttle has been placed in stop.	
12	259	D	A hydrometer indicates specific gravity by comparing the _____.	density of a substance in water with the density of the same substance in air	differences in weight between water and the liquid measured	mass of substance measured with the density of the same substance	buoyancy of an object in water with the buoyancy of the same object in the liquid being measured	
12	260	B	The arrow drawn through the component shown in the illustration means that the device's value _____.	is fixed and cannot be changed	is variable between two limits	has yet to be determined for the circuit application	is not allowed to change during circuit operation	See illustration number(s): EL-0015
12	261	B	The unit of apparent power in a purely inductive circuit is called the _____.	kva	var	emf	watt	
12	262	B	A grounded switch or cable will be indicated by a megohmmeter reading of _____.	infinity	"zero"	being unsteady in the high range	being unsteady in the low range	
12	263	C	Regarding battery charging rooms, ventilation should be provided _____.	at the lowest point of the room	horizontally near the batteries	at the highest point of the room	only when charging is in progress	
12	264	C	In a 15 HP induction-type motor with a cage rotor, the current required at standstill to produce starting torque is approximately _____.	half the full load current	equal to the full load current	five times the full load current	ten to twenty times the full load current	
12	265	C	A single-phase induction motor having a relatively high starting torque, is the _____.	shaded pole motor	wound-rotor motor	capacitor-start motor	resistance-start motor	
12	266	A	If the clock frequency to the circuit shown in the illustration were 2 kHz, what would be indicated at the output of "FF-C"?	250 Hz	666 Hz	6 kHz	16 kHz	See illustration number(s): EL-0087
12	267	B	A common type of protective covering used on electrical conductors is _____.	plain paper	fibrous braid	silver sheathing	babbitt sheathing	
12	268	D	The main difference between an electron tube and a transistor is the _____.	type of function they can perform	reaction of electron flow through a gas or vacuum in a transistor	reaction of electron flow through a semiconductor when placed in a tube	reaction of electron flow through a semiconductor used to form a transistor	
12	269	B	Which of the following statements concerning the specific gravity of a battery electrolyte is true?	The electrolyte becomes less dense when it is cooled.	The specific gravity reading is lowered when the electrolyte is heated.	The most accurate hydrometer reading is obtained immediately after water is added.	The temperature does not affect the specific gravity of the electrolyte.	
12	270	B	If the values of C and R shown in the illustration were 1-microfarad and 3-Megohms respectively, which of the listed intervals would equal one "time constant"?	0.33 second	3 seconds	6 seconds	15 seconds	See illustration number(s): EL-0086
12	271	C	The ratio of the effective value of the counter EMF in volts, to the effective value of the current in amperes is called _____.	impedance factor	capacitive reactance	inductive reactance	root mean square	
12	272	C	A generator has been exposed to water and is being checked for its safe operation. Therefore, it is necessary to _____.	check for shorted coils with a growler	take moisture readings with a hydrometer	test insulation values with a megger	ground the commutator, or slip rings and run it at half load for 12 hours	
12	273	C	Figure "C" of the diagram shown in the illustration has a turns ratio of four to one. If a three-phase 440 volt supply is connected to terminals "A-B-C", what voltage should develop across terminals "a-b-c"?	64 volts	110 volts	190 volts	762 volts	See illustration number(s): EL-0084
12	274	B	The speed of a three-phase squirrel-cage induction-type motor operating in a fixed frequency system is varied by changing the _____.	number of phases to the motor	number of stator poles	locked rotor current	resistance of the rotor winding	

12	275	D	An across-the-line starter is typically used for which of the following applications?	Reduced-current starting of large motors	Low torque starting of small motors	Low resistance starting of DC motors	Full-voltage starting of motors	
12	276	A	The multiple prefix "kilo" means _____.	thousand (10 to the 3rd power)	million (10 to the 6th power)	billion (10 to the 9th power)	trillion (10 to the 12 power)	
12	277	B	An adjustable resistor, whose resistance can be changed without opening the circuit in which it is connected, is called a _____.	bleeder resistor	rheostat	bridge	variable shunt strip	
12	278	A	The purpose of a heat sink, as frequently used with transistors, is to _____.	prevent excessive temperature rise	compensate for excessive doping	increase the reverse current	decrease the forward current	
12	279	B	Batteries used for diesel engine starting should _____.	be located in a locker on the weather deck	be located as close as possible to the engine	have sufficient capacity to provide at least 50 starts consecutively without recharging	only be of the nickel alkaline type	
12	280	B	The turns ratio of device "B" shown in the illustration is two to one (total). If 440 volts were applied to terminals "H1" & "H2", what would be indicated across "X1" & "X4" with "X2" & "X3" connected and isolated?	110 volts	220 volts	880 volts	1760 volts	See illustration number(s): EL-0082
12	281	C	The combined effect of inductive reactance, capacitive reactance, and resistance in an AC series circuit is known as _____.	reactance	total reactance	impedance	resonance	
12	282	A	Before testing insulation with a megohmmeter, the windings of large machines should be grounded for about 15 minutes just prior to the test, because the _____.	static charge of the machine may give a false reading	armature will have a greater number of leakage paths	insulation may be damaged	insulation may be covered with moisture	
12	284	B	A double squirrel-cage motor is designed to have _____.	low starting torque	low starting current	high starting voltage	low starting resistance	
12	286	A	The diagram shown in the illustration demonstrates one of the useful properties of an "RC" time constant circuit. The useful characteristic of the circuit is that "C" can be charged _____.	slowly at low current with a high "R" value and discharged rapidly at a high current with a low "R" value	slowly at a high current with a low "R" value and discharged rapidly at a low current with a high "R" value	rapidly at a low current with a high "R" value and discharged slowly at a high current with a low "R" value	rapidly at a high current with a high "R" value and discharged slowly at a low current with a low "R" value	See illustration number(s): EL-0086
12	287	D	In a DC series circuit, all the conductors have the same _____.	power expended in them	voltage drop across them	resistance to current flow	current passing through them	
12	288	C	Which of the listed components does line "C" represent for the transistor illustrated?	Grid	Plate	Emitter	Collector	See illustration number(s): EL-0068
12	289	C	Battery charging rooms should be well ventilated because the charging process produces_____.	highly poisonous gas	highly combustible oxygen	explosive gases	corrosive gases	
12	290	A	Figure "D" shown in the illustration represents a/an _____.	DIP IC chip	integrated diac/triac envelope	TO-5 flat pack	7-segment BCD display	See illustration number(s): EL-0078
12	291	A	AC circuits develop resistance, inductance, and capacitance. The inductive reactance of a circuit is expressed in _____.	ohms	mhos	henrys	farads	
12	292	D	When a megohmmeter is used to test insulation, the gradual rise of the pointer reading as a result of continued cranking, is caused by _____.	good conductor resistance	the leakage of current along the surface of dirty insulation	the inductive reactance of the windings	the dielectric-absorption effect of the insulation	
12	293	D	Which of the methods listed is used to maintain equal load sharing between two compound wound DC generators operating in parallel?	The shunt fields are interconnected.	The shunt field rheostats are interconnected.	The series fields of both generators are connected in series.	The series fields of both generators are connected in parallel.	
12	294	A	The rotor slots of a repulsion-type motor are generally skewed (placed nonparallel to the rotor axis) to _____.	produce a constant starting torque	permit a greater air gap with the starter	permit a smaller air gap with the starter	reduce eddy current losses	

12	295	A	Shading coils are installed on AC full-voltage starters to _____.	eliminate contact chatter	dissipate opening contact arcs	delay current build up in the holding coil	protect the motor windings from momentary starting current overload	
12	296	B	A silicon controlled rectifier (SCR) is a solid state device used to change _____.	DC to AC and control relatively low load current	AC to DC and control relatively high load current	DC to AC and control relatively high load current	AC to DC and control relatively low load current	
12	297	C	Which of the AWG wire sizes listed below would have the smallest diameter?	0	0	14	250	
12	298	B	The basic control action of a magnetic amplifier depends upon _____.	variations in the load capacitance	changes in inductance	type of core material	construction of the core	
12	299	C	During the charging process of storage batteries, the charging rooms should be well ventilated because _____.	without ventilation excessive gassing will occur	highly poisonous gases are released	highly explosive gases will otherwise accumulate	without ventilation the battery will not take a full charge	
12	300	D	If the inputs to the diagram shown in the illustration were J=1, K=0, H=0, L=1, M=1, what logic levels would be indicated at points "X" and "Y" respectively?	0,0	0,1	1,0	1,1	See illustration number(s): EL-0089
12	301	A	Which of the listed figures shown in the illustration represents devices connected in a three-phase delta-delta arrangement?	A	B	C	D	See illustration number(s): EL-0084
12	302	B	When using a megohmmeter to test insulation, good insulation will be indicated by _____.	slight kicks of the needle down scale	a downward dip followed by a gradual climb to the true resistance value	a gradual rise in the pointer reading at the outset	the initial dip of the pointer	
12	303	A	Figure "D" of the diagram shown in the illustration has a turns ratio of four to one. If a three-phase 440 volt supply is connected to terminals "A-B-C", what voltage should develop across terminals "a-b-c"?	64 volts	110 volts	190 volts	762 volts	See illustration number(s): EL-0084
12	304	B	A three-phase, induction-type motor experiences an open in one phase. Which of the listed automatic protective devices will prevent the machine from being damaged?	Overspeed trip	Thermal overload relay	Three-pole safety switch	Magnetic blowout coil	
12	305	B	Most three-phase induction motors used for driving engine room auxiliaries are started by _____.	resistor starters	across-the-line starters	impedance starters	reactor starters	
12	306	D	The turns ratio of device "B" shown in the illustration is two to one (total). If 110 volts were applied to terminals "X1,3" and "X2,4", what would be indicated across "H1" and "H2"?	27.5 volts	55 volts	220 volts	440 volts	See illustration number(s): EL-0082
12	307	C	When electrical cables penetrate watertight bulkheads, _____.	they should be grounded on either side of the bulkhead	they must be bent to a radius of six diameters	a watertight stuffing tube capable of accepting packing should be employed	they should be secured by a clamp	
12	308	A	The purpose of an impressed current cathodic protection system aboard ship is to _____.	prevent corrosion of the hull, propeller, rudder and line shafting	neutralize the vessel's stray magnetic fields which would interfere with radar	protect engine room and deck machinery from oxidation in the presence of salt air	maintain a minimum constant alternator load to prevent overheating	
12	309	D	Routine maintenance of lead acid batteries should include _____.	keeping the terminals clean	coating cable connections with petroleum jelly	maintaining a trickle charge	all of the above	
12	310	D	Leads on the device in figure "B" shown in the illustration are named _____.	source, gate and drain	emitter, base and collector	emitter, base 1 and base 2	anode, cathode and gate	See illustration number(s): EL-0067
12	311	C	The process, whereby electrons gain sufficient energy to be released from the surface of a thin, heated metal plate, is known as _____.	photo electric emission	secondary emission	thermionic emission	regressive emission	

12	312	D	Before testing insulation with a megohmmeter, the windings of large machines should be grounded for about 15 minutes just prior to the test as the _____.	insulation may be damaged	insulation may be covered with moisture	armature windings will have a greater number of leakage paths	larger machines may acquire a charge of static electricity during operation	
12	313	B	A variable shunt, connected across the series field coils of a DC compound wound generator, to permit adjustment of the degree of compounding, is called a _____.	divider	diverter	converter	rheostat	
12	315	C	Across-the-line starters are used with AC motors to provide _____.	reduced starting current	regulated starting current	high starting torque	controlled starting acceleration	
12	316	A	The leads of the device in figure "B" shown in the illustration are named _____.	source, gate and drain	emitter, base and collector	emitter, base 1 and base 2	anode, cathode and gate	See illustration number(s): EL-0065
12	317	A	Electrical circuits are protected against overheating by means of a/an _____.	circuit breaker	amplifier	diode	capacitor	
12	318	C	The function of a rectifier is similar to that of a _____.	trap	regulating valve	check valve	filter	
12	319	C	The circuit shown in the illustration functions as a _____.	pulse trigger circuit for an operational amplifier	three stage, high gain class 'A' amplifier	binary ripple counter or shift register	free running multivibrator	See illustration number(s): EL-0087
12	320	D	The multiple prefix "tera" (T) means _____.	thousand (10 to the 3rd power)	million (10 to the 6th power)	billion (10 to the 9th power)	trillion (10 to the 12th power)	
12	321	A	Most conducting materials such as copper, aluminum, iron, nickel, and tungsten _____.	increase in resistance with increased temperature	increase in resistance with decreased temperature	decrease in resistance with increased temperature	increase in conductance with increased temperature	
12	322	D	The electrician reports to you that he has obtained low (but above 1 megohm) megger readings on the windings of a deck winch motor. Upon checking the records of that motor, you find the readings have consistently been at that level for the last six years. You should, therefore, recommend that the _____.	motor be replaced	windings be dried	windings be cleaned	readings are acceptable	
12	325	D	In a faceplate-type motor starter, the starting arm is held in the "OFF" position by a/an _____.	cotter pin	magnet	electrical circuit	strong spring	
12	326	D	If the values of "C" and "R" shown in the illustration were 1 microfarad and 3 Megohms respectively, at what listed time would "C" be considered fully charged?	0.33 second	3 seconds	6 seconds	15 seconds	See illustration number(s): EL-0086
12	327	B	A circuit is protected from overheating by a/an _____.	pyrometer	thermal overload relay	magnetic contactor	overload transformer	
12	328	A	The device in figure "A" shown in the illustration can sometimes have two _____.	gates	emitters	substrates	cathodes	See illustration number(s): EL-0078
12	329	B	Which of the following devices should be used to measure the temperature of a battery electrolyte?	Mercury thermometer	Alcohol thermometer	Thermocouple pyrometer	Potentiometer	
12	330	C	Which of the wave shapes shown in the illustration is termed a sinusoidal wave?	A	B	C	D	See illustration number(s): EL-0088
12	331	B	In a series circuit, which value will remain unchanged at all places in the circuit?	Voltage	Current	Resistance	Inductance	
12	332	D	If the pointer fails to return to zero when a megger is disconnected, the _____.	pointer is stuck	hair springs are burned out	megger is out of calibration	megger is operating normally	
12	333	B	Which of the following components are used to convert alternating current produced in the generator windings to direct current?	Armature and equalizer	Commutator and brushes	Rotor and interpoles	Field and exciter	
12	334	D	Which line of figure "A" shown in the illustration represents the interval that the pulse is 'OFF'?	W	X	Y	Z	See illustration number(s): EL-0088
12	335	B	In electronic circuitry, the abbreviation "PCB" commonly means _____.	pulse coded binary	printed circuit board	poly-coated braid	personal computer bits	

12	336	D	The seven segment arrangement for numerical display on consoles, test meters and other applications can be either _____.	UJT or BJT	BCD or OCD	JFET or IGFET	LED or LCD	
12	337	D	Line losses in a distribution circuit are kept to a minimum by _____.	adding rubber insulation conductors to the circuit	using higher current and lower voltage	increasing the number of thermal relays in the circuit	using higher voltage and lower current	
12	338	B	Which of the listed conditions describes the effect on intrinsic semiconductor operation as a result of a temperature increase?	Additional heat sinks will be required	Conductivity will increase	Conductivity will decrease	Resistivity will increase	
12	339	D	The arrow drawn through the resistor shown in the illustration indicates that it is _____.	for use in low power applications	a carbon composition type	a wire-wound type	one whose resistance is variable	See illustration number(s): EL-0086
12	340	D	In electronic circuits, DC voltages can be positive (+) or negative (-) when measured with respect to the _____.	printed circuit board "common" trace	chassis, console frame or hull "ground"	analogue or digital circuitry "common" bus	all of the above	
12	342	A	The final step in testing a circuit for a ground involves the use of a megohmmeter. A grounded switch or cable will be indicated by a megohmmeter reading of _____.	"zero"	infinity	steady in the high range	unsteady in the low range	
12	344	D	Which of the following statements is true concerning the cleaning of electrical contacts?	Compressed air should be used to blow out metallic dust.	Magnetic brushes should be used to remove metallic dust.	The contact surfaces should be greased to increase contact resistance.	Delicate parts should be cleaned with a brush and an approved safety solvent.	
12	345	C	Which of the following describes the action when the handle is moved to the start position of a drum-type motor controller used with a compound motor?	Full current is supplied to the shunt field, series field, and armature.	Full line current is supplied to the shunt and series fields, and reduced current is supplied to the armature.	Full line current is supplied to the shunt field, and reduced current is supplied to the series field and the armature.	Reduced line current is supplied to the shunt field, series field, and armature.	
12	346	B	The multiple prefix "mega" (M) means _____.	thousand (10 to the 3rd power)	million (10 to the 6th power)	billion (10 to the 9th power)	trillion (10 to the 12th power)	
12	347	D	To minimize magnetic field interaction between electrical conductors in physical proximity, it is best to keep them _____.	parallel and as close as possible to each other	at right angles and as close as possible to each other	parallel to and as far as practicable from each other	at right angles and as far as practicable from each other	
12	348	A	Capacitors are used on the output of the power supply in today's consoles to _____.	filter out "ripple"	prevent overloads	act as a permanent load	decrease the average value of the output voltage	
12	349	D	A nickel-cadmium battery is receiving a normal charge and gases freely. The charging current should _____.	be increased	be decreased	be cut off and the battery allowed to cool	remain the same	
12	350	C	Figure "A" shown in the illustration represents a/an _____.	magnetic amplifier	Scott-T transformer	saturable-core reactor	oil-filled toroid	See illustration number(s): EL-0091
12	351	B	Reduced voltage applied to a motor during the starting period will _____.	result in decreased acceleration time only	lower the starting current and increase accelerating time	cause a greater starting torque	increase the starting current and pump capacity	
12	353	C	Armature cores in a DC generator are made of laminated steel sheets to _____.	fit the curvature of the frame	increase the hysteresis effect	reduce eddy current losses	allow for easy assembly	
12	354	B	The item referred to as a pigtail on a DC motor brush rigging is a/an _____.	feather spring	uninsulated wire	flexible spring adjuster	brush holder	
12	355	A	The purpose of a motor undervoltage protection device is to _____.	prevent high armature current when power is restored	start the motor at a very low voltage	trip the load off the motor in case of fire	protect personnel from low voltage shocks	
12	356	B	If the clock frequency to the circuit shown in the illustration were 100 kHz, what would be indicated at the output of "FF-C"?	10.1 kHz	12.5 kHz	805 kHz	1010 kHz	See illustration number(s): EL-0087

12	357	D	Which of the following components are used to assemble a fluorescent lighting system?	Lamp	Starter	Ballast	All of the above	
12	358	B	A saturable-core reactor operates on the principle of controlling a load winding's inductance by varying the core's _____.	dielectric	permeability	reactance	inductance	
12	359	B	RC time constant characteristics, as shown in the illustration, are important in _____.	bridge rectifiers for alternator excitation	timing and pulse shaping circuits	transistor power amplifier biasing	motor controller overload protection	See illustration number(s): EL-0086
12	360	A	Operational amplifiers, used primarily in analog circuits, are characterized by _____.	high input impedance, high gain and low output impedance	high input impedance, high gain and high output impedance	low input impedance, low gain and high output impedance	low input impedance, high gain and low output impedance	
12	361	D	Reversing the current flow through a coil will _____.	reduce the amount of flux produced	have no effect on the eddy currents produced	reduce the power consumed	reverse its two-pole field	
12	362	D	In testing a three-phase delta winding for an open circuit using a megohmmeter, you must _____.	test each phase with all connections intact	measure the voltage across the open connections while testing	test the windings as parallel groups to avoid short circuiting	open the delta-connections to avoid shunting the phase being tested	
12	365	D	Low voltage releases as used in some shipboard motor starter and control equipment will have which of the following characteristics?	They trip circuit contactors when the motor starts to overspeed.	They require manual resetting upon restoration of normal voltage.	They use a phase sensitive relay to trip contacts in series with the holding coil of the starter.	They allow the motor to restart upon restoration of normal voltage.	
12	366	D	The schematic symbol for an operational amplifier in an analog circuit is a _____.	circle	square	trapezoid	triangle	
12	367	B	The total resistance of a parallel circuit is always _____.	larger than the greatest branch resistance	smaller than the lowest branch resistance	equal to the sum of the individual branch resistances	one-half the sum of the individual branch resistances	
12	368	C	Which of the following expresses the relationship of the input and output frequencies in a full wave rectifier?	The output frequency is the same as input frequency.	The output frequency is one-half the input frequency.	The output frequency is twice the input frequency.	The output frequency is four times the input frequency.	
12	369	A	In which section of the 24 VDC power supply circuit illustrated, does the greatest change in voltage level take place when fed from ships power.	I	II	III	IV	See illustration number(s): EL-0085
12	370	B	If the outputs marked "Q" of "FF-A", "FF-B" and "FF-C" in the circuit shown in the illustration are at logic levels 0, 1, and 1 respectively, what levels are present at the "NOT Q" outputs?	1, 0, and 1	1, 0, and 0	0, 0, and 1	0, 1, and 1	See illustration number(s): EL-0087
12	371	B	The direction of rotation of an induction motor is _____.	opposite the rotating field direction	the same as the direction of the rotating field	determined by the number of poles	determined by the staggering of the brushes	
12	372	A	An insulation resistance reading is taken at 20°C and found to be 10 megohms. What would you expect the resistance reading to be at 40°C?	2.5 megohms	10 megohms	15 megohms	20 megohms	
12	375	B	A motor controller contains three selector push buttons labeled "start", "jog", and "stop". When the "jog" button is pushed, the motor _____.	will run continuously after the "jog" button is released	will run until the "jog" button is released	will not start until both the "jog" and "start" buttons are pushed	will not stop unless the "stop" button is pushed	
12	376	D	For more complete vessel protection when using an impressed current cathodic system _____.	all ship's service alternators have additional temperature sensing devices and a thermal recorder installed	machinery on deck and in the engineroom is first coated with zinc chromate before final painting	the hull's magnetic fields are aligned with a solid-state degaussing circuit using SCR's	straps connect the rudder with the hull and the propeller shaft is grounded through a slip ring/brush arrangement	

12	377	B	A "dead front" switchboard is one _____.	without switches on it	with insulated switches and no exposed terminals	without circuit breakers	without safety hand rails nor rubber mats	
12	378	B	The device in figure "B" shown in the illustration will conduct when the _____.	base-emitter is forward biased and the collector-base is reverse biased	anode-cathode is forward biased and the cathode-gate is forward biased	source-gate is forward biased and the gate-drain is reversed biased	terminal 1-2 is forward biased and the emitter-terminal 1 is reverse biased	See illustration number(s): EL-0067
12	379	A	Mercury filled thermometers should never be used to determine the temperature of the battery electrolyte because accidental breakage of the thermometer can cause _____.	severe sparking and explosions	rapid oxidation of battery plates	contamination of the electrolyte	corrosion on the battery terminals	
12	380	A	The sub-multiple prefix "milli" (m) means _____.	one thousandth (10 to the -3rd power)	one millionth (10 to the -6th power)	one billionth (10 to the -9th power)	one trillionth (10 to the -12th power)	
12	381	D	When a solid-state component of an electronic circuit is mounted to a metallic mass, the general purpose of that mass is to _____.	prevent vibration damage to delicate components	prevent mechanical damage to solid-state components	dissipate stray magnetic currents	act as a heat sink	
12	382	B	When you are making a high potential test on a piece of repaired electrical machinery, a rise in leakage current indicates _____.	good insulation	bad insulation	high insulation power factor	a high slot discharge factor	
12	383	A	If the values of "C" and "R" shown in the illustration were 1 microfarad and 100 kOhms, which of the listed time intervals would equal one "time constant"?	0.1 second	0.2 second	0.5 second	5.0 seconds	See illustration number(s): EL-0086
12	384	B	What is the function of the interpoles installed in DC motors?	To provide greater torque by strengthening the main field.	To provide sparkless commutation without having to shift the brushes.	To limit the production of counter-electromotive force.	To limit the starting surge current.	
12	385	B	Which of the wave shapes shown in the illustration is termed a ramp or sawtooth wave?	A	B	C	D	See illustration number(s): EL-0088
12	386	D	The circuit shown in the illustration represents a/an _____.	operational amplifier	Wheatstone bridge	magnetic amplifier	power supply	See illustration number(s): EL-0085
12	387	C	The purpose of a main switchboard circuit breaker's reverse-power trip is to _____.	prevent main circuit overload	protect the circuit breaker blowout coil	prevent alternator motorization	prevent low voltage tripout	
12	388	C	A temperature instrumentation system for an engine room console consists of a resistance temperature detector (RTD), a measuring bridge circuit, and a meter (or alarm circuit).Which of the following statements is true concerning the measuring bridge circuit?	The input voltage varies in a linear fashion with temperature.	The voltage across the center of the resistance bridge is always constant.	The resistance bridge is said to be balanced when its output voltage is zero.	The input voltage of the resistance bridge is the constant temperature signal.	
12	389	A	When charging lead-acid batteries, the charging rate should be reduced as the battery nears its full charge to _____.	prevent damaging battery plates	allow equalization of cell voltages	reduce lead sulfate deposits	increase lead peroxide formation	
12	390	D	One feature of the operational amplifier is that it can have _____.	up to ten outputs	binary coded decimal inputs	several hundred amps at the output	inverting and non-inverting inputs	
12	391	A	Regarding an induction motor, the power developed by the rotor automatically adjusts itself to the _____.	power required to drive the load	speed required to drive the load	current flow in the motor stator	torque developed by the rotating field	
12	392	A	You are testing the insulation in an AC generator with a megohmeter. The resistance value of a dry, clean winding will _____.	continue to rise as the test potential is maintained, becoming fairly steady as the leakage current stabilizes	remain constant as the temperature of the windings increases	continue to drop as the potential is maintained, becoming fairly steady after 5 to 7 minutes	stabilize after approximately 2 to 4 minutes of fluctuation	
12	393	B	Modern DC generators are fitted with commutating poles to _____.	prevent motorizing	reduce sparking	reduce the load on the main poles	reduce spring pressure on the brushes	

12	395	B	The purpose of a magnetic relay is to _____.	open a circuit only in the event of overload	remotely open and close contacts	provide overcurrent protection during starting	relay voltages at increased power	
12	396	D	A saturable reactor uses relatively small DC currents to control _____.	high frequency low power loads	low frequency low power loads	high frequency high power loads	low frequency high power loads	
12	397	C	If a frequency of 16.8 kHz were measured at the output of "FF-C" of the circuit shown in the illustration, the clock frequency would be _____.	8.4 kHz	50.4 kHz	134.4 kHz	1680.0 kHz	See illustration number(s): EL-0087
12	398	D	A signal derived from a controlled function and returned to the initiating point is called a/an _____.	monitoring signal	inverse signal	reverse signal	feedback signal	
12	399	A	Routine maintenance of dry-type transformers should include _____.	cleaning the windings, if accessible, with a vacuum cleaner or very low pressure air	measuring and recording the winding temperature with an accurate mercury thermometer	periodic cleaning of the winding insulation with an approved solvent	making sure that the units are close to bulkheads or corners to protect them from damage	
12	400	B	The sub-multiple prefix "micro" (Greek letter 'mu') means _____.	thousandth (10 to the -3rd power)	millionth (10 to the -6th power)	billionth (10 to the -9th power)	trillionth (10 to the -12th power)	
12	401	B	A semiconductor is a material with a _____.	conductivity higher than a normal conductor	conductivity higher than a normal insulator	high conductivity at low temperatures	low conductivity at high temperatures	
12	402	C	A capacitor can be tested using a megohmmeter or an ohmmeter. If the meter is connected to a shorted capacitor, the meter pointer should _____.	immediately swing to the maximum resistance value for the capacitor	first swing quickly to "zero", then gradually move up the scale as the capacitor charges	immediately deflect to and remain at zero	immediately swing to a high reading and then gradually decrease	
12	404	D	A shaded-pole motor is a _____.	synchronous motor	three-phase induction motor	compound-wound motor	single-phase induction motor	
12	406	D	To provide its unique characteristics to analog circuits, the operational amplifier is made up of a/an _____.	voltage amp, current amp and output amp	input amp, power amp and output amp	scaling amp, power amp and voltage amp	differential amp, voltage amp and output amp	
12	407	D	The part of the shipboard electrical system used to control the distribution of power to the branch circuits, is the _____.	bridge control panel	disconnect links	governor relay box	main switchboard	
12	408	D	The amount of current flow required for the cathodic protection of a vessel is dependent upon the _____.	amount of bare steel surface	speed of the ship through the water	temperature of the water	all of the above	
12	409	D	When mixing electrolyte for a lead-acid storage battery, you should pour the _____.	distilled water into the acid in a zinc-plated container	distilled water into the acid in a glass container	acid into the distilled water in a zinc-plated container	acid into distilled water in a glass container	
12	410	A	Figure "B" shown in the illustration represents a/an _____.	magnetic amplifier	Scott-T transformer	saturable-core reactor	oil-filled toroid	See illustration number(s): EL-0091
12	411	A	In the illustration, if the device in figure "A" has a step-up ratio of 10 to 1, what voltage should be measured at the secondary shortly after the primary of the device is connected to 110 volts DC?	0 volts	110 volts	11 volts	1100 volts	See illustration number(s): EL-0059
12	412	C	To carry out an insulation resistance test, one terminal of the megohmmeter should be connected to the winding, with the other terminal being connected to the _____.	power supply	variable resistor	frame of the machine	armature	
12	413	C	If the values of "C" and "R" shown in the illustration were 1 microfarad and 100 kOhms respectively, at what listed time would "C" be considered fully charged?	0.1 second	0.2 second	0.5 second	5 seconds	See illustration number(s): EL-0086
12	414	A	The mica used in the commutators of DC machinery is _____.	harder than copper	softer than copper	the same hardness as the copper	softer than copper but wears away at a slower rate	

12	415	B	When starting a DC propulsion motor the variable rheostat must FIRST be turned _____.	all the way to the run position then quickly back to slow	to the slow position then gradually moved to full speed	to the mid position	quickly to the run position	
12	416	C	Which section of the circuit shown in the illustration smooths out highest degree of pulsations?	I	II	III	IV	See illustration number(s): EL-0085
12	417	A	A switchboard for an AC electrical system requires the use of which of the following devices?	Frequency meter.	Ohmmeter.	Induction voltage regulator.	Current transformer governor.	
12	418	D	When replacing a power transistor fitted with a heat sink in a circuit, a coating of silicone grease is applied between the transistor case and the heat sink. This is done to _____.	lubricate the transistor	lubricate the heat sink	aid in the removal of the heat sink	provide maximum heat transfer	
12	419	B	The charge of a lead-acid battery can be restored by _____.	passing an alternating electric current through the cell	passing a direct electric current through the cell	adding acid to the electrolyte	all of the above	
12	420	D	Which of the wave shapes shown in the illustration is termed a sharp pulse or spiked wave?	A	B	C	D	See illustration number(s): EL-0088
12	421	A	The resistance of a conductor varies _____.	directly as its length and inversely as its cross-sectional area	inversely as its length and directly as its cross-sectional area	directly as its length and directly as its cross-sectional area	inversely as its length and inversely as its cross-sectional area	
12	422	D	To determine if a stator coil is grounded, you should use a/an _____.	ammeter	ground detection lamp	magneto	megger	
12	423	B	In an impressed current cathodic protection system, the anode is _____.	connected to the hull and deteriorates with time	insulated from the hull and does not waste away	connected to the hull but does not waste away	insulated from the hull but deteriorates with time	
12	425	A	One function of the movable cams in a drum-type motor controller is to _____.	regulate the speed of the motor	maintain resistance contacts in clean condition	insulate the operating handle	limit the amount of load put on the motor	
12	426	C	The point of operation for a saturable reactor in a power circuit is that at which _____.	a large change in control current results in small change in load current	a small change in load current results in a large change in control current	a small change in control current results in a large change in load current	a large change in load current causes a small change in control current	
12	427	A	In the illustrated circuit, section II is considered to be a _____.	full wave rectifier	half wave rectifier	quarter wave rectifier	short wave rectifier	See illustration number(s): EL-0085
12	428	C	In order to check the performance of a transistor removed from its circuit, the instrument to be used should be a/an _____.	voltmeter or transistor tester	impedance meter	ohmmeter or transistor tester	sensitive potentiometer	
12	429	B	To test the state of charge of a nickel-cadmium battery, you should use a/an _____.	ammeter	voltmeter	hydrometer	potentiometer	
12	430	B	Section III of the circuit shown in the illustration is a _____.	voltage regulator	filter	rectifier	voltage transformer	See illustration number(s): EL-0085
12	431	D	If a frequency of 2.5 kHz were measured at the output of "FF-C" in the circuit shown in the illustration, what would be the clock frequency?	0.8 kHz	2.5 kHz	7.5 kHz	20 kHz	See illustration number(s): EL-0087
12	432	C	When a megohmmeter is being used to test insulation resistance, current leakage along the surface of the insulation is indicated by the megohmmeter's pointer _____.	dipping toward zero then raising slowly	continually rising as test voltage is applied	kicking slightly down scale as voltage is applied	fluctuating around a constant resistance reading	
12	434	B	Which of the following types of DC motors has its field connected in parallel with its armature?	Counter EMF	Shunt	Salient pole	Series	
12	435	B	Magnetic controller contacts may become welded together during operation due to _____.	an open coil	low contact pressure	excessive ambient temperature	excessive magnetic gap	

12	436	C	What precaution should be taken with a vessel's impressed current cathodic protection system after a drydocking period during which the hull has been painted?	Output currents should be carefully monitored to assure operation at nearly 100 % capacity for proper curing.	Reference cell voltages should be maintained at half the normal range for approximately 48 hours.	The unit should remain off for the specified amount of time so as not to disturb curing.	A slight (10-15%) overcurrent to the anodes should be allowed in order to speed drying.	
12	437	A	On a switchboard, if all three ground detection lamps remain burning at half intensity when the test button is depressed, which of the listed conditions is indicated?	No grounds exist.	All three phases are grounded.	The test switch is grounded.	The current transformers are shorted.	
12	438	B	Which of the following actions can be carried out in order to prevent thermal runaway in a transistor?	Increase the current through the collector-base junction.	Install a heat sink.	Shift the "Q" point to increase collector current.	Increase the potential difference between the emitter and the base.	
12	439	D	When checking the specific gravity of the battery electrolyte with a hydrometer, you should be aware that _____.	the battery is fully charged when the float sinks deepest into the electrolyte	the battery is discharged when the float is highest in the electrolyte	a hydrometer reading is accurate if taken immediately after water is added to the cell	warm temperatures will lower the specific gravity of the electrolyte	
12	440	C	Basic operating characteristics of the operational amplifier such as gain and stability are the function of its _____.	differential input stage	power output stage	feedback circuit	supply voltages	
12	441	D	Possible phase relationships between voltage and current in an alternating current circuit include which of the following conditions?	Current and voltage may be in phase.	Current may lead the voltage.	Current may lag the voltage.	All of the above.	
12	442	B	A suspected "open" in a motor field can be tested by using a/an _____.	potentiometer	megger	wattmeter	ammeter	
12	444	D	Insufficient brush pressure on a DC motor may cause _____.	generator overload	excess residual magnetism	water vapor absorption	sparking of the brushes	
12	445	B	Burning of controller contacts, when opening, is prevented by _____.	coating the contact surfaces lightly with petroleum jelly	magnetic blowout coils	an overvoltage release	an overcurrent release	
12	446	C	The sub-multiple prefix "nano" (n) means _____.	thousandth (10 to the -3rd power)	millionth (10 to the -6th power)	billionth (10 to the -9th power)	trillionth (10 to the -12th power)	
12	447	D	A switchboard, for a AC electrical distribution system, will be provided with which of the following components?	Frequency meter.	Ammeter	Voltmeter	All of the above	
12	448	D	Which of the procedures listed could result in damaging a transistor beyond repair?	Applying incorrect polarity to the collector circuit.	Applying excessive voltage to the input circuit.	Careless soldering which would overheat the transistor.	All of the above.	
12	449	A	What is the polarity of voltage at point "Z" in the circuit shown in the illustration?	It will always be positive.	It will always be negative.	It depends on the instantaneous polarity at point "W".	It cannot be determined without a voltmeter.	See illustration number(s): EL-0085
12	450	D	Basically, a magnetic amplifier is a saturable reactor with the addition of _____.	AC to the bias winding	variable capacitance to all windings	eddy current protectors	a rectifier in the load circuit	
12	451	D	Which of the electrical properties listed will always be the same for each component in a parallel circuit?	Impedance	Current	Resistance	Voltage	
12	452	B	Which of the listed instruments can be best used to locate a grounded field coil in a synchronous motor?	Frequency meter	Megohmmeter	Voltmeter	Multimeter	
12	453	B	A generator is prevented from becoming motorized by the use of a/an _____.	overspeed trip	reverse power relay	back pressure trip	governor controls	
12	454	B	Which type of AC single-phase motor will also operate on direct current?	Split-phase	Series-wound	Shaded-pole	Repulsion-start	
12	455	B	If the contacts of a motor starter or controller fail to drop out when the "stop" button is depressed the _____.	contacts are carrying excessive current	contacts have become welded together	shading coil is broken	shading coil is loose	

12	456	C	Figure "A" of the diagram shown in the illustration represents a _____.	differential transformer	saturable reactor	synchro system	magnetic amplifier	See illustration number(s): EL-0092
12	457	B	Which section of the circuit shown in the illustration changes AC to DC?	I	II	III	IV	See illustration number(s): EL-0085
12	458	B	A capacitor discolored due to excessive heat should be _____.	calibrated	replaced	cooled	soldered	
12	459	A	The standard procedure for maintaining the charge in an emergency diesel starting battery is to trickle charge the battery _____.	continuously	at least once each week	whenever the charge falls to 75% of full charge	whenever the electrolyte specific gravity falls to 1.250 or lower	
12	460	A	Which of the wave shapes shown in the illustration is termed a square wave?	A	B	C	D	See illustration number(s): EL-0088
12	461	A	A replacement wire having twice the length and one-half the cross sectional area of the original wire will have a resistance that is _____.	four times that of the original wire	twice that of the original wire	the same as that of the original wire	one-half that of the original wire	
12	462	D	Aboard ship, a grounded field coil in an AC motor can be determined by using a _____.	portable growler	galvanometer	visual inspection	megohmmeter	
12	463	B	The electrical energy necessary to power a sound-powered telephone's small vibrating bell is obtained from _____.	the emergency batteries for the general alarm	each station's hand-cranked generator	the emergency switchboard	normal 115 volt DC supplies	
12	464	B	What is the purpose of the "annunciator module" (6000F35) shown in the illustration?	Provide an input to the setpoint module.	Drive the alarm lamp and, through the controller, the horn.	Deliver +5 and +24 volts to their respective power supplies.	Connect 24 volts to both sides of the horn.	See illustration number(s): EL-0094
12	465	C	Grease coatings on electrical contact surfaces increase contact resistance and should be removed with a/an _____.	small wire brush	compressed air jet	clean dry cloth	10% solution carbon solvent and water	
12	466	B	Which of the referenced waveshapes would appear at point "W" in the circuit shown in the illustration?	A	B	C	D	See illustration number(s): EL-0085
12	467	D	A ground in an electrical circuit outside the engine room _____.	cannot be detected under normal conditions	is of no consequence to engineering personnel	is indicated at the branch circuit breaker panel	is indicated by the ground detecting lamps on the main switchboard	
12	468	B	If a delicate component must be soldered into a circuit, the component may be protected from the heat of the soldering process by _____.	operating the soldering gun not more than 60 seconds at a time	using a thermal shunt	pre-oxidizing the leads to be soldered	coating the leads to be soldered with a light oil film	
12	469	C	As shown in the illustration, the circuit which "shapes" the linear output of the thrust lever so that the steady-state ship speed is linear with respect to that lever's setting is the _____.	"pitch controller"	"error amplifier"	"function generator"	"servo amplifier"	See illustration number(s): EL-0095
12	470	C	If the "E/P converter" shown in the illustration operated on a range of 1-9 volts and 6-30 PSI, a 5 volt input would yield _____.	9 PSI	15 PSI	18 PSI	24 PSI	See illustration number(s): EL-0096
12	471	A	If you disconnect and arrange both ends of a three conductor cable, without any contact between the individual conductors, an indicated ohmic value between the ends of a single conductor would indicate _____.	continuity of the conductor	an infinite resistance	the presence of a partial ground	that the conductor is not short circuited	
12	472	A	A testing device called a "growler" is being used to locate a shorted coil in the stator of an AC electrical machine. When the "feeler" is moved over a slot containing the shorted coil _____.	a loud growling noise will be heard	any vibration within the feeler will cease	the meter needle will be deflected to zero	the meter needle will be deflected to full-scale	

12	473	D	A DC shunt generator has its field windings connected in _____.	series with the series windings	parallel with the field rheostat	series with the armature windings	parallel with the armature windings	
12	474	A	Which line in figure "A" shown in the illustration represents the leading edge of the wave?	W	X	Y	Z	See illustration number(s): EL-0088
12	475	C	Controller contacts should be routinely cleaned by _____.	blowing with compressed air	filing with a bastard file	wiping with a clean dry cloth	dressing with crocus cloth	
12	476	D	The "T-R" circuit of the system shown in the illustration would become inoperative if a ground developed at _____.	either "T" or "C"	either "B" or "R"	both "B" and "C"	both "T" and "R"	See illustration number(s): EL-0093
12	477	B	The third color band on a resistor is used to indicate the _____.	tolerance of the resistor	number of zeros following the first two significant figures in the resistance value	first significant figure of the resistance	second significant figure of the resistance	
12	478	B	Why is it a poor practice to use a high wattage soldering iron when soldering or desoldering components on a printed circuit board?	The circuit board will blister and warp.	The foil wire bonded to the board may come loosened from the board.	The circuit board has a low melting temperature.	The solder is kept to a dull heat dissipating finish.	
12	479	B	Which of the following temperatures represents the maximum allowable temperature for the electrolyte of a lead-acid battery?	100°F	125°F	145°F	212°F	
12	480	D	The sub-multiple prefix "pico" (p) means _____.	thousandth (10 to the -3rd power)	millionth (10 to the -6th power)	billionth (10 to the -9th power)	trillionth (10 to the -12th power)	
12	481	A	Which of the following statements concerning a simple parallel resistance circuit is correct?	The voltage drop across each resistor is the same.	The total current flow equals the reciprocal of the sum of the individual currents.	The total resistance equals the sum of the individual resistances.	The total voltage equals the sum of the individual voltages across each resistance.	
12	482	D	When troubleshooting AC motors, a portable growler can be used for locating _____.	open field coils	grounded field coils	grounded stator coils	shorted stator coils	
12	483	B	The horizontal line which cuts across "L1" shown in figure "A" of the illustration indicates a/an _____.	iron core	saturable core	air gap	capacitive coupling	See illustration number(s): EL-0091
12	484	C	Impressed current cathodic protection is used on vessels instead of _____.	fire alarm systems	repeated painting	sacrificial zincs	vacuum tube degaussing systems	
12	485	C	Which of the following methods should be used to dress the face of silver-plated contacts?	Filing	Burnishing	Sanding with 0000 sandpaper	All of the above are correct.	
12	486	A	A lead-acid battery may become hotter than normal during a charge if the _____.	battery has a shorted cell	charging voltage is too low	specific gravity is too high	battery room door is secured	
12	487	B	The resistance value of a resistor in a circuit can best be determined by the _____.	single solid body color of the resistor	band markings on the resistor	amperage value written on the resistor	physical size of the resistor	
12	488	C	On AC vessels, which of the following statements represents the most difficult problem involved in obtaining a DC potential suitable for use by computer components?	A stepdown transformer is always required.	Vessel vibrations affect the voltage source.	The voltage must be rectified and made ripple free.	Rectifiers cannot operate with voltage regulators.	
12	489	C	When charging a nickel-cadmium battery, _____.	the charging rate should be lessened when gassing commences	overcharging should be avoided	the specific gravity of the electrolyte will be unaffected by the state of charge	add distilled water just prior to charging to insure proper mixing	
12	490	B	Common basic applications for the operational amplifier include _____.	counting, pulsing and clocking amplifiers	summing, scaling and difference amplifiers	step-up, step-down and rectifying amplifiers	all of the above	
12	491	D	Which of the substances listed can be used to shield sensitive equipment from static magnetic fields?	Glass	Mica	Bakelite	Permeable iron	
12	492	D	Handheld phase sequence indicators are useful when _____.	preparing to parallel alternators	connecting lighting branch circuits	troubleshooting DC motors	connecting shore power lines to the ship	

12	493	D	A shunt-wound DC generator is one in which the shunt field windings are in parallel with the _____.	commutator	brushes	armature	all of the above	
12	494	B	The rotor of a synchronous motor operates in synchronism with the rotating field because _____.	of the amortisseur windings	the rotor is magnetically locked into step with the rotating magnetic field by the excitation current	the field strength varies directly with rotor slip	the stator flux rotates in the opposite direction	
12	495	D	Which of the listed items will stop a motor due to a reduction in voltage and restart it when the voltage is restored to normal?	Low voltage protection circuit	Non-renewable link fuse	Renewable link fuse	Low voltage release circuit	
12	496	A	Section IV of the circuit shown in the illustration is the _____.	voltage regulator	filter	rectifier	voltage transformer	See illustration number(s): EL-0085
12	497	C	The timer element found in a reverse power relay obtains its operating torque via _____.	line voltage	the main bus	electromagnets	a separate battery source	
12	498	B	When soldering a printed circuit board component, you should be careful to prevent damage by _____.	quickly heating the joints, using a high wattage iron	using the soldering iron tip sparingly	using only acid cord solder	applying mechanical pressure to the joints being soldered	
12	499	D	To determine the state of charge of a nickel-cadmium battery, you should _____.	check the electrolyte with a hydrometer	use the constant specific gravity method	use a nonbreakable mercury thermometer	connect a voltmeter to the battery terminals	
12	500	D	Which section of the circuit is responsible for maintaining a nearly constant voltage for all loads within its operating range?	I	II	III	IV	See illustration number(s): EL-0085
12	502	B	Hand-portable phase sequence indicators should be used when _____.	installing a new synchroscope	preparing to make the shore power connection	replacing a defective solenoid	all of the above	
12	503	B	The division of kilowatt load between two paralleled alternators is determined by the _____.	amount of field excitation to the leading machine	load-speed characteristics of the governors	amount of field excitation to the lagging machine	number of field poles per alternator	
12	504	A	The difference between the synchronous speed of an induction machine and its operating speed (slip) may be correctly expressed _____.	as a percent of synchronous speed	as a decimal fraction of synchronous speed	directly in revolutions per minute	as all of the above	
12	505	A	The set point current at which a magnetic-type overload relay tends to trip may be increased by turning the dashpot in the "lower" direction. This action _____.	reduces magnetic force on the plunger and requires more current to trip the relay	reduces magnetic force on the plunger and requires less current to trip the relay	increases magnetic force on the plunger and requires more current to trip the relay	increases magnetic force on the plunger and requires less current to trip the relay	
12	506	B	The purpose of the bias winding in figure "B" shown in the illustration is for _____.	changing the direction of current in the control winding	setting the operating point of the device	allowing the use of either AC or DC in the load circuit	changing the direction of current through the load	See illustration number(s): EL-0091
12	507	C	The timer element of a reverse power relay cannot be energized unless _____.	one generator is fully motorized	the movement of the disk is damped by a permanent magnet	the power flow is the same as the tripping direction	the power flow is the opposite to the tripping direction	
12	508	D	Before touching a small capacitor connected to a de-energized circuit, or even one that is completely disconnected, you should _____.	gently tap the body with a screwdriver	tag it with a de-energized tag	be equipped with an insulated fuse puller	short circuit the terminals to make sure that the capacitor is discharged	
12	509	A	A breakable, mercury-filled thermometer should not be used in a lead-acid battery to measure electrolyte temperature, as an accidental breakage can cause _____.	severe sparking and explosions	rapid oxidation of battery plates	violent gassing at the positive plates	corrosion on the battery terminals	
12	510	B	What common shipboard system does figure "A" represent?	Navigational running lights	Rudder angle indicator	Sound powered telephone	Winch speed control	See illustration number(s): EL-0092

12	511	A	Which of the following statements is true concerning simple parallel resistance circuits?	The total current flow equals the sum of the individual currents.	The total current flow equals the reciprocal of the sum of the individual currents.	The total resistance equals the sum of the individual resistance.	The total voltage equals the sum of the individual voltages across each resistance.	
12	512	D	Which of the listed statements is correct when using an analog multimeter as an ohmmeter?	The pointer should be adjusted to zero each time a new resistance range is selected.	The pointer will move to infinity when the meter is not in use.	Ohmmeters are not sufficiently sized to measure conductor insulation resistance.	All of the above.	
12	513	A	Kilowatt load is divided between two AC generators operating in parallel by _____.	adjusting the governor controls	varying the excitation voltage	increasing both prime mover speeds simultaneously	decreasing both prime mover speeds simultaneously	
12	514	A	An increase in which of the listed conditions will increase the speed of a synchronous motor?	Frequency	Voltage	Armature current	Inductance	
12	515	C	Before working on an electric cargo winch master switch or controller, you should _____.	spray the gasket surface with a solvent	drain condensate from the box	open the circuit breaker in the power supply and tag	heat the switch box to remove any moisture	
12	516	C	The pushbutton on the handset of a ship's sound-powered telephone must be depressed to _____.	talk then released to listen	listen then released to talk	both talk and listen	ring the station being called	
12	517	D	What is the purpose of either "setpoint module" (6000F090/030) shown in the illustration?	Program the "signal conditioner" as to how to vary its input.	Supply 0 - 10 volts to the "signal conditioner".	Initiate logging of measured information at set intervals; for example, each hour.	Obtain an input from the "signal conditioner" and, if outside set limits, signals the "annunciator".	See illustration number(s): EL-0094
12	518	C	When troubleshooting an electronic circuit, a cold solder joint can be located with the aid of an ohmmeter. Once the problem has been located, you should _____.	reheat the circuit in an oven to an even temperature and recheck with an ohmmeter	reheat the connection with a match and recheck with an ohmmeter	reheat connection with a soldering tool and recheck with an ohmmeter	do nothing as this is the normal condition	
12	519	A	When a nickel-cadium battery begins gassing while connected to the battery charging circuit, you should _____.	do nothing as this is a normal condition when charging	add distilled water to each cell to reduce the specific gravity of the electrolyte	add potassium hydroxide to each cell to increase the specific gravity of the electrolyte	decrease the charging rate	
12	520	A	The "function generator" of the control circuit illustrated _____.	can be programmed to produce a non-linear output for a linear input depending on operating conditions	is used for controlling relay contacts' positions in selection circuits	automatically selects which or how many engines are needed for a required vessel speed	all of the above	See illustration number(s): EL-0095
12	521	B	The frequency of an alternator at a given RPM is determined by the _____.	number of turns of wire in the armature coil	number of magnetic poles	strength of the magnets used	output voltage	
12	522	B	Which of the following methods should be used to test for an "open" coil in an AC motor stator?	Test with an ohmmeter, one test lead on the shaft, and the other test lead to the stator leads.	Test with an ohmmeter with the test leads between the stator leads.	Use a growler, listening for noise and vibration to diminish when over an open coil.	Use a growler, listening for noise and vibration to increase when over an open coil.	
12	523	C	The illustrated circuit is a _____.	megohm meter	Gauss meter	wheatstone bridge	germanium diode tester	See illustration number(s): EL-0024

12	524	A	If a three-phase induction motor malfunctions and drops to a single-phase (one supply line open) _____.	the motor will continue to run if it is not heavily loaded	more torque will be developed	the motor will immediately stop and not be able to be restarted	the motor will immediately stop and can only be restarted at no load	
12	525	B	During its operation, loud buzzing and resultant welding of contacts of a magnetic relay may be caused by _____.	overheating of the contactor coil	low voltage on the operating coil	low insulation resistance to ground	lubrication of the contact bearing points	
12	526	A	Although saturable reactors are extremely useful in some applications, their gain is low because of _____.	core hysteresis losses	inductive reactance in the control winding	IR drop throughout the load winding	all of the above	
12	527	A	In a three-phase circuit, the phase voltages are _____.	120°, apart	160°, apart	180°, apart	360°, apart	
12	528	D	A solid-state circuit is inoperative; the FIRST action that should be taken is to _____.	wiggle all the components to check for loose connections	check all the resistors	change all transistors	check the DC supply voltage	
12	529	A	Which of the problems listed will occur if a lead-acid battery is allowed to remain in a discharged condition for a long period of time?	The battery may be unable to accept a full charge.	The electrolyte will change to lead sulfate.	The concentrated sulfuric acid will attack the lead peroxide plates.	The separators will harden.	
12	530	B	Which line in figure "A" shown in the illustration represents the trailing edge of the wave?	W	X	Y	Z	See illustration number(s): EL-0088
12	531	B	The "E/P converter" shown in the illustration receives a _____.	steady pressure signal and produces a programmed electrical output	variable electrical signal and produces a corresponding pressure output	steady electrical signal and produces an inverse temperature correction	variable pressure signal and produces a corresponding electrical output	See illustration number(s): EL-0096
12	532	B	What type of current would flow through the load in figure "B" shown in the illustration?	AC only	DC only	AC or DC depending on control winding polarity	AC or DC depending on instantaneous polarity of the source	See illustration number(s): EL-0091
12	533	D	The division of the kilowatt load between two AC generators operating in parallel is controlled by the settings and characteristics of the _____.	voltage regulators	field rheostats	reverse power relays	prime mover governors	
12	534	C	Most three-phase induction motors of five horsepower or less, are started by _____.	autotransformer starters	resistor starters	across-the-line starters	reactor starters	
12	535	D	If a magnetic controller relay fails to drop out when the coil voltage is removed from the relay, the probable cause may be _____.	excessive spring tension	overvoltage	excessive current	welded contacts	
12	536	C	How many different D.C. voltages are required to operate the circuit shown in the illustration?	Two	Three	Four	Five	See illustration number(s): EL-0094
12	537	D	The circuit shown in the illustration represents a _____.	battery charging circuit	synchronous exciter	depth sounding unit	cathodic protection system	See illustration number(s): EL-0090
12	538	B	When troubleshooting electronic equipment, the FIRST step to be taken before testing the circuit voltage is to _____.	set the meter to the lowest range	check the voltage supply from the power source	remove the suspected component	check the current flow through the circuit	
12	539	C	When charging a 100 amp-hour lead-acid battery, _____.	the temperature of the electrolyte should not be allowed to exceed 90,F	the charging rate should be no greater than 125% of the battery amp-hour rating	the source of power for charging should be 2.5 volts per cell	gassing within the battery decreases when nearing full charge and it will be necessary to reduce the charging current to a low finishing rate	
12	540	C	Section II of the circuit shown in the illustration is the _____.	voltage regulator	filter	rectifier	voltage transformer	See illustration number(s): EL-0085

12	541	B	The only point in the steering stand shown in the illustration which needs periodic lubrication is the _____.	repeater assembly ball bearings	steering wheel bearing	operation selector switch	course selector pointer	See illustration number(s): EL-0098
12	542	C	When testing a capacitor with an analog type ohmmeter, a good capacitor will be indicated when _____.	there is no meter deflection	the meter deflects to a low resistance value and remains there	the meter deflects to a low resistance value and slowly increases towards infinity	the meter deflects to a low resistance value and increases rapidly to a higher value, but stays fairly low	
12	543	B	The division of kilowatt load between two paralleled alternators is determined by the _____.	amount of field excitation of the leading machine	load-speed characteristics of the governors	amount of field excitation to the lagging machine	type of alternator	
12	544	B	The synchronous speed of an induction motor is the _____.	speed at which the rotor turns	speed of the rotating field	frequency of the rotor current	slip in per cent of rotor RPM	
12	545	A	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 10 ohms, and R2 is 10 ohms what is the current flowing through R2?	0.6 amp	0.833 amp	1.2 amps	2.4 amps	See illustration number(s): EL-0036
12	546	D	In a simple series circuit, the entire source voltage will drop across _____.	the resistor next to the negative terminal	a short circuit	the resistor next to the positive terminal	an open circuit	
12	548	C	Which line in figure "A" shown in the illustration represents the interval that the pulse is 'ON'?	W	X	Y	Z	See illustration number(s): EL-0088
12	549	B	The charging of lead-acid storage batteries will always result in _____.	dangerous acid burns	a dangerously explosive gas being liberated	the danger of lead poisoning	all of the above	
12	550	D	If coil "R1-R2" on the transmitter in figure "A" shown in the illustration is turned 30 degrees clockwise, corresponding coil "R1-R2" on the receiver should _____.	make coils "S1-S2-S3" turn faster because of induced currents	ring at the receiving station until the turning stops	receive a higher voltage depending on the turns ratio	align itself to the same position if free to move	See illustration number(s): EL-0092
12	551	C	When the current flow through a power transmission line is doubled, the power loss _____.	is halved	is doubled	is quadrupled	remains the same	
12	552	C	While troubleshooting a circuit in an engine room central control console, a resistor is suspected of being faulty. Which of the following precautions must be observed if an ohmmeter is to be used to check its value?	Correct polarity must be observed because reverse bias will damage the component.	Meter leads must not be twisted so as to cancel out the individual magnetic fields.	Resistor's circuit must be de-energized and at least one end of the component isolated.	The meter case must be grounded prior to attaching the leads.	
12	553	C	Which of the following procedures should be used to determine the load of a three-phase, delta wound, AC generator?	Multiply the amperage in one phase by three.	Divide the total amperage in all phases by three.	Multiply the amperage in one phase by the square root of three.	Divide the total amperage in all phases by the square root of three.	
12	554	A	An across-the-line starter provides _____.	maximum torque	slow starting power	high speed	reduced voltage	
12	555	B	Excessive heat in an operating motor controller can result from _____.	a closed starter contact	loose connections	missing arc chutes	low motor starting torque	
12	556	B	The fluctuation of voltages in figure "A" and "D" of the circuit shown in the illustration is called _____.	wave	ripple	roll	swell	See illustration number(s): EL-0085
12	557	D	Transformers are used onboard ships with AC generators to _____.	change frequency	increase power output to modulating frequency controllers	decrease power output to modulating frequency controllers	permit higher voltage for electric motor operation and low voltage for lighting circuits	
12	558	B	A full-wave rectifier has one diode burned out in an open condition, what will be the output characteristic of the device?	Zero	Half-wave rectified	Full-wave rectified	Equal to the AC input	

12	559	B	Considering the function of the circuit shown in the illustration, what is the purpose of supplying the thrust lever potentiometers with both (+) and (-) 15 volts?	To select which lever (bridge or engine room) is active.	So the circuit can differentiate between ahead and astern commands.	To provide an alternate voltage supply if the other fails.	So as to automatically select the position of Relay #1.	See illustration number(s): EL-0095
12	560	C	What is the total power consumed by the illustrated circuit if the supply is 24 volts and the resistances of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	2 watts	12 watts	48 watts	288 watts	See illustration number(s): EL-0020
12	561	B	The full load torque of an electric motor is the _____.	minimum torque developed by the motor accelerating from stop to full speed	turning moment exerted by the motor at rated load and speed	maximum torque developed by the motor with rated voltage and frequency	turning moment exerted by the motor from any rotor angular position at any load	
12	562	B	Prior to using an analog type ohmmeter, the leads are purposely shorted together. Which of the following actions should be taken if, when adjusting to "zero" ohms, the indicating needle can not be returned to "zero" on the scale?	The lead clips should be replaced.	The batteries should be replaced.	The test reading should be added to each final reading.	The test reading should be subtracted from each final reading.	
12	563	A	What is the purpose of each of the "signal conditioners" (6000F085 / AH170 / F125) shown in the illustration?	Convert the varying signal from its particular sensor and deliver a corresponding signal of 0 - 10 volts to the "setpoint module".	Drive the Data and Alarm Loggers directly for a continuous record of sensor operating conditions during the time the engine(s) may be on-line.	Supply two or three different D.C. voltages to their respective motors which in turn rotates to indicate relative input conditions.	Receives constantly updated information from the "setpoint module" in order to keep the pressure or temperature at its sensor at set limits.	See illustration number(s): EL-0094
12	564	B	The speed of a wound-rotor induction motor _____.	will be fixed by the number of field poles	can be varied by a rheostat-type control	can only be synchronous speed at full load	can only attain synchronous speed at no load	
12	565	C	If you hear a loud buzzing noise coming from a magnetic motor controller, you should _____.	assume that the motor is operating at a full load	assume that the controller is operating normally	notify the electrician or watch engineer of the problem	feel the outside of the casing with your hand to see if it is hot	
12	566	C	Using illustrated chart, when will the power factor be least efficient?	When the motor is operating at full load.	When the percentage of slip is greatest.	When there is no load on the motor.	the power factor is the same from no-load to locked rotor.	See illustration number(s): EL-0006
12	567	C	The function of the autotransformers used with the starters of large AC motors is to provide _____.	increased voltage for starting	increased torque for starting	reduced voltage for starting	speed control	
12	568	B	When the circuit shown in the illustration is operating correctly, the voltage at the reference electrode will be kept in the optimum range of _____.	0.01 - 0.05 volt	0.80 - 0.85 volt	35 - 60 volts	100 - 115 volts	See illustration number(s): EL-0090
12	569	B	When lead-acid batteries are charging, they always give off hydrogen gas that is _____.	considered inert	highly explosive	extremely toxic	heavier than air	
12	570	A	The transmit and receive elements of a sound-powered telephone handset are _____.	identical and can be used for either function	of similar construction but different enough to be used only for its own function	of very different construction and MUST be used only for its own function	constructed so that each can fit only in its own recess	
12	571	B	The resistance of most conducting materials will change as a result of temperature change. The resistance of copper will _____.	increase as temperature decreases	decrease as temperature decreases	remain the same between 20°F and 110°F	remain the same between 68°F and 230°F	
12	572	B	Which of the following conditions indicates a short circuited capacitor when checking its condition with an ohmmeter?	The capacitor shows charging, but the final resistance reading is appreciably less than normal.	The reading is practically zero and remains there.	The capacitor shows no charging action, but indicates a very high resistance.	The pointer moves quickly to the low resistance side of the scale, then slowly recedes toward infinity.	

12	573	D	Which of the following will happen to the alternator frequency if the load is removed from a turbogenerator, whose governor has a 3% speed droop?	It will remain unchanged.	It will decrease by approximately 3%.	It will become variable.	It will increase.	
12	574	D	Reversing any two of the three rotor leads on a wound-rotor induction motor will _____.	increase motor performance	decrease motor performance	reverse the motor rotation	have no effect on the direction of rotation or motor performance	
12	575	A	Which of the following conditions is most likely to occur if a single element fuse were used to replace a blown dual element fuse in a motor controller circuit?	The fuse will blow when the motor is started.	The fuse works, but overheats at high motor loads.	The motor runs at reduced voltage.	The motor runs normally.	
12	576	A	If the steering stand selector switch is allowed to remain in the "Non-Followup" mode after testing of the steering gear, the rudder will _____.	not respond to commands from the helm	move in one direction only regardless of the movement of the helm	not respond to output from the rotary actuator	stop moving only when the helm is counter-rotated to put the pump at neutral stroke	See illustration number(s): EL-0097
12	577	B	The function of a stepdown potential transformer is to reduce the load _____.	voltage and current	voltage and increase line current	current and increase line voltage	power	
12	578	B	To avoid damaging the components of a printed circuit board when testing it with a DC volt-ohmmeter, you should _____.	ground the board	avoid reversing the polarity of the leads	isolate sensitive components with heat sinks	all of the above	
12	579	C	In actual applications, electrical connections to "R1-R2" of figure "A" and to "R1-R2-R3" of figure "B" shown in the illustration are made by _____.	soldered contacts	spliced and taped connections	slip rings and brushes	solderless crimp-on connectors	See illustration number(s): EL-0092
12	580	D	The component labeled "CR1" in the circuit shown in the illustration _____.	varies its anode/cathode polarity depending on "RL" current	rectifies the varying voltage from the collector of "Q1"	acts as a low capacitive reactance to smooth ripple	establishes a constant reference voltage for the base of "Q1"	See illustration number(s): EL-0085
12	581	D	A resistor placed in parallel to the output of a power supply _____.	is a temperature compensator	corrects power factor	prevents excessive currents	aids in output voltage regulation	
12	582	A	With both ends of a three conductor cable disconnected and arranged without the conductors touching each other, an ohmmeter reading of "zero" ohms between the ends of one conductor would indicate _____.	continuity	a partial ground	the resistance is infinite	a short circuit	
12	583	A	As load is added to an AC generator provided with constant field excitation, the prime mover slows down with the effect of _____.	lowering frequency and lowering generated voltage	increasing frequency and increasing generated voltage	increasing frequency and lowering generated voltage	lowering frequency and increasing generated voltage	
12	584	B	A characteristic of an induction motor with a low resistance rotor winding is _____.	high starting voltage	high starting current	high slippage	low starting voltage	
12	585	C	A loud buzzing noise in an AC controller is probably caused by _____.	poor contact with the overload relay	an incorrectly sized heater	a broken shading coil	abnormal starting current	
12	586	C	How many modes of rudder positioning are available using the steering stand shown in the illustrations?	One	Two	Three	Four	See illustration number(s): EL-0097 EL-0098
12	587	D	Increasing the load to the secondary windings of a transformer will cause a/an _____.	decrease in the primary voltage	increase in the primary voltage	decrease in the primary current	increase in the primary current	
12	588	D	In troubleshooting a circuit in a console, you find that a resistor may be faulty. Which of the precautions listed must be observed when using an ohmmeter to carry out this test?	Correct polarity must be observed, connecting the red lead to the banded end of the resistor.	Meter leads must be twisted to cancel the leads' magnetic fields.	The meter must be placed in series with the resistor and the circuit.	The resistor's circuit must be de-energized and at least one end of the component isolated.	
12	589	C	The state of charge of a lead-acid battery is best indicated by the _____.	individual cell voltage	ampere-hour capacity	electrolyte specific gravity	total cell voltage	
12	590	C	The device in figure "B" shown in the illustration can be used to control an AC load yet maintain its high gain by _____.	connecting the load to the output side of the bridge	reversing the current flow through the control winding	connecting the load to the input side of the bridge	reversing the current flow through the bias winding	See illustration number(s): EL-0091

12	591	D	The most inefficient method of voltage reduction from the stand point of power loss, is a/an _____.	capacitor in series with the load	inductor in series with the load	capacitor and inductor in series with the load	resistor in series with the load	
12	593	D	Which is a function of the voltage regulators used with AC generators?	To cut out generators when they are no longer required.	To cut in additional generators automatically as required.	To divide the KW load equally between generators operating in parallel.	To divide reactive current between generators operating in parallel.	
12	594	D	If an induction motor were to be operated at 90% rated voltage, _____.	there would be an increase in starting torque	starting current would increase slightly	synchronous speed would decrease slightly	the slip would increase	
12	595	C	When troubleshooting a magnetic controller, it is found that the contacts are welded together. The most probable cause is _____.	excessive operation at low load	high ambient temperature	low voltage on the operating coil	high voltage on the operating coil	
12	596	A	The purpose of a "slew rate controller" in a circuit such as shown in the illustration is to _____.	limit the rate of change of a signal	introduce a 'live zero' factor into the circuit	shape the linear input into a non-linear output	reduce air pressure to a value required by a combination circuit	See illustration number(s): EL-0096
12	597	C	For practical purposes, in a simple series circuit, the source voltage will be dropped across one resistor if it has _____.	half the resistance of the other resistor	a resistance equal to the other	at least ten times the resistance of the other	a partial short circuit	
12	598	A	If both the "high level" and "low level" alarms come on for the same address of a centralized control console, the most likely problem is a/an _____.	sensor failure	failed alarm	low level	extremely high level	
12	599	D	The voltage at the reference electrode of the circuit shown in the illustration is applied to the input of a/an _____.	class A detector whose output drives an autotransformer	operational amplifier whose output controls a step-up voltage reactor	amplitude modulator whose output drives an 2-stage isolation transformer	magnetic amplifier whose output controls a saturable reactor	See illustration number(s): EL-0090
12	600	A	Erratic operation of the devices represented in the diagrams shown in the illustration could be traced to _____.	improper contact at "R" slip rings or "S" connections	a low three-phase voltage supply	improper contact at "S" slip rings or "R" connections	a high three-phase voltage supply	See illustration number(s): EL-0092
12	601	C	A transformer works on the basic principle of _____.	self impedance	attraction and repulsion	mutual induction	increasing power	
12	602	B	Before measuring an unknown resistance with an ohmmeter, you should _____.	adjust the meter's pointer to mid-scale	short the test leads and calibrate the meter reading to "zero"	change the meter's batteries	center the meter's pointer at infinity	
12	603	C	The instantaneous reduction in voltage of an AC generator, resulting from an increase in load, and prior to the automatic voltage regulator correcting the situation, is called voltage _____.	droop	drop	dip	regulation	
12	604	B	A characteristic of a wound-rotor induction motor, with a high resistance rotor winding, is _____.	low starting torque	high starting torque	high speed	low starting voltage	
12	605	D	The diagrams shown in the illustration represent a/an _____.	engine order telegraph circuit	rudder angle indicator arrangement	engine speed tachometer with repeaters	sound powered telephone system	See illustration number(s): EL-0093
12	606	B	In the illustration, the voltage applied to the circut is 12 VDC, the resistance for R1 is 10 ohms, and R2 is 10 ohms. What is the power consumed in "R1" of the circuit shown in the illustration?	0.6 watts	3.6 watts	7.2 watts	120 watts	See illustration number(s): EL-0036

12	607	C	The potentiometers shown in the illustration are supplied with both (+) and (-) voltages as well as a reference to ground _____.	so there is always a spare power supply on standby which is grounded for safety	because one supply is for pitch command, the other for lever illumination at night and the potentiometers are in positions where they can be accidentally touched	to command or indicate pitch direction in addition to amount of pitch	because one supply is for pitch command, the other for relay operation and the potentiometers are in positions where they can be accidentally touched	See illustration number(s): EL-0095
12	608	A	You have installed a Zener diode in parallel with a load. While measuring the voltage across the Zener diode it is found that it does not change as the current through the load increases. This means that the Zener diode _____.	is working as it should	is shorted	is open	does not regulate as it should	
12	609	D	Violent gassing from a lead-acid battery while it is being charged, indicates that the _____.	plate separators are grounded	battery compartment ventilation is inadequate	electrolyte specific gravity is too low	charging rate is too high	
12	610	D	Assuming a standard 60 Hz. input to the circuit shown in the illustration, the ripple frequency would be _____.	30 Hz	60 Hz	90 Hz	120 Hz	See illustration number(s): EL-0085
12	611	D	What controls the rudder when the "operation selector switch" of the steering stand shown in the illustration is in the "HAND" position?	Non-followup controller	Gyro-compass	Course selector pointer	Steering wheel	See illustration number(s): EL-OO98
12	612	C	An ohmmeter can be used to measure _____.	current flow in a circuit	voltage between two points in a circuit	circuit continuity	power	
12	613	C	Which sensor shown in the illustration develops its own conditioning and point setting and 'reports' directly to the "annunciator"?	Transducer	Resistance Temperature Detector (RTD)	Pressure Switch	Thermocouple	See illustration number(s): EL-0094
12	614	C	Under normal conditions, the speed of a two-speed squirrel cage induction motor is changed by varying the _____.	frequency of the applied voltage	resistance in the rotor circuit	number of field poles	amplitude of the applied voltage	
12	615	B	Magnetic controller contacts may become welded together during operation because of _____.	excessive magnetic gap	low contact pressure	an open coil	excessive ambient temperature	
12	616	D	What is the power consumed by "R1" in the circuit illustrated if the supply is 24 volts and the resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	2 watts	3 watts	6 watts	12 watts	See illustration number(s): EL-0020
12	617	B	If a transformer is connected to a DC source, the transformer will overload at the _____.	contacts	primary coil	secondary coil	core	
12	618	D	A burned-out LED should be indicated by _____.	excessive output	a slight glow in the crystal	excessive illumination	no illumination	
12	619	C	When a lead-acid battery begins gassing freely while receiving a normal charge, the charging current should be _____.	increased	shut off	decreased	unchanged	
12	620	A	The electrical supply applied to the anodes shown in the illustration is _____.	low voltage, high current DC	low voltage, high current AC	high voltage, low current DC	high voltage, low current AC	See illustration number(s): EL-0090
12	621	A	The basic operating principle of a transformer is attributed to _____.	electromagnetic induction	variance of a conductor in a magnetic field	mutual reaction	thermionic emission	
12	622	D	Which of the meters listed should only be used after a circuit has been electrically disconnected?	Wattmeter	Frequency meter	Ammeter	Ohmmeter	
12	623	D	The output voltage of a 440 volt, 60 Hz AC generator is controlled by the _____.	load on the alternator	load on the prime mover	speed of the prime mover	exciter output voltage	

12	624	B	In a three-phase, squirrel-cage type, induction motor the rotating magnetic field is established by the _____.	current induced in the rotor windings	application of a three-phase voltage supply to the stator windings	laminated steel core and aluminum conductors in the rotor	interaction of the magnetic field caused by the induced current in the squirrel-cage bars with the magnetic field of the stator	
12	625	B	Motor controller or starter contacts may become pitted and welded together if the contacts _____.	open under loaded conditions	close slowly with light pressure	open too quickly and arc	close quickly with proportionate pressure	
12	626	D	If coil "R1-R2" at the receiver of figure "A" shown in the illustration turned opposite of that in the transmitter, what corrective action should be taken?	No action is necessary as this is normal operation.	Reverse 60 Hz supply connections to "R1" and "R2".	Interchange connections to "S1" and "S2".	Interchange connections to "S1" and "S3".	See illustration number(s): EL-0092
12	627	A	Transformer cores are laminated to reduce _____.	eddy currents	secondary flux	leakage flux	all of the above	
12	628	B	When using an ohmmeter to test a semiconductor diode, you find a low resistance in both the forward and reverse bias directions. This indicates that the diode has a/an _____.	open	short	good resistive quality	good capacitive quality	
12	629	B	The capacity of a storage battery is measured in _____.	volts	ampere-hours	farads	amps	
12	630	B	Power necessary to operate the horn shown in the illustration _____.	comes from each station's magneto	is supplied from a 115 volt source	is conducted through a relay coil	also lights lamps "R" and "T"	See illustration number(s): EL-0093
12	631	C	When placed in a magnetic field, which of the materials listed will maintain the highest permeability?	Glass	Bakelite	Soft iron	Aluminum	
12	632	D	Before measuring an unknown resistance with an ohmmeter, you should _____.	adjust the meter's pointers to mid-scale	change the meter's batteries	center the meter's pointer at infinity	short the test leads and calibrate the meter	
12	633	A	The governor control switch of an alternator is moved to the "raise" position. This action will _____.	raise the no-load speed setting of the governor	raise the percentage of speed droop	lower the no-load speed setting of the governor	lower the percentage of speed droop	
12	634	A	Which of the following statements is true concerning the operating characteristics of a squirrel-cage motor?	Rotor slip is dependent upon the motor load.	An increase in motor load results in less slip.	A decrease in rotor speed results in less generated current.	A decrease in rotor speed produces a weaker magnetic field.	
12	635	B	The pitting of controller contacts can be caused by _____.	excessive spring pressure	insufficient contact pressure	continuous motor overload	all of the above	
12	636	A	The meter indicating the position of the "bridge Thrust lever" shown in the illustration is located _____.	in the Engine Control Room	on the Bridge	in the Captain's office	in the Chief Engineer's office	See illustration number(s): EL-0095
12	637	C	A transformer in an electric circuit serves to _____.	generate its own electrical power	transform electrical energy into mechanical energy	increase or decrease circuit voltage as required	convert AC current to DC current	
12	638	D	One diode of a full-wave rectifier has burned out in a shorted condition. Therefore, the output will be _____.	zero	a rectified half-wave	a rectified full-wave	equal to the AC input	
12	639	B	The charge of a lead-acid battery is checked with a/an _____.	manometer	hydrometer	voltmeter	ohmmeter	
12	640	C	The +5 volt regulated power supply shown in the illustration is fed directly from the _____.	115 volt AC bus	Annunciator Module	+24 volt supply	Annunciator Controller	See illustration number(s): EL-0094
12	641	C	As an armature revolves within a magnetic field, friction is developed between the rotated magnetized particles as they pass through each magnetization cycle. This results in _____.	copper loss	eddy-current loss	hysteresis loss	armature reaction	

12	642	C	To test fuses in an energized circuit, you should use a _____.	low voltage light bulb	megohmmeter	voltmeter	resistance meter	
12	643	B	The main purpose of an electric space heater installed in a large AC generator is to _____.	prevent the windings from becoming brittle	prevent moisture from condensing in the windings during shutdown	prevent acidic pitting of the slip rings	keep the lube oil warm for quick starting	
12	644	B	The speed of a squirrel-cage induction motor is determined by the _____.	diameter of the stator	number of stator poles	rotor winding resistance	rotor conducting bars resistance	
12	645	D	Magnetic controller contacts may become welded together during operating conditions as a result of _____.	high spring pressure	high ambient temperature	an open coil	low voltage on operating coil	
12	646	D	What are the plant conditions existing in the "engine speed control" diagram shown in the illustration?	The Bridge is in control in the "auto. maneuver" mode.	The Engine Room is in control in the "cruise split" mode.	The Bridge is in control in the "auto. split" mode.	The Engine Room is in control in the "auto. maneuver" mode.	See illustration number(s): EL-0096
12	647	D	When a transformer is used to step down voltage, the low voltage winding is _____.	part of the core	the primary coil	not insulated	the secondary coil	
12	648	C	How many anodes can the 200 ampere reactor supply drive in the circuit shown in the illustration?	One	Two	Four	Six	See illustration number(s): EL-0090
12	649	B	The proper way to mix the electrolyte for a battery is to add _____.	acid to alkaline water	acid to distilled water	alkaline water to acid	distilled water to acid	
12	650	A	Which of the referenced waveshapes would appear at point "X" of the circuit shown in the illustration?	A	B	C	D	See illustration number(s): EL-0085
12	651	A	If the illustrated motor fails to start and gives a loud hum when the start button is pushed, the problem is _____.	one of the phases to the motor is not energized because of an open motor lead	the "Disc.sw." is open	power to "L1" at the "Disc.sw." is not energized because of a problem with the ship's electrical distribution system	"OL1" is open because of "T1" overload causing the motor to single phase	See illustration number(s): EL-0007
12	652	A	In order to increase its range of measurement, a resistance would be placed in series with which of the following instruments?	DC voltmeter	DC ammeter	frequency meter	power factor meter	
12	653	A	Prior to starting an AC generator prime mover, the voltage regulator cutout switch should be placed in the _____.	manual position	bus neutral position	raise voltage position	transfer position	
12	654	B	What controls rudder movement when the Operation Selector Switch shown in the illustration is in the "NFU" position?	Steering wheel	Non-followup controller	Gyro-compass	Course selector pointer	See illustration number(s): EL-0097
12	655	B	A loud buzzing noise at the contacts of a magnetic controller could indicate _____.	weak contact spring pressure	misalignment of the magnet faces	excessive line current	mechanical binding	
12	656	C	If coils "R1-R2-R3" at the receiver of figure "B" shown in the illustration turned opposite of those in the transmitter, what corrective action should be taken to have both turn in the same direction?	Reverse the 60 Hz supply connections to "S1" and "S2".	No action is needed.	Interchange leads "R1" and "R3".	Interchange leads "R2" and "R3".	See illustration number(s): EL-0092
12	657	A	An AC circuit has capacitance arranged in series. If the line voltage remains constant, the capacitive reactance value can be varied by changing the _____.	line frequency	resistance	number of commutating poles	number of interpoles	
12	658	A	The total voltage of a series circuit is the _____.	sum of the individual voltage drops	total resistance divided by the total current	sum of the individual currents multiplied by the number of resistors	total current divided by the total resistance	
12	659	D	When mixing electrolyte for a lead-acid storage battery, _____.	stirring should always be avoided	a lead container should always be used	always pour the water into the acid	always pour the acid into the water	

12	660	A	What is the power consumed by "R2" in the circuit illustrated, if the supply is 24 volts and the resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	16 watts	20 watts	24 watts	28 watts	See illustration number(s): EL-0020
12	661	B	What is the direction of current through the load resistor in the circuit shown in the illustration?	Always from point "Z" to the grounded end.	Always from the grounded end to point "Z".	It depends on the instantaneous polarity at point "W".	It cannot be determined without a directional ammeter.	See illustration number(s): EL-0085
12	662	D	If the approximate voltage to be measured in a circuit is not known, you should _____.	use the lowest voltage range on the voltmeter	connect the meter in series with the circuit	only have to calibrate the meter before using it	use the highest voltage range on the voltmeter	
12	663	D	When securing an AC generator, you should FIRST _____.	open the generator circuit breaker	switch the voltage regulator to "manual"	decrease the field excitation to minimum	reduce the load on the unit	
12	664	D	The speed of a squirrel-cage motor is usually changed by _____.	varying the frequency to the machine	adding resistance in series with the stator windings	adding resistance in parallel with the stator windings	changing the number of connected poles in the stator	
12	665	C	Excessive humming of AC contactors may be caused by _____.	burnt arc shields	shorted armature coils	a broken shading coil	high voltage	
12	666	D	Sections "I", "II" and "III" of the circuit shown in the illustration are 'station numbers' _____.	2, 4 and 6	1, 2 and 3	3, 5 and 8	1, 2 and 6	See illustration number(s): EL-0093
12	667	B	Decreasing the frequency in a capacitive circuit while maintaining a constant circuit voltage, will result in a/an _____.	increase in apparent power	decrease in circuit current	decrease in capacitive reactance	decrease in total impedance	
12	668	A	How much current will flow in the illustrated circuit if the supply is 24 volts and the resistances of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	2 amps	6 amps	8 amps	10 amps	See illustration number(s): EL-0020
12	669	B	Caution must be exercised during the charging of lead-acid storage batteries as _____.	the acid will become weaker	hydrogen gas is being continuously liberated	both plates are changing chemically to lead sulfate	lead peroxide in the negative plate is poisonous	
12	670	D	What is the total current in the illustrated circuit with a 6 volt battery if the resistance of R1 is 2 ohms, R2 is 4 ohms, and R3 is 4 ohms?	0.6 amp	1 amp	4 amps	6 amps	See illustration number(s): EL-0021
12	671	C	When the current flow through a copper wire increases, its _____.	resistance will decrease	insulation will burn	temperature will increase	conductivity will increase	
12	672	B	Which of the following actions must be carried out before a voltage tester can be used to test the three line fuses to a three-phase motor?	The fuses must be removed from the circuit.	The starter must be placed in the STOP position to stop the motor.	The three line connections in the motor terminal box must be disconnected and tagged.	Nothing need be done as long as the motor is running under a light load.	
12	673	A	The cycles per second developed by the alternator aboard your vessel is determined by _____.	the speed of the engine driving the alternator	the resistance applied to the field rheostat	the synchronous speed of induction	the adjustments made to the voltage regulator	
12	674	B	The counter EMF produced in the windings of a DC motor is "zero" when the _____.	armature has just begun to turn	armature is not turning	motor is almost up to rated speed	motor is at rated speed	
12	675	D	A loud buzzing noise coming from the contacts in a magnetic controller can be caused by _____.	excessive current	excessive magnet gap	bouncing of contacts	dirt on magnet faces	
12	676	B	What is the voltage across "R1" of the illustrated circuit if the supply is 24 volts and resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	2 volts	6 volts	8 volts	10 volts	See illustration number(s): EL-0020
12	677	B	Component "A" of section "I" shown in the illustration represents a _____.	sealed junction box	bell	buzzer	shunt	See illustration number(s): EL-0093
12	678	B	While testing a semi-conductor diode with an ohmmeter, both the forward and reverse readings are almost in the infinity range. This would indicate that the unit is _____.	good	open	grounded	shorted	

12	679	C	The specific gravity of the electrolyte in a lead-acid battery is measured by a _____.	gould plate	titration pipette	hydrometer	litmus paper test	
12	680	C	Which of the referenced waveshapes would appear at point "Z" in the circuit shown in the illustration?	A	B	C	D	See illustration number(s): EL-0085
12	681	D	The existing resistance of a conductor is dependent upon its length, cross-sectional area, _____.	temperature and insulation	material and insulation	resistive coefficient and material	material and temperature	
12	682	D	The "annunciator module" and "controller" shown in the illustration together provide for _____.	blinking lamp on alarm; testing the lamp and alarm; and logging alarm conditions	acknowledging alarm conditions; logging data at the end of the watch; and blinking the lamp	flashing lamp on alarm; connecting +24 volts to the lamp and horn; and driving the horn via a relay	testing the visual and audible alarms; flashing lamp on alarm; and silencing the horn when answering an alarm	See illustration number(s): EL-0094
12	683	C	The frequency of an AC generator is adjusted by means of the _____.	main alternator field rheostat	exciter field rheostat	prime mover governor control	equalizing reactor	
12	684	A	The function of the commutator in a DC motor is to _____.	reverse the flow of current through the armature	reverse the flow of current in the field poles	reduce the reluctance of the magnetic path through the motor	shift the neutral running plane of the brushes to prevent sparking	
12	685	A	Humming or buzzing of electric contacts is a symptom of _____.	low voltage on the operating coil	power failure to the operating coil	a control circuit ground	a control circuit overload	
12	686	B	The "pitch controller module" shown in the illustration is fed the actual pitch position of the propeller from the _____.	"pitch meter"	"pitch feedback potentiometer"	#5 relay position	pitch error signal	See illustration number(s): EL-0095
12	687	C	Capacitance in an AC circuit will _____.	stop current flow once the capacitor is fully charged	allow current flow in only one direction	oppose any change in circuit voltage	rectify the current	
12	688	A	An ohmmeter used to test for front-to-back resistance of a PN junction diode should produce roughly what ratio?	100:01:00	500:01:00	1000:01:00	5000:01:00	
12	689	A	Which of the following activities occurs during the charging process of a lead-acid storage battery?	The specific gravity of the acid increases.	Both plates change chemically to lead sulfate.	The specific gravity of the acid decreases.	Hydrogen gas is absorbed.	
12	690	A	As shown in the illustrations, feedback or rudder angle repeatback is used by the steering stand in which operational modes?	Gyro-compass and hand steering only	Hand steering and non-followup only	Non-followup and gyro-compass only	Gyro-compass and synchronizing only	See illustration number(s): EL-0097
12	691	C	In a simple DC circuit, the resistance is held constant while the applied voltage is halved. Current flow, therefore, will _____.	double	remain the same	be divided by two	be divided by four	
12	692	A	When measuring AC current flow, you must always connect the meter _____.	in series with the power source and load	in parallel with the power source and load	insuring correct polarity	using the lowest range possible to prevent instrument damage	
12	693	D	To increase the frequency of an operating AC generator, you should _____.	increase the field excitation	decrease the field excitation	increase the number of magnetic poles	increase the speed of the prime mover	
12	694	A	The counter EMF of a DC motor is maximum when the _____.	motor is at rated speed	armature is not turning	motor is almost up to rated speed	armature has just begun to turn	
12	695	C	Magnet chatter or "pumping" occurring in a magnetic contactor can be caused by _____.	dirt or grease on pole faces	mechanical interference in the contacts	chattering contacts on the control relay	magnetic lock out of the contacts	
12	696	B	What is the power consumed by "R3" in the circuit illustrated if the supply is 24 volts and resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	12 watts	20 watts	24 watts	48 watts	See illustration number(s): EL-0020
12	697	C	Which of the following characteristics is most critical in determining the size of the cable to be used in a particular circuit?	voltage rating	weight per unit length	current rating	inductance per unit length	

12	698	A	To conduct an in-circuit test of a transistor, you should use a/an _____.	voltmeter or transistor tester	impedance meter	ohmmeter or transistor tester	wattmeter	
12	699	D	The specific gravity of the electrolyte solution in a lead acid battery _____.	is not effected during charging	remains the same during discharge	would read close to 1.830 when discharged	gives an indication of the state of charge of the battery	
12	700	C	Component "B" of section "I" shown in the illustration represents a _____.	bridge rectifier	selsyn motor	small generator	shielded lamp	See illustration number(s): EL-0093
12	701	B	In the flow of one cycle of single phase AC current past any given point in a circuit, the maximum current peak occurs _____.	one time	two times	three times	four times	
12	702	B	If coil "R1-R2" at the receiver of figure "A" shown in the illustration were in 180 degree error with respect to that of the transmitter, what corrective action should be taken?	No action is necessary as this is proper operation.	Reverse the 60 Hz supply connections at "R1" and "R2".	Interchange connections "S1" and "S2".	Interchange connections "S1" and "S3".	See illustration number(s): EL-0092
12	703	A	AC and DC generators are similar in that they _____.	both generate alternating voltages	both rectify the voltage before delivery	are constructed at the same physical size for the same kilowatt rating	both supply three-phase power	
12	704	A	Shunt, series, and compound wound motors, are all DC motors designed to operate from _____.	constant potential, variable current DC sources	variable potential, constant current DC sources	variable potential, variable current DC sources	constant potential, constant current DC sources	
12	705	D	Motor starter or controller contacts may become welded together if the contacts _____.	open too quickly and arc	close under excessive pressure	open or close too quickly	close under excessive starting current	
12	706	D	Which of the referenced waveshapes would appear at point "Y" in the circuit shown in the illustration?	A	B	C	D	See illustration number(s): EL-0085
12	707	B	Which of the following statements concerning copper wire sized by AWG numbers is correct?	Number 12 AWG wire has a higher current rating than 10 AWG wire.	Number 12 AWG wire at 25°C has more resistance per 1000 ft than 10 AWG wire at 25°C.	Number 10 AWG wire has a higher dielectric strength than 12 AWG wire.	Number 12 AWG wire is larger than number 10 AWG wire.	
12	708	D	Normally, the FIRST step in troubleshooting a transistor circuit card is to _____.	carefully remove the transistors from the card	give the circuit an initial test with a signal generator	test for continuity with a low voltage DC supply	visually inspect the card	
12	709	C	During discharge of a lead-acid storage battery, which of the following actions occurs?	The acid becomes stronger.	Both plates change chemically to ammonium chloride.	The acid becomes weaker.	Hydrogen gas is liberated.	
12	710	B	An open-circuit fault between the pressure switch and the "annunciator module" shown in the illustration would cause the alarm circuit to react in the same manner as if _____.	3.5 volts were applied to the "setpoint module"	"reduction gear lube oil pressure" fell below switch setting	50 PSI were applied to the "setpoint module"	the pressure switch closed	See illustration number(s): EL-0094
12	711	A	If the length of a wire is halved and the cross-sectional area is doubled, the resistance will be _____.	quartered	unchanged	doubled	quadrupled	
12	712	B	Prior to taking a resistance reading with a volt-ohm-milliammeter, the "zero" setting must be adjusted. After clipping the two leads together, you find the adjustment knob will not return the pointer to "zero". This is most likely an indication of _____.	an improper resistance range setting	weak batteries	a faulty zero ohms knob	a faulty meter movement	
12	713	A	Which of the following devices are protected from being motorized by a reverse-power relay?	Alternators	Wave guides	Exciters	Amplidynes	
12	714	D	An advantage of DC motors over AC motors is that they _____.	are less expensive	require less maintenance	can be started across the line	offer a more effective means of controlling speed	
12	715	B	If many turns of an alternating current coil for a contactor become short circuited, the coil _____.	temperature will drop	will probably burn out immediately	will continue to operate	will operate on reduced current	

12	716	C	As shown in the illustration, when the "speed control" system is in "SPLIT" _____.	Relays #1, #5 and #8 are not used	the "slew rated controller" is grounded through Relay #6	the RPM "function generator" and "thrust levers" have no control	the "E/P converters" are bypassed and air is fed directly to the governors via the "load sharing valve"	See illustration number(s): EL-0096
12	717	B	A bus disconnect link is used to isolate _____.	one bus bar from another	the generator circuit breaker from the bus	different phases from the equalizer connection	positive and negative buses from the neutral	
12	718	B	Which of the wave forms shown in the illustration will be produced when the circuit is in use?	A	B	C	D	See illustration number(s): EL-0064
12	719	C	When correcting specific gravity readings of a lead-acid battery for existing temperature conditions, you should _____.	add 10 points for each 4° above 80°F	subtract 10 points for each 4° above 80°F	add 4 points for each 10° above 80°F	add 4 points for each 10° below 80°F	
12	720	C	As shown in the illustrations, fine adjustments such as "weather" and "turning rate" have no effect on steering stand operation when the "operation control switch" is in _____.	GYRO	HAND	NFU	DIFF	See illustration number(s): EL-0097
12	721	B	Relative to the secondary winding of a step-up transformer, the primary winding will have _____.	more turns	fewer turns	half as many turns	twice as many turns	
12	722	D	Before using a volt-ohmmeter to measure resistance readings, you should _____.	replace all batteries	test the insulation resistance of the leads	make sure the test leads do not touch	hold the leads together and "zero" the meter	
12	723	A	To equalize the power factor of two alternators operating in parallel, the _____.	field excitation of both units is adjusted	governors of both units are adjusted	phase sequence is altered	kilowatt load is evenly divided	
12	724	A	Which of the following operating characteristics for DC motors is considered to give high starting torque?	series	shunt	cumulative-compound	differential-compound	
12	725	D	If a magnetic controller contactor fails to pick up when the coil voltage is applied to the contactor coil, the cause may be _____.	overload	misalignment of the affected contactor contacts	low spring pressure	an open contactor coil	
12	726	B	The total power used up in a series circuit is _____.	the sum of the powers used in each load (resistor) divided by the number of loads	the sum of the powers used in each load	always less than the power used in the smallest load	never more than the power used in largest load	
12	727	D	When the operating handle of a molded-case circuit breaker is in the mid-position, this indicates that the circuit breaker is _____.	on	off	reset	tripped	
12	728	B	As shown in the illustration, which of the symbols is used to represent a capacitor?	A	B	C	D	See illustration number(s): EL-0066
12	729	C	When you check the specific gravity of the battery electrolyte with a hydrometer, it should be kept in mind that _____.	the battery is fully charged when the indicator floats low in the electrolyte	any water that has been previously added to the cells will dilute the solution and give a false reading	a hydrometer reading is inaccurate if taken immediately after water is added to the cell	temperature has no effect on hydrometer readings	
12	730	C	As shown in the illustration, a "pitch cutback" feature is incorporated in the system. This circuit reduces pitch amount to prevent engine overload when it senses _____.	pitch error of any magnitude	wrong direction of the "pitch servo"	excessive propeller speed or fuel to either engine	only one engine on the line	See illustration number(s): EL-0095
12	731	B	The total resistance of a parallel circuit is always _____.	larger than that of the branch with the greatest resistance	smaller than that of the branch with the lowest resistance	equal to the sum of the individual branch resistances	equal to the sum of the individual branch resistances divided by the number of branches	

12	732	C	What is the current flowing through R1 of the illustrated circuit with a 6 VDC battery if the resistance of R1 is 2 ohms, R2 is 4 ohms and R3 is 4 ohms?	0.5 amps	1.5 amps	3.0 amps	6 amps	See illustration number(s): EL-0021
12	733	A	Equal power factors on paralleled AC generators are maintained by an automatic _____.	voltage regulator	reverse power relay	reverse current relay	governor control switch	
12	734	A	If a lower than normal resistance is applied to the shunt field of a DC compound motor, the motor speed will _____.	decrease	increase	remain constant	brake down to a stop	
12	735	B	If a magnetic controller contact fails to pick up when the operating coil is energized, one possible cause may be _____.	low spring pressure	low voltage to the coil	the residual magnetism of the contact faces	dirty contact faces	
12	736	A	Component "D" in section "I" shown in the illustration represents a _____.	selector switch	vibrating reed indicator	junction box	ring counter	See illustration number(s): EL-0093
12	737	A	If coils "R1-R2-R3" at the receiver of figure "B" shown in the illustration were in 180 degree error with those of the transmitter, what corrective action should be taken?	Reverse the 60 Hz connections to "S1" and "S2".	No action is needed as this is proper operation.	Interchange leads "R1" and "R3".	Interchange leads "R2" and "R3".	See illustration number(s): EL-0092
12	738	A	In the electrical schematic, a Zener diode will be represented by which of the symbols shown in the illustration?	A	B	C	D	See illustration number(s): EL-0067
12	739	C	Which of the listed forms of water should be added to a lead-acid battery?	saltwater	brackish water	distilled water	light water	
12	740	C	What is the voltage across "R2" of the illustrated circuit if the supply is 24 volts and the resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	2 volts	6 volts	8 volts	10 volts	See illustration number(s): EL-0020
12	741	A	If the resistance of a circuit is cut in half and the applied voltage is kept constant, the current flow will be _____.	doubled	quadrupled	unchanged	cut in half	
12	742	C	What is the current flow through R1 of the circuit illustrated if the resistance of R1 is 2 ohms, R2 is 3 ohms and R3 is 6 ohms with a 12 VDC battery?	2 amps	4 amps	6 amps	12 amps	See illustration number(s): EL-0021
12	743	C	The power factor at which a paralleled AC generator operates is usually adjusted by the _____.	connected load	prime mover speed	field excitation	generator's rated voltage	
12	744	C	As load is added to a shunt motor, the motor will _____.	speed up	continue to operate at the same speed	slow down slightly	stop	
12	745	C	Which of the listed types of motor controllers and starters is illustrated?	Across-the-line	Primary-resistor	Autotransformer	Part-winding	See illustration number(s): EL-0080
12	746	A	Batteries "A" and "B" shown in the illustration are 6 volts each and batteries "C" and "D" are 24 volts each. If "A" and "B" were reconnected to be in series-opposing to "C" and "D" respectively, the result would be _____.	18 volts, negative at the top terminal	18 volts, positive at the top terminal	30 volts, negative at the bottom terminal	30 volts, positive at the bottom terminal	See illustration number(s): EL-0039
12	747	B	What would be the total current flowing in the circuit shown in the illustration if the source is 30 volts, the resistance of R1 is 10 ohms, R2 is 10 ohms and R3 is 10 ohms?	1 amp	2 amps	5 amps	15 amps	See illustration number(s): EL-0032
12	748	D	As shown in the illustration, which of the elements listed does the line "B" represent in the basic schematic symbol of a PNP transistor?	Base	Emitter	Cathode	Collector	See illustration number(s): EL-0068
12	749	B	Which of the processes listed occurs during the charging of a lead acid storage battery?	Negative plates change to lead peroxide.	Positive plates change to lead peroxide.	Both plates change to lead peroxide.	Both plates change to lead sulfate.	

12	750	A	What type of service is NOT provided by the circuit shown in the illustration?	Logging of engine order signals from the bridge.	Printed record of alarms as they occur.	Visual metering of temperature and pressure conditions.	Periodic recording of pressure and temperature conditions.	See illustration number(s): EL-0094
12	751	A	The primary function of an electric motor is to _____.	develop torque	generate high voltages	produce a magnetic field	generate high electrical resistance	
12	752	A	Current measuring instruments must always be connected in _____.	series with a circuit	parallel with a circuit	series-parallel with a circuit	delta with the shunt	
12	753	A	If the excitation is increased to one of two alternators operating in parallel, the _____.	power factor will change in the lagging direction	power factor will change in the leading direction	kilowatt load will be greatly increased	ampere load will be greatly decreased	
12	754	A	In a series wound motor, the current passing through the field windings is also passing through the _____.	armature	shunt field	reactance comparator	laminations	
12	755	D	As shown in the illustration, "H1" and "H2" are _____.	fixed capacitors	variable capacitors	contacts, closed when the circuit is energized	contacts, open when the circuit is energized	See illustration number(s): EL-0058
12	756	D	Which of the listed devices may be installed on a large diesel-electric alternating current propulsion generator?	Temperature detector coils inserted in the stator slots for measuring stator temperature.	A CO2 fire extinguishing system.	Electric space heaters to prevent condensation of moisture.	All of the above.	
12	757	B	What would be the voltage drop across the parallel branches of the circuit shown in the illustration if the source is 30 volts the resistance for R1 is 10 ohms, R2 is 10 ohms and R3 is 10 ohms?	5 volts	10 volts	20 volts	30 volts	See illustration number(s): EL-0032
12	758	C	As shown in the illustration, which electrical symbol represents a PNP type semiconductor?	A	B	C	D	See illustration number(s): EL-0065
12	759	A	Power necessary to operate the horn relay shown in the illustration _____.	comes from each station's magneto	is supplied from a 115 volt source	is conducted through the relay's contacts	also lights lamps "R" and "T"	See illustration number(s): EL-0093
12	760	C	The total power consumed in a parallel circuit is _____.	the sum of the powers used in each load (resistor) divided by the number of loads	always less than the power used in the smallest load	the sum of the powers used in each individual load	never more than the power used in the largest load	
12	761	B	The resistance of electric wire will decrease as its _____.	length increases	cross-sectional area increases	temperature increases	percent of metallic purities increases	
12	762	A	Which of the instruments listed should always be connected in series with a circuit?	Ammeter	Megohmmeter	Wattmeter	Voltmeter	
12	763	A	The power factor of an AC generator operating singularly is determined by the _____.	connected load	prime mover speed	field excitation	generator's rated voltage	
12	764	A	The speed of a series wound winch motor is controlled by _____.	varying the voltage applied to the motor	the weight of the load on the cargo boom	overcurrent protection devices in the motor	a hydraulic speed-limiting governor	
12	765	A	"A-1", as shown in the illustration, is/are _____.	normally-closed overload relay contacts	a double pole knife switch	normally-open overload relay contacts	a single pole knife switch	See illustration number(s): EL-0017
12	766	D	What is the voltage across "R3" of the illustrated circuit if the supply is 24 volts and the resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms?	2 volts	6 volts	8 volts	10 volts	See illustration number(s): EL-0020
12	767	B	The arc resulting from the tripping of a circuit breaker is prevented from damaging the contacts by _____.	designing the contacts to open slowly	directing the arc into an arc chute	an inverse timed thermal trip for short circuit currents	instantaneous magnetic trip for overload currents	
12	768	A	Which of the devices listed is indicated by the symbols lettered "A" to "F", shown in the illustration?	Diodes	Linear inductors	Capacitors	Transistors	See illustration number(s): EL-0016

12	769	C	When a lead-acid battery begins gassing freely while receiving a normal charge, the charging current should _____.	be increased	remain unchanged	be decreased	shut off	
12	770	D	As shown in the two illustrations for "pitch control" and engine speed control", when the plant is in "AUTO / CRUISE" propeller pitch is controlled by _____.	the "trim potentiometer" and speed by either "thrust lever"	either "thrust lever" and speed also by the selected Lever	the split trim potentiometer and speed by its "trim pot".	either "thrust lever" and speed by the "trim potentiometer"	See illustration number(s): EL-0095 EL-0096
12	771	D	When the voltage remains constant and the resistance is increased in a series circuit, the flow of current _____.	increases by the square of the original value	increases	remains the same	decreases	
12	772	C	An ammeter should be used to measure _____.	the voltage between two points in a circuit	circuit continuity	current flow in a circuit	total or partial circuit resistance	
12	773	A	Why is it desirable to operate paralleled AC generators at the same power factor?	Circulating currents are kept to a minimum.	Field excitation losses are kept to a minimum.	Generator rotors will have a lesser tendency to hunt.	Because a power factor increase will decrease kilowatt output.	
12	775	D	As shown in the illustration, "S" is the _____.	safety switch	overload trip	start button	stop button	See illustration number(s): EL-0017
12	776	C	What would be the voltage drop across the series resistor of the circuit shown in the illustration if the source is 30 volts, the resistance of R1 is 10 ohms, R2 is 10 ohms and R3 is 10 ohms?	5 volts	10 volts	20 volts	30 volts	See illustration number(s): EL-0032
12	777	D	In the pitch control diagram shown in the illustration, what are the present plant operating conditions?	One engine is on the line, cruise mode is selected and the engine room is in control.	One engine is on the line, maneuvering mode is selected and the bridge is in control.	Both engines are on line, cruise mode is selected and the bridge is in control.	Both engines are on line, maneuvering mode is selected and the engine room is in control.	See illustration number(s): EL-0095
12	778	A	The schematic diagram shown in the illustration represents which of the listed solid-state circuits?	Bridge rectifier	Magnetic amplifier	Flip-flop generator	Cathodic amplifier	See illustration number(s): EL-0069
12	779	B	The charge of a lead-acid battery is checked with a _____.	manometer	hydrometer	viscosimeter	ohmmeter	
12	780	B	What is the current through R2 of the circuit illustrated if the resistances of R1 is 2 ohms, R2 is 4 ohms, and R3 is 4 ohms with a 6 volt battery?	0.5 amp	1.5 amps	3.0 amps	6 amps	See illustration number(s): EL-0021
12	781	A	When the voltage remains constant, and the resistance increases in a series circuit, current flow _____.	decreases	remains the same	increases	increases by the square	
12	782	A	A DC ammeter is always connected _____.	in series with a circuit	in parallel with a circuit	with internal shunts only	without regard to polarity	
12	783	C	The voltage output of an AC generator is accurately controlled by _____.	changing the sensitivity of the prime mover to large changes in voltage	varying the reluctance of the air gap	varying the DC exciter voltage	shorting out part of the armature windings	
12	784	C	In a compound-wound motor, a portion of the line current flows through the _____.	inertial poles	stator	shunt field coils	frame	
12	785	C	If a 6 volt battery were connected in series with a 24 volt battery by putting their negative terminals together, what would be the result?	"Zero" volts	12 volts of the opposite polarity	18 volts, positive on the 24 volt battery	30 volts, negative on the 24 volt battery	

12	786	B	As shown in the illustrations, which statement characterizes steering operations using the "non-followup controller"?	The rudder responds while the switch is held left or right and returns to mid-ships when the self-centering switch is released.	The rudder responds while the switch is held left or right and remains in position when the self-centering switch is released.	The rudder responds to the gyro input if the switch is held left and responds to the Wheel if the switch is held right; in both cases, it returns to mid-ships with switch "off".	The rudder responds to the Wheel if the switch is held left and responds to the gyro input if the switch is held right; in both cases, it remains in position when switch is "off".	See illustration number(s): EL-0097 EL-0098
12	787	A	You can determine if a circuit breaker has tripped by _____.	examining the position of the handle	checking for which of the breakers is warm	looking for a burned-out link	all of the above	
12	788	A	An operational amplifier, as used in today's consoles, may have a calculated gain of 5. This means that as the input changes by _____.	1 volt, the output changes 5 volts	5 volts, the output changes 1 volt	5 volts, the output changes 10 volts	10 volts, the output changes 5 volts	
12	789	D	Component "C" in section "I" shown in the illustration represent _____.	a selectable holding coil arrangement	a "fuse blown" indicator circuit	"reset" and "trouble" lamps	a handset with switch and voice elements	See illustration number(s): EL-0093
12	790	D	Under which of the following conditions will a lead-acid battery be given a "test discharge"?	To determine its capacity.	Whenever a cell cannot be brought within 10 points of full charge specific gravity.	When one or more cells is found to have less than normal voltage after an equalizing charge.	All of the above.	
12	791	A	Which of the formulas listed is correct for determining power?	P = (E)(E)/R	P = (I)(R)(R)	P = (I)(I)/R	P = E/R	
12	792	C	Which of the listed meters uses a shunt connected in series with the load, but parallel with the meter movement?	Voltmeter	Power factor meter	Ammeter	Wattmeter	
12	793	B	What is the current flowing through R2 of the illustrated circuit if the voltage is 12 VDC and the resistance of R1 is 2 ohms, R2 is 3 ohms and R3 is 6 ohms?	2 amps	4 amps	6 amps	12 amps	See illustration number(s): EL-0021
12	794	C	Which of the following statements describes what will happen when both the polarity of the field poles, and the direction of current to the brushes of a DC motor are reversed?	The motor will not start.	The direction of rotation of the armature will be reversed.	The direction of rotation of the armature will remain the same.	The field pole windings will become overheated.	
12	795	A	A slow continual loss of electrolyte level from one cell of a storage battery could be due to _____.	a cracked casing	too low a charging rate	the specific gravity being higher than normal	one filler cap installed too tightly	
12	796	A	Nickel-cadmium batteries are superior to lead-acid batteries at high discharge rates because they _____.	deliver a large amount of power and can be recharged in a shorter time	need fewer cells in connected series and less mounting space	have higher output voltages and require no maintenance	all of the above	
12	797	C	When the operating handle of a molded-case circuit breaker is in the mid-position, the circuit breaker is indicated as being _____.	in the "closed" position	in the "opened" position	tripped	reset	
12	798	D	When a console indicating lamp burns out, attempts to renew it should not be made while maneuvering because _____.	the new lamp may be of a higher wattage and cause heat damage to the lens	removing a faulty lamp usually causes an alarm to sound on the bridge	attention should be paid only to engine orders	a socket/wiring fault may cause a ground or short circuit to shut down a vital function	
12	799	C	As shown in the illustration, what is the meaning of the numbers in brackets [ ] at location "31/33U"?	Four separate devices with these part numbers feed signals into this point.	There is a 33 kOhm bridge resistor at each of these locations in the wheelhouse.	Wire "33K" continues on those four pages and connects to devices at the indicated coordinates.	None of the above.	See illustration number(s): EL-0100
12	800	D	The sensor connected to "signal conditioner" (6000F085) shown in the illustration is a/an _____.	thermocouple	transducer	inverter	RTD	See illustration number(s): EL-0094

12	801	B	The rate at which heat is produced in a direct current circuit is equal to _____.	P divided by R	I squared times R	E divided by I	I times R divided by T	
12	802	D	The basic meter movement responds to the flow of current through its coil. Therefore, this meter movement may be used as a/an _____.	voltmeter by placing a resistance in parallel with the coil	ohmmeter by placing another meter movement in parallel with the coil	wattmeter by placing a battery in parallel with the coil	ammeter by placing a low resistance in parallel with the coil	
12	803	B	If Relay #5 changed contact position grounding the "auto" input to the "pitch controller module", pitch control would be effected by the _____.	pitch feedback potentiometer	Engine room thrust split potentiometer	Engine room thrust lever only	Bridge thrust lever only	See illustration number(s): EL-0095
12	804	C	When power is restored after a complete power failure, a steering gear pump motor will _____.	have to be restarted	have to be reset	restart automatically	trip its overload relays	
12	805	D	What would be the total power consumed in the circuit shown in the illustration if the source is 30 volts the resistance for R1 is 10 ohms, R2 is 10 ohms, and R3 is 10 ohms?	10 watts	40 watts	45 watts	60 watts	See illustration number(s): EL-0032
12	806	C	The ring circuit of the system shown in the illustration would become inoperative if a ground developed at _____.	either terminal "T" or "C"	either terminal "B" or "R"	both terminals "B" and "C"	both terminals "T" and "R"	See illustration number(s): EL-0093
12	807	A	Which of the following represents a characteristic of an ungrounded electrical distribution system?	Accidental contact between one line and ground does not cause an outage.	Double ground faults on different phases will not cause an outage.	Ground detection systems are unnecessary.	Accidental contact between one line and ground will always cause an outage.	
12	808	A	As shown in the illustrations, ordered rudder angle is fed back from the _____.	power unit to the magnetic amplifier	steering gear to the control potentiometer	magnetic amplifier to the steering gear	rudder yoke to the non-followup controller	See illustration number(s): EL-0097
12	809	B	What is the approximate voltage per cell produced by the nickel-iron (Edison) battery?	0.85 volts	1.35 volts	2.20 volts	6.05 volts	
12	810	D	The device at coordinates "63/1" in the illustration represents a/an _____.	A.C. buzzer	A.C. motor	D.C. motor	D.C. relay coil	See illustration number(s): EL-0100
12	811	C	One horsepower is equal to _____.	500 watts	663 watts	746 watts	1,000 watts	
12	812	A	An ammeter reads slightly above "zero" when its leads are disconnected, this is a result of _____.	mechanical misalignment of the meter pointer	a poor ground for the meter case	static electricity in the air	resistors inside the meter storing charges	
12	813	C	When an alternator is to remain idle for even a few days _____.	lift the brushes and disconnect the pigtails	insulate the collector rings with strips of cardboard	energize the heater circuit	open the equalizing bus disconnect switch	
12	814	A	Proper storage battery maintenance includes _____.	keeping connections tight and casing surfaces clean	making sure electrolyte level is below the separator plates	insulating the terminals with naval jelly	maintaining a high charging rate at all times	
12	816	B	Part of the insulation of practically all electrical machinery is in the form of organic compounds which contain some amount of _____.	asbestos	water	fibre	plastic	
12	817	A	When the current in a power transmission line is increased, the power loss _____.	increases as the square of the current	decreases as the square root of the current	remains the same, as it is independent of current flow	increases in direct proportion as the current	
12	818	D	Modern handheld digital tachometers operate by counting light pulses returned to the unit by _____.	the tach generator	either the coupling or shaft	a small bulb attached to the shaft	a piece of reflective tape	
12	819	A	To determine the state of charge of a nickel-cadmium battery, you would use a/an _____.	voltmeter	hydrometer	ammeter	potentiometer	
12	820	C	The symbol at coordinates "11R" in the illustration indicate a connection to _____.	ground	the console chassis	the digital circuitry common bus	earth through the vessel's hull	See illustration number(s): EL-0100

12	821	A	The true power indicated by the pointer movement of a wattmeter depends on the current flow through the load, the magnitude of the potential across the load, and the _____.	power factor of the load	angle of coil displacement	inertia of the movable coil	high resistance from the load	
12	822	A	The shunt of a DC ammeter should be connected in _____.	series with the load and in parallel with the meter movement	parallel with the load and in series with the meter movement	parallel with the load and in parallel with the meter movement	series with the load and in series with the meter movement	
12	823	C	The standard method of controlling the output voltage of a 440 volt, 60 Hz, AC generator is accomplished by adjusting the _____.	prime mover speed droop	number of poles	alternator field excitation	load on the alternator	
12	824	D	The air gap provided in induction motors should be checked periodically with a feeler gage to detect an unequal air gap and _____.	decreased motor magnetizing current	hysteresis loses	increased power factor	mechanical damage to the rotor	
12	825	A	When troubleshooting a lead-acid storage battery, a weak or dead cell is best detected by _____.	measuring and comparing all cells' specific gravity	taking an open circuit voltage test of individual cells	visually inspecting the electrolyte levels of each cell	taking each cell's temperature with a calibrated mercury thermometer	
12	826	D	Common nickel-cadmium and nickel-iron storage batteries utilize _____.	acid primary cells	alkaline primary cells	acid secondary cells	alkaline secondary cells	
12	827	B	Due to the operating characteristics of the system, time lag fuses (or dual-element fuses) are necessary for use in _____.	main lighting circuits	motor starting circuit	emergency lighting circuits	general alarm circuits	
12	828	D	Loss of or weak residual magnetism in an alternator or generator can be corrected for by _____.	running the rotor in the opposite direction for 5 minutes	allowing the generator to run at 10% of normal speed for 5 minutes	running the generator at normal speed with the field rheostat fully counterclockwise	using a storage battery or battery charger to "flash" the field	
12	829	A	What is the current flowing through R3 of the illustrated circuit if the battery is 12 VDC and resistance of R1 is 2 ohms, R2 is 3 ohms, and R3 is 6 ohms?	2 amps	4 amps	6 amps	12 amps	See illustration number(s): EL-0021
12	830	A	The sensor connected to "signal conditioner" (6000AH170) shown in the illustration is a/an _____.	thermocouple	transducer	inverter	RTD	See illustration number(s): EL-0094
12	831	B	An accidental path of low resistance which passes an abnormal amount of current is known as a/an _____.	polarized ground	short circuit	ground reference point	open circuit	
12	832	B	A milliammeter, with a full scale deflection reading of 100 milliamps, is known to have an accuracy of + or - 2%. A meter reading of 10 milliamps would indicate a line current of between _____.	9.8 and 10.0 milliamperes	9.8 and 10.2 milliamperes	8.0 and 12.0 milliamperes	8.0 and 10.0 milliamperes	
12	833	C	The amount of voltage induced in the windings of an AC generator depends mainly on _____.	the number of field poles energized	the speed at which the stator windings rotate through the magnetic field	the strength of the magnetic field	all of the above	
12	834	A	Which of the following materials is a good electrical insulator?	wood	silver	copper	gold	
12	835	C	Cleaning of electrical insulation should be _____.	done every six months	accomplished every 12 months	determined by need and not the calendar	performed whenever the electrician is not otherwise busy	
12	836	D	The plates of a NiCad storage battery are made of _____.	potassium hydroxide with a small amount of sulfuric acid	lead and lead peroxide	silver oxide and lead sulfate	combinations of nickel powder and nickel & cadmium salts	
12	837	A	An instantaneous-trip-type fuse will _____.	open as soon as the load current exceeds its set point	allow a preset delay between overcurrent and melting	open a circuit by using a time delay element with a magnetic trip	reset itself when the overcurrent is corrected	

12	838	B	Basic electrical motor action depends on _____.	a conductor rotated within a magnetic field	a current carrying conductor placed in a magnetic field	the relative force of the commutator and commutating poles	the relative force of the armature and interpoles	
12	839	A	When mixing electrolyte, which of the following precautions should always be observed?	Add the acid to the water.	Use a heavy duty aluminum pail.	Add the water to the acid.	Mix the solution outdoors.	
12	840	B	What power would be consumed in EACH of the branch resistors of the circuit shown in the illustration if the source is 30 volts, the resistance for R1 is 10 ohms, R2 is 10 ohms and R3 is 10 ohms?	5 watts	10 watts	20 watts	40 watts	See illustration number(s): EL-0032
12	841	D	Which of the following statements about copper wire sized by the AWG rating is correct?	Number 12 AWG wire has a higher current rating than number 10 AWG wire.	Number 10 AWG wire has a higher dielectric strength than number 12 AWG wire.	Number 12 AWG wire is larger than Number 10 AWG wire.	Number 12 AWG wire at 25°C has more resistance per 1000 feet than No. 10 AWG wire at 25°C.	
12	842	B	Which of the following statements represents the correct method of connecting the shunt of an ammeter prior to taking a reading?	In series with the load and in series with the meter movement.	In series with the load and in parallel with the meter movement.	In parallel with the load and in series with the meter movement.	In parallel with the load and in parallel with the meter movement.	
12	843	C	Relative to the direction of rotation, a D.C. motor commutating pole has the same polarity as the _____.	main pole following	interpole following	main pole preceding	interpole preceding	
12	844	A	One method of troubleshooting digital circuits in a console is to _____.	supply alternate logic levels at the input(s) and test for change of state conditions at the output	ground all inputs and test for a logic "1" at the output	open all inputs and test for a logic "0" at the output	vary each input smoothly from 0-10 volts and test for similar variance at the output	
12	845	D	Vessel pitch can be controlled by either the "bridge or engine room thrust lever" shown in the illustration; but only with one engine on the line whether in "cruise or maneuver" mode. The cause is most likely a faulty relay _____.	#1	#2	#3	#4	See illustration number(s): EL-0095
12	846	B	The devices located at coordinates "49W" in the illustration represents a/an _____.	A.C. motor	A.C. relay coil	D.C. motor	D.C. buzzer	See illustration number(s): EL-0100
12	847	B	Upon failure of the normal power supply, the emergency generator is placed on the line by the _____.	main bus tie feeder	automatic bus transfer device	line connection feeder	power failure alarm bus	
12	848	D	Routine maintenance of a ship's service alternator should include _____.	changing the pedestal bearing insulation yearly	megger testing of all rectifying diodes	lubricating excitation slip rings	periodic cleaning of the air filters or screens	
12	849	B	The sensor connected to "signal conditioner" (6000F125) shown in the illustration is a/an _____.	thermocouple	transducer	inverter	RTD	See illustration number(s): EL-0094
12	850	B	Nickel-cadmium storage batteries are superior to lead-acid batteries because they _____.	put out higher voltages and require no maintenance	can remain idle and keep a full charge for a long time	need fewer cells in series and use less mounting space	all of the above	
12	851	B	The force that causes free electrons to move in a conductor as electric current flow is called a/an _____.	resistant force	electromotive force	inductive force	dielectric force	
12	852	D	Which of the following meters uses a shunt connected in series with the load, but parallel with the meter movement?	voltmeter	power factor meter	wattmeter	ammeter	
12	853	C	Electrical machinery insulation will break down more rapidly due to _____.	low loading of motors and generators	frequent megger testing	high temperatures and vibration	high operating frequencies	
12	854	A	The speed of a multi-speed, squirrel-cage, induction motor operating in a fixed frequency system can be changed by _____.	reconnecting stator windings for different numbers of poles	changing the RPM of the rotor flux	changing the phase sequence of the applied voltage	reconnecting the stator so that no poles have the same polarity	

12	855	D	In the construction of D.C. motors, parts of both the series and shunt fields are wound on the _____.	opposite main pole	rotor core	interpole	same main pole	
12	856	B	A handheld digital tachometer could give a bad reading if _____.	aimed directly at the shaft	partially aimed at a 60 Hz. fluorescent light	positioned 5-10 inches from the shaft	the tape is too shiny	
12	857	D	Which of the listed sections of an emergency switchboard is used to supply power for alarm signals under emergency conditions?	The generator and bus transfer section	The 450 volt, 60 cycle, 3 phase bus	The 120 volt, 3 phase, 60 cycle bus	The 24 volt DC bus	
12	858	C	As shown in the illustration, the M-G set's three-phase motor drives the _____.	motor and the generator	motor and the exciter	generator and the exciter	main field and the interpole field	See illustration number(s): EL-0101
12	859	C	Which of the listed ranges represents specific gravity corrected for temperature for the electrolyte of a fully charged portable lead-acid battery?	1.100 to 1.150	1.180 to 1.200	1.280 to 1.300	1.750 to 2.000	
12	860	B	The operator of electrical motors should keep a constant check on the loads they carry because _____.	low loads necessitate frequent insulation cleaning	exceeding nameplate values shortens useful life	energy is wasted if full loading is not utilized	power factor correction methods are load dependent	
12	861	B	Inductance is the property of an electric circuit that _____.	opposes any change in the applied voltage	opposes any change in the current flow through the circuit	aids any changes in the applied voltage	aids any changes in the current through the circuit	
12	862	C	An important factor in reducing D.C. motor commutator wear is _____.	keeping the ambient humidity as low as possible	ensuring a very low brush current density	establishing the copper oxide surface film	all of the above	
12	863	C	When removing ball or roller bearings from the shaft of a motor, you should use a _____.	rawhide hammer	brass mallet	wheel puller	soft iron pry bar	
12	864	A	The rotation of a three-phase induction motor can be reversed by _____.	interchanging any two of the three line leads to the stator	disconnecting one of the three line leads to the stator	switching the shunt field coil leads	permanently disconnecting any two of the three line leads to the stator	
12	865	D	The "safe switch" of the winch controller shown in the illustration is operated _____.	through the master switch handle	when heater circuit current is high	by contactor coil "FR"	manually by the winch operator	See illustration number(s): EL-0102
12	866	C	Which plant parameters shown in the illustration would produce an alarm if they fell below preset values?	SME #7 CYL. EXH. and L.O. PRESS. TO RDCN. GR.	L.O. PRESS TO MN. ENG. and PME #3 MN. BRG.	L.O. PRESS. TO MN. ENG and L.O. PRESS. TO RDCN. GR.	PME #3 MN. BRG. and SME #7 CYL. EXH.	See illustration number(s): EL-0094
12	867	C	When troubleshooting a console circuit card which is suspected of being faulty, the first step would be to _____.	pull the card and measure the value of all resistors	check for the correct value and polarity of all power connections to the card	de-energize and pull the card to visually inspect for burned components	check for continuity of circuit board traces and then the gain of each transistor	
12	868	C	If the motor fails to start and a voltmeter reading between 1 and 6, as illustrated, indicates line voltage, your next step should be to _____.	replace fuse "10a"	replace or repair contact "Ma"	reset and determine the cause of the overload	check line voltage between L1 and L3	See illustration number(s): EL-0007
12	869	D	What power would be consumed by the series resistor of the circuit shown in the illustration if the source is 30 volts, the resistance of R1 is 10 ohms, R2 is 10 ohms, and R3 is 10 ohms?	5 watts	10 watts	20 watts	40 watts	See illustration number(s): EL-0032
12	870	D	The amount of mechanical force or torque produced by an electric motor depends on the _____.	strength of its magnetic field	amount of armature current flow	length of conductor in the field	all of the above	
12	871	B	Capacitance is the property of an electric circuit opposing a change in the _____.	current in the circuit	voltage in the circuit	inductance in the circuit	resistance in the circuit	
12	872	C	A megohmmeter is connected to each end of an individual motor winding. A low ohm reading indicates _____.	an open coil	a loose coil	good continuity	a dirty coil	
12	873	B	The frequency of an AC generator is controlled by the _____.	rheostat	governor	exciter	capacitor	

12	874	A	A faulty "function generator" shown in the illustration may prevent _____.	proper pitch control from both the "bridge" and "engine room thrust levers"	the "split potentiometer's" ability to control pitch	the pitch meter from indicating accurately	relays #2 and/or #3 from energizing	See illustration number(s): EL-0095
12	875	A	The symbol at coordinates "15R" in the illustration indicate a connection to _____.	the analog circuitry common bus	ground	the vessel's hull	the console's chassis	See illustration number(s): EL-0100
12	876	A	The "reset" contacts of the master switch shown in the illustration are _____.	closed only when the master switch is "off"	closed only when the master switch selects a "run" condition	opened separately by the winch operator	opened when line voltage drops 10%	See illustration number(s): EL-0102
12	877	D	The 24 volt DC bus on the emergency switchboard is used to supply power to the _____.	general alarm system	gyrocompass power failure alarm system	smoke detection system	all of the above	
12	878	A	The life expectancy of electrical insulation, is approximately halved for an increased operating temperature of _____.	10° C	25° C	50° C	100° C	
12	879	A	Under normal conditions, storage batteries used for starting the emergency diesel generator are maintained in a charged state by which of the following methods?	Trickle charging	Fast charging	Equalizing charge	Reverse charging	
12	880	D	As shown in the illustration, which set of conditions, evident to the operator and the "setpoint module" respectively, will result in a high exhaust temperature alarm on the "starboard main engine"?	50° F and 3.3 volts	180° F and 6.0 volts	750° F and 0-10 volts	900° F and 7.5 volts	See illustration number(s): EL-0094
12	881	C	At high discharge rates, nickel-cadmium storage batteries are superior to lead-acid batteries because they _____.	require fewer cells for the same voltage and less mounting space	are able to produce higher voltages and do not have to be charged as often	can be charged and discharged many times without much damage	have no individual cells to replace at the end of useful life	
12	882	A	A megohmmeter can be used to test for _____.	an open field coil	a shorted field pole	undercut mica	reversed polarity	
12	883	C	The frequency of an alternator is controlled from the main switchboard by adjusting the _____.	frequency meter	voltage regulator	governor control	sychroscope switch	
12	884	C	The reversal of an AC, three-phase, induction motor is accomplished by _____.	changing all three motor leads	reversing the position of the slip rings	interchanging any two of the three motor leads	interchanging any two brushes	
12	885	C	When troubleshooting a console circuit card suspected of being faulty, first check for proper voltages to the card and then _____.	test transistors or integrated circuits for gain and compare with manufacturer's specifications	blow any accumulated dust from the card with at least 30 psi air from the ship's service air system	pull the card, clean the sliding connections with a pencil eraser, and remove accumulated dust	de-energize the card and check the printed circuit traces for continuity with an ohmmeter	
12	886	C	A useful instrument for checking A.C. motor performance by measuring possible unbalanced currents is the _____.	hand or battery-operated megger	vibrating-reed frequency meter	hook-on voltmeter-ammeter	D'Arsonval iron-vane probe	
12	887	B	In an AC circuit, the inductive reactance of a coil varies with the _____.	resistance of the circuit	frequency of the circuit	voltage of the circuit	current of the circuit	
12	888	A	Complete maintenance of electrical motors should include periodic checks for machine _____.	vibration	watertight integrity	speed droop	reactive power	
12	889	A	As shown in the illustration, the D.C. motor's direction of rotation in changed by changing the _____.	polarity of the generator field	direction of three-phase motor rotation	direction of generator rotation	polarity of the motor field	See illustration number(s): EL-0101
12	890	C	In order to take a current reading with a "clamp-on" ammeter, the instrument's jaws _____.	should remain open	cannot touch the adjacent conductor	must be fully closed	will act as a transformer primary	
12	891	B	The number of cycles per second occurring in AC voltage is known as the _____.	phase angle	frequency	wave form	half mode	
12	892	D	Which plant parameters shown in the illustration would produce an alarm if they exceeded preset values?	SME #7 CYL. EXH. and L.O. TO RDCN. GR.	L.O. PRESS. TO MN. ENG. and PME #3 MN. BRG.	L.O. PRESS. TO MN. ENG. and L.O. TO RDCN. GR.	PME #3 MN. BRG. and SME #7 CYL. EXH.	See illustration number(s): EL-0094
12	893	A	What is the approximate voltage produced by a nickel-cadmium battery cell?	1.25 volts	1.50 volts	2.20 volts	6.05 volts	

12	894	B	You are using a mechanical voltage tester to check the fuses in a three-phase circuit supplying an electric motor. For which of the following reasons must the motor be stopped during the test?	Testing an energized circuit presents a hazard to the testing personnel.	A faulty fuse could go undetected with the motor energized.	Reversed polarity of the circuit would be indicated by the voltage tester with the circuit energized.	All of the above.	
12	895	D	When "selector switch" "SEL8" shown in the illustration is in the "ON" position, contacts "3,4" and "7,8" are respectively _____.	open; closed	closed; open	open; open	closed; closed	See illustration number(s): EL-0100
12	896	C	What would be the power consumed in the combined parallel section of the circuit shown in the illustration if the source were 30 volts and the resistance for R1 is 10 ohms, R2 is 10 ohms, and R3 is 10 ohms?	5 watts	10 watts	20 watts	40 watts	See illustration number(s): EL-0032
12	897	B	Sparking of D.C. motor brushes can be caused by _____.	an open commutating winding	many mechanical, electrical or operating faults	an open interpole	all of the above	
12	898	B	In an emergency, the fastest way to interrupt power and stop the winch shown in the illustration is for the _____.	mate to open the disconnect switch at "L1" and "L2"	winch operator to open the "safe switch" at the "master switch"	engine room watch engineer to open the winch circuit breaker	electrician to open the test link at the controller	See illustration number(s): EL-0102
12	899	A	A hydrometer is used to measure the _____.	specific gravity of a battery electrolyte	water pressure in a deck pipeline	amount of potable water a vessel is taking on	power developed by a salt water service pump	
12	900	C	The "reset" contacts of the master switch shown in the illustration provides the winch controller with _____.	low voltage release	overload protection	low voltage protection	high power factor correction	See illustration number(s): EL-0102
12	901	C	When troubleshooting an alkaline storage battery a weak or dead cell is best located by _____.	checking the specific gravity of each cell	visually inspecting each cell's electrolyte level	testing each cell with a voltmeter	measuring the electrolyte temperature with an accurate mercury thermometer	
12	902	C	When a megohmmeter is used to test the dielectric strength of wire insulation, the initial dip of the pointer toward "zero" is caused by _____.	good insulation	the leakage of current along the surface of dirty insulation	the capacitance of the circuit	the dielectric absorption effect of the insulation	
12	903	D	The voltage of an operating AC turbogenerator is raised or lowered by adjusting the _____.	exciter generator governor controls	synchronizing switch	phase sequence switch	generator field exciter	
12	904	A	To properly seat the brushes on slip rings, you should use _____.	sand paper	crocus cloth	emery cloth	all of the above	
12	905	D	Electrical insulation is classed by the _____.	International Association of Electrical Manufacturers	approximate operating voltage and current expected	U.S. Coast Guard	temperature stability of the manufacturing material(s)	
12	906	B	In D.C. motor construction, commutating windings are wound on _____.	opposite main poles	interpoles	adjacent main poles	the rotor core	
12	907	C	Which of the following statements concerning AC circuits is correct?	The power factor of a resistive circuit is always zero.	True power in an inductive circuit always equals apparent power.	Inductive reactance varies directly with the frequency and the inductance.	Total opposition to the flow of alternating current depends upon the amount of reactive power.	
12	908	B	When troubleshooting motor controllers, a shorted relay or contactor coil is often indicated by _____.	a resistance reading of "infinity" on an ohmmeter	charred insulation and/or a blown control fuse	a reading of "zero" on a megger from one of the coil's leads to ground	a higher-than-normal voltage reading across the winding	
12	909	B	When a battery-charging panel is being used, the batteries will discharge if _____.	DC voltage is supplied	the polarity is reversed	the voltage fluctuates	too little current is supplied	

12	910	A	Routine A.C. motor maintenance should include periodic _____.	thermometer readings at normal loads to detect abnormal temperature rises	inspection of the motor's internals for loose rotor bars or field poles	bearing replacement each year using sealed units if available	all of the above	
12	911	C	Electric current is the flow of electrons through a conductor. The rate of this flow is measured as _____.	volts/watt	amperes/centimetre	coulombs/second	ohms/volt	
12	912	B	If the pointer on a megger fails to return to "zero" when not being used, the _____.	megger is out of calibration	megger is operating normally	hairsprings are burned out	pointer probably stuck in that position	
12	913	A	If the driving torque, such as that produced by a diesel engine, creates pulsations when coupled with a synchronous generator operating in parallel; the generator rotor may be periodically pulled ahead or behind its normal position as it rotates. This hunting condition is sometimes reduced by _____.	amortisseur windings	direct coupling	increase governor speed droop	decreasing governor speed droop	
12	914	A	Which of the following statements represents the FIRST step in seating new brushes on slip rings?	Wrap sandpaper around the slip rings and slide it back and forth between the brushes and the slip rings.	Press the brushes against the slip ring with a wood block.	Increase brush pressure and run at no load for 3 to 4 hours.	Apply seating compound under the brushes and run at no load for 2 hours.	
12	915	C	When replacing fuses, always make sure _____.	to stand on a rubber mat and use rubber gloves	to use insulated pliers or screwdriver	the fuse clips are straight, tight, and in good contact	to increase the fuse rating 10% to guard against "nuisance blowing"	
12	916	B	Periodic testing of circuit breakers is necessary to assure that a correctly rated and properly installed unit _____.	can trip faster as it increases in age	will continue to provide the original degree of protection	does not exceed its interrupting capacity	be able to withstand at least 125% of applied voltage	
12	917	B	Voltage will always lead current in a/an _____.	capacitive circuit	inductive circuit	magnetic circuit	resistive circuit	
12	918	A	The need for insulation cleaning may be determined by _____.	visual inspection for dirt accumulation	high megger readings	low operating temperature	the time period since the last cleaning	
12	919	D	If power were lost to the winch shown in the illustration while in 'second point hoist' the winch would stop. When power is restored the winch would _____.	continue to run at 'second point hoist' unless a different speed is selected by the "master Switch"	continue to run but at 'first point' speed, for safety, until the "master Switch" is brought to "off" and then back to the desired speed	remain stopped until the "safety switch" is recycled either directly or by action of the "master switch" handle	remain stopped until the "master switch" is returned to "off" closing the "reset" contacts and then moved to any 'run' position	See illustration number(s): EL-0102
12	920	A	When "selector switch" "SEL8" shown in the illustration is in the "OFF" position, contacts "3,4" and "7,8" are respectively _____.	open; closed	closed; open	open; open	closed; closed	See illustration number(s): EL-0100
12	921	B	Motor name plate data includes ",°C rise". This indicates the _____.	actual running temperature of the winding from no load to full load	permissible temperature rise of the windings above the designed ambient temperature	maximum allowable temperature rise above normal full load operating temperature	maximum allowable temperature rise for continuous no load service	
12	922	B	When using a megohmmeter to test the dielectric strength of wire insulation, a continuous series of slight downscale kicks by the pointer is result of _____.	good insulation	the leakage of current along the surface of dirty insulation	the capacitance of the windings	the dielectric-absorption effect of the insulation	
12	923	B	You are attempting to parallel two AC generators and the synchroscope pointer is revolving in the slow direction. This indicates that the frequency of the incoming machine is _____.	higher than the bus frequency	lower than the bus frequency	the same as the bus frequency but out of phase with it	the same as the bus frequency, and the circuit breaker may be closed at any pointer position	

12	924	D	As shown in the illustration, operating the reversing switch will change the polarity of the _____.	generator field	generator armature	motor armature	all of the above	See illustration number(s): EL-0101
12	925	A	Periodic testing by a shoreside support technician using a special camera which can detect potentially dangerous loose or corroded bus bar and controller connections is termed _____.	heat sensitive thermography	visual pyrotronics	corrosion electrolysis	electric vibroanalysis	
12	926	A	When troubleshooting a console circuit card suspected of being faulty, first check operating voltages, clean the card and then _____.	make sure wired connections and push-on connectors are tight	test each resistor and capacitor on the card with an ohmmeter	check the continuity of all printed circuit traces with an ohmmeter	measure the gain of each transistor or integrated circuit	
12	927	C	Four lamps are connected in parallel in a single circuit. If one of the lamp burns out, the others will _____.	all go out	become dimmer	burn with their original intensities	become brighter	
12	928	D	A commutator's protective oxide film can be destroyed by _____.	periods of low humidity	very low brush current density	improper brush grade	all of the above	
12	929	A	When the electrolyte level of a lead-acid storage battery has decreased due to normal evaporation, the level should be reestablished by adding _____.	distilled water only	sulfuric acid only	a weak solution of sulfuric acid and distilled water	a strong solution of sulfuric acid and distilled water	
12	930	A	When troubleshooting a motor controller, all indications are that a relay coil should be energized. If there were no magnetic pull, with rated voltage measured across the coil, the most probable cause would be that the _____.	coil is open	control fuse is open	auxiliary contact in series with the coil is defective	relay armature is stuck	
12	931	C	Materials that retain a large part of their magnetization, after the magnetizing force is removed, are said to have _____.	low hysteresis loss	high flux density	high permanence	high permeability	
12	932	D	Discharge switches are often located on hand-driven meggers. The purpose of these switches is to discharge capacitive charges stored in the _____.	megger hand generator	megger movement coils	tested equipment while conducting test	tested equipment after testing	
12	933	A	You are attempting to parallel two AC generators and the synchroscope pointer stops at a position other than 0, prior to closing the circuit breaker. This indicates _____.	the frequency of the incoming machine is the same as the bus frequency	the incoming machine is in phase with the bus, but the frequency is not the same	the circuit breaker may be closed after breaker has been reset	there is an existing cross current between generators	
12	934	B	In the system shown in the illustration, the station at section I is unable to signal any other station nor is any other station able to signal the station in section I. The station can, however, ring itself by proper positioning of its selector switch. What is the most probable cause of this problem?	The selector switch is grounded at the problem station diverting current from the other stations' ringing devices.	There is an open between terminal "C" of the problem station and the multi-conductor cable to the other stations.	The contacts to the left of component "B" are stuck closed allowing only a single station to respond to itself.	The switch at component "C" is stuck open.	See illustration number(s): EL-0093
12	935	A	If the total source voltage of the three-wire distribution system shown in the illustration is 240 volts, what is the voltage across load L4?	110.4 volts	112.2 volts	113.0 volts	114.8 volts	See illustration number(s): EL-0075
12	936	B	The purpose of the "heater resistors" for the winch circuit shown in the illustration is to _____.	limit the current in the heater circuit	dispel moisture in the "master switch" housing & control panel	keep the winch brake housing below the dew point	maintain winch motor operating temperature	See illustration number(s): EL-0102
12	937	D	When shipboard electrical distribution circuits are connected in parallel, additional parallel circuits will cause the total circuit resistance to _____.	increase, causing a drop in the line current	increase, causing a decrease in the line voltage	decrease, causing an increase in the line voltage	decrease, causing an increase in the line current	
12	938	D	Which of the listed classes of electrical insulation is suited for the highest operating temperature?	Class 90 (O)	Class 105 (A)	Class 130 (B)	Class 180 (H)	
12	939	C	Which of the following procedures represents the best method to prevent the freezing of batteries continuously exposed to low temperatures?	The battery caps should be removed.	The battery cap vents should be sealed.	The battery should be kept in a fully charged condition.	The battery should be disconnected from its charging source.	

12	940	B	When "selector switch" "SEL8" shown in the illustration is in the "TEST" position, contacts "3,4" and "7,8" are respectively _____.	open; closed	closed; open	open; open	closed; closed	See illustration number(s): EL-0100
12	941	B	Ambient temperature is the _____.	amount of temperature rise with no load	temperature of the compartment where the motor is located	normal operating temperature, less the room temperature	amount of temperature developed by an operating motor	
12	942	A	A megohmmeter can be used to test for _____.	an open field coil	synchronous speed	undercut mica	reversed polarity	
12	943	C	You are attempting to parallel two AC generators and the synchroscope pointer is revolving slowly in the fast direction. You should _____.	use the governor control switch to adjust the incoming voltage so it is equal to the bus voltage	use the governor control switch to increase the speed of the machine on the line only	close the circuit breaker when the synchroscope pointer approaches the 0° position	use the field rheostat to adjust the speed of the incoming machine	
12	944	D	When the control handle is in the "off" position, the solenoid actuated brake of the electric winch is _____.	de-energized and the brake is released	energized and the brake is released	energized and the brake is set by a spring	de-energized and the brake is set by a spring	
12	945	A	In D.C. motor construction, the armature coils' ends are _____.	soldered to the commutator bar risers	imbedded into core slots	crimped together with brush pigtails	spliced with the field windings	
12	946	A	Electric circuits are protected against overloads and short circuits by means of a/an _____.	circuit breaker	amplifier	diode	capacitor	
12	947	A	In addition to testing the calibration of a circuit breaker, maintenance should include all of the following EXCEPT _____.	changing out of magnetic elements and thermal heaters yearly	checking for corrosion, accumulation of dirt and thermal fatigue	inspecting for loose or missing parts	making sure foreign matter does not block tripping element	
12	948	B	When changing fuses and the spring clips are found to have lost their grip, they should be replaced or _____.	tightened firmly with insulated pliers	clip clamps should be used	wired closed with uninsulated, varnished copper wire	carefully bent back to their original shapes	
12	949	D	Which of the substances listed should be applied to battery terminals to help prevent corrosion?	Zinc chromate	Naval jelly	Lead peroxide	Petroleum jelly	
12	950	D	When troubleshooting a console circuit card suspected of being faulty, the last step would be to _____.	check the fuses and voltage levels of all power supplies in the console	clean dust and debris from the card and burnish the sliding connections	make sure all connections are tight including wire wrappings and push-on types	substitute a new or repaired spare card and check the operation of the circuit	
12	951	C	The armature cores of the D.C. motors are constructed with laminations to _____.	eliminate hysteresis	minimize brush sparking	reduce eddy current losses	compensate for armature reaction	
12	952	C	When a megohmmeter is being used to test insulation resistance, current leakage along the surface of the insulation is indicated by the megohmmeter pointer _____.	fluctuating around a constant resistance reading	dipping towards "zero", then rising slowly	kicking slightly downscale as voltage is applied	continually rising as the test voltage is applied	
12	953	D	While paralleling two (2) AC generators using synchronizing lamps only, both lamps will go dark when the generators are _____.	running at the same speed	grounded	of the same polarity	in phase	
12	954	A	The direction of rotation of a DC propulsion motor can be reversed by _____.	reversing the field connections	reversing the field and the armature connections	wiring the field and armature in parallel	wiring the field and armature in series	
12	955	D	Motor controllers are seldom troubled by grounds because _____.	cabinet heaters always keep internal components dry	special insulation is used on wire for vital circuits	shock mounts on controller panels greatly reduce vibration	contactors and relays are mounted on nonconducting panels	
12	956	C	Which of the listed groups of electrical insulation materials is best suited for the highest operating temperatures?	impregnated cotton and silk	unimpregnated paper and cotton	pure glass and quartz	mica and porcelain with bonding agents	

12	957	B	Capacitors can be used in electric distribution systems to improve power factor. This is accomplished by seesawing energy between the capacitor and the _____.	generator	inductive loads	resistive loads	all of the above	
12	958	A	The heaters for the winch circuit shown in the illustration are powered from _____.	a separate source	the winch main bus	the master switch power circuit	the contactor control circuit	See illustration number(s): EL-0102
12	959	C	A lead-acid battery cell sustaining a short circuit _____.	will be indicated by lime accumulation on the terminal posts	will have unusually high cell voltage	will become excessively heated while being charged	cannot be completely discharged under load	
12	960	A	The propeller shaft speed in a turbo-electric, synchronous, propulsion drive motor is changed by varying the _____.	turbine speed	number of motor poles	field strength of the generator	field strength of the motor	
12	961	C	When the voltage and the current developed in an AC circuit reach their peak values at the same time, the power factor is considered to be _____.	lagging	leading	unity	infinity	
12	962	B	Which of the instruments listed is used to check insulation resistance?	Magneto	Megohmmeter	Dynamometer	Rheostat	
12	963	B	You are paralleling two alternators. The synchronizing lamps grow dim and are totally darkened as the synchroscope pointer approaches the 0, position. This indicates that the _____.	alternator voltages are 180, apart	circuit breaker can be closed	incoming alternator is running too slowly	synchroscope is defective or broken	
12	964	D	If you reverse both the field and the armature connections to a DC propulsion motor, _____.	the direction of motor rotation will change	the brushes will become overheated	a magnetic lock will occur in the motor	the direction of motor rotation will remain the same	
12	965	B	The turns ratio of device "B" shown in the illustration is two to one (total). If 220 volts were applied to terminals "H1" & "H2", what would be indicated across "X1" & "X4" with "X2" & "X3" connected and isolated?	55 volts	110 volts	220 volts	440 volts	See illustration number(s): EL-0082
12	966	D	A fuse will blow for all the listed reasons EXCEPT _____.	excessive vibration	extremely hot surroundings	loose fuse clips	low contact resistance within the fuse	
12	968	B	In the illustration, the component labeled "EXC" is _____.	a separate class II regulated DC generator for critical direct current loads	a generator feeding the FLD winding through the voltage regulator.	the controller to drive the governor for turbogenerator speed.	the electronic driver for the switchboard metering circuits	See illustration number(s): EL-0003
12	969	B	Two contributors of electronic console failures are heat and vibration. To combat some of their effects, preventive maintenance procedures should include _____.	systematic rotation of circuit cards with those from spares to allow component cooling	periodic changing or cleaning of console ventilation and control room air conditioning filters	weekly tightening of console foundation bolts and changing of the air in the control room	all of the above	
12	970	C	The direction of propeller shaft rotation in a turbo-electric synchronous propulsion drive motor is changed by reversing the _____.	polarity of the propulsion motor	polarity of the propulsion generator	phase sequence of power to the motor	phase sequence of power to the generator	
12	971	C	When voltage and current developed in an AC circuit reach their peak values at the same time, the power factor is _____.	lagging	leading	maximum	minimum	
12	972	A	The leads from a megohmmeter are attached to the leads of an AC motor field coil. A reading of infinity is obtained indicating a/an _____.	open field coil	shorted field coil	grounded field coil	shunted field coil	
12	973	B	What can be used to replace the exciter in the circuit shown in the illustration?	A step-up transformer.	A rectifier.	A step-down transformer.	An operational amplifier.	See illustration number(s): EL-0101
12	974	B	The direction of rotation of a DC propulsion motor can be changed by reversing the _____.	brush holder position	polarity of the field poles	brush staggered order	motor interpole connections	

12	975	C	The small circular symbols to which wire "52N57E" is connected at coordinates "57L" and "57P" shown in the illustration represent _____.	relay contact solder points	wire wrap connections	terminal board screws	switch contact terminals	See illustration number(s): EL-0100
12	976	A	In general, D.C. propulsion motor brush sparking can be caused by _____.	incorrect brush grade, pressure or position	a concentric commutator	a dark chocolate colored commutator	all of the above	
12	977	D	Automatic voltage regulators provided on switchboards function to _____.	regulate the AC load on the generator	protect the switchboard from high voltage	govern prime mover speed to control voltage	vary the field excitation to the generators	
12	978	A	Compressed air should not be used to clean motor controller equipment because _____.	it may force metallic particles into coil insulation	the surrounding area may need additional cleaning	the air blast dries out insulation quickly	a mask and respirator would be required	
12	979	D	Which of the following problems is indicated if a lead-acid battery begins to gas violently when it is first placed on charge?	Insufficient compartment ventilation is being provided.	A short circuit exists in one of the battery cells.	The battery is undergoing its normal charging rate.	An excessive charging rate is being applied to the battery.	
12	980	B	Moisture absorbed in the windings or condensed on the surface of electrical machinery insulation _____.	is good for long term preserving since most insulation is organic and contains some amount	lowers the insulation value and is a common cause of fault grounds in idle machines	will enhance insulation resistance only if it is fresh water and contains no salt	reduces the amount of current supplied or drawn by the machine so horsepower is limited	
12	981	C	The voltage developed by an AC generator is controlled by varying the _____.	speed of the prime mover	AC excitation to the field	DC excitation to the field	DC excitation of the voltage regulator	
12	982	D	In which of the situations listed will a megohmmeter give the most accurate readings?	While the machine is in operation.	While the machine is discharging static electricity.	Immediately prior to restarting the machine.	When the machine has been shut down and grounded for a period of 15 minutes.	
12	983	A	You are attempting to parallel two AC generators, and the synchroscope pointer is revolving in the fast direction. This indicates that the frequency of the incoming machine is _____.	higher than the bus frequency	lower than the bus frequency	the same as the bus frequency but out of phase with it	the same as the bus frequency and the circuit breaker may be closed at any pointer position	
12	984	B	Temporary repairs to an open DC propulsion armature coil can be made by _____.	connecting the coil ends directly to a pair of negative brushes	disconnecting coil ends, insulating each, and short circuiting the two commutator bars	grounding the coil ends and short circuiting the commutator bar	removing the sparking brushes	
12	985	B	If the total source voltage of the three-wire distribution system shown in the illustration is 240 volts, what is the voltage across load L3? [NOTE: Kirchhoff's voltage and current laws apply.]	110.4 volts	112.2 volts	113.0 volts	114.8 volts	See illustration number(s): EL-0075
12	986	A	As shown in the illustrations, most console schematic diagram sheets have letters and/or numbers placed across the top and numbers along the side boarders. The purpose of these markings is to _____.	make a grid which, together with the sheet numbers, can direct the engineer to any location in the prints	section-off the book so that each console function is marked with the same letter/number combination	allow a record to be kept of how often a particular component represented on that page has been tested	indicate, by punching a small hole over a letter and number, what month and year that particular page was redrawn	See illustration number(s): EL-0099 EL-0100
12	987	B	When shore power is being connected to a ship in dry dock, _____.	the ship's generators are paralleled with the shore power to provide continuous power	proper phase sequence must be established	exactly 450 volts must be supplied from the shore	exactly 60 Hz must be provided by the terminal	
12	988	C	If a fuse of correct size and type blows frequently, _____.	try the next higher amperage rating	try the next lower amperage rating	look for trouble within the circuit	reduce the applied voltage 10%	

12	989	C	If violent gassing occurs when a lead-acid storage battery is first placed on charge, the _____.	battery must be given an emergency charge	charging rate is too low	charging rate is too high	specific gravity of the electrolyte solution is too low	
12	990	C	The purpose of "R6" in the winch circuit shown in the illustration is to _____.	maintain dry conditions within the winch brake box	keep the series field current at a low value during "fourth and fifth point lowering"	act as the armature dynamic braking load to assist the winch in stopping	limit the armature current during lowering operation with heavy loads	See illustration number(s): EL-0102
12	991	C	The most practical way to control the voltage output of an AC generator is to vary the _____.	number of windings	speed of the rotating field	strength of the rotating magnetic field	power factor of the load	
12	992	C	Which of the instruments listed could be use to locate a grounded field coil in a synchronous motor?	Ammeter	Voltmeter	Megohmmeter	Frequency meter	
12	993	C	You are attempting to parallel two AC generators and the synchroscope pointer stops at a position other than 0,. If you close the circuit breaker at this moment _____.	the incoming machine will accept all of the load	the incoming machine will trip out on low voltage release	a hazardous condition will be created by the cross current between the machines	a hazardous condition will be created by the incoming machine being at a higher frequency than the bus	
12	994	C	Before servicing the device indicated as "A" in panels #1 and #3 of the illustration, the device labeled "CT" must _____.	have the disconnected leads taped to prevent short circuiting.	only be connected to multimeter on the ammeter setting	be short circuited	have one lead grounded to discharge static electricity for the prevention of damage to electronic components	See illustration number(s): EL-0003
12	995	D	The devices labeled "L" in the illustration are _____.	load lights indicating that the generator breaker is closed and the generator is supplying power to the main bus	synchronizing lights. When the synchroscope is at the 12 o'clock position the lights are on at their brightest indicating that the generators are in phase	emergency lighting for the switchboard to enable the meters to be read in case of power failure	synchronizing lights. When the synchroscope is at the 12 o'clock position the lights are at their dimmest or out indicating the the generators are in phase	See illustration number(s): EL-0003
12	996	A	The device labeled "REG SW" in the illustration is used to _____.	shift from the automatic voltage regulator to the manual voltage regulator	shift the governor control from manual to automatic/zero droop	enable the operator to read the field voltage on device "REG ADJ" or device "MAN ADJ"	supply regulated control power to the switchboard	See illustration number(s): EL-0003
12	997	A	The timer element of a reverse power relay cannot be energized unless _____.	the power flow is the same as the tripping direction	the power flow is the opposite to the tripping direction	the movement of the disk is damped by a permanent magnet	one generator is motorized	
12	998	B	What type of electric motor is commonly used to start small auxiliary diesel engines?	synchronous	series	shunt	cage	
12	999	D	Violent gassing developed by a lead-acid battery during charging indicates that the _____.	plate separators are grounded	cell voltages are excessive	specific gravity in insufficient	charging rate is excessive	
12	1000	D	As shown in the illustrations of console schematic diagrams, each circuit card and component, such as a relay or indicating lamp, has an identifier attached. This identifier, which is composed of digits and letters, is to _____.	be used only by manufacturer's service technicians and is of little importance to the ship's engineers	identify the overall circuit in which the component or circuit card is being used	specify the month and year of manufacture so that a similar unit can be ordered as a spare	indicate where the item may actually be found on the console by section, surface and possible subassembly	See illustration number(s): EL-0099 EL-0100
12	1001	D	One important difference between wye-connected and delta-connected generators is that delta connections have _____.	line voltages equal to the vector sum of the phase voltages	phase voltages 90° out of sync	line current equal to the phase current	line voltage equal to the phase voltage	
12	1002	B	A megohmmeter is used to measure _____.	voltage	dielectric strength	current	power	

12	1003	A	You are attempting to parallel two AC generators, and the synchroscope pointer is revolving fast in the clockwise direction. This indicates that the frequency of the incoming machine is _____.	higher than the bus frequency	lower than the bus frequency	the same as the bus frequency and the circuit breaker may be closed at any pointer position	the same as the bus frequency but out of phase with it	
12	1004	A	A "dielectric" is a/an _____.	electrical insulator	current flow	good conductor	semiconductor material	
12	1005	B	All of the following items can be used in the maintenance of a D.C. propulsion motor's commutator EXCEPT _____.	a canvas wiper	safety solvent	abrasive dressing stones	sandpaper	
12	1006	B	In the illustration, if one of the devices labeled "TURB" should fail the _____.	device labeled "EXC" will drive the alternator	device labeled "BKR" for that alternator should automatically open because of the reverse power relay	operator must open all the devices labeled "BKRS" to reduce the load on the remaining turbo-alternator	emergency generator should automatically start and be placed on line to supply emergency load centers	See illustration number(s): EL-0003
12	1007	D	A reverse-current relay will prevent AC generator motorization by _____.	automatically redirecting the load	automatically speeding up the prime mover	tripping the panel board main switch	tripping the generator circuit breaker	
12	1008	B	If many turns of an alternating current coil for a contactor become short circuited, the coil _____.	will continue to operate	will probably burn out immediately	will operate on reduced current	temperature will drop	
12	1009	C	When a battery is continuously exposed to low temperatures, the best procedure to keep it from freezing is to _____.	remove the battery caps	securely cover the battery	keep the battery fully charged	disconnect the battery	
12	1010	C	In the illustration, "D" is the symbol for a/an _____.	thermal overload heater	portable cable	fuse	indicating lamp	See illustration number(s): EL-0005
12	1012	C	A galvanometer is an instrument used to measure _____.	thickness of galvanized metal	resistance of electrical wiring insulation	very small amounts of current or voltage	quantity of galvans in an electric circuit	
12	1013	A	Using a fuse whose rating is higher than necessary _____.	endangers the apparatus it is supposed to protect	reduces the possibility of short circuits	increases the efficiency of the equipment by allowing more current to be used	wastes money because they are more expensive	
12	1014	D	Complete controller maintenance includes _____.	periodic testing of protective devices	checking for loose or worn contacts and weak springs	maintaining a sufficient supply of spare parts	all of the above	
12	1015	A	If a unloaded shunt motor's field were weakened by rheostat resistance or by an open circuit, the motor would _____.	overspeed due to reduced CEMF	stop because of low flux	continue to run at base speed	slow down and overheat	
12	1016	B	The vertical dotted line connecting the small circular symbols at coordinates "05L", "09L", "13L", "21L", "25L", etc., shown in the illustration, indicate that all _____.	contacts are operated by the same relay coil	screw connections are on terminal board "TB2"	wires are grounded at both ends of the line	wires have a common shield	See illustration number(s): EL-0100
12	1017	D	The purpose of the reverse power relay, provided on a ship's service alternator panel, is to trip the circuit in the event of _____.	main circuit overload	high power transfer	generator overspeeding	alternator motorization	
12	1018	B	When the series field relay "FR" of the winch circuit shown in the illustration is energized during dynamic braking the _____.	shunt Field Relay "FR-B.O." is de-energized and contacts "FR" open setting the mechanical brake	"FR" contacts close strengthening the shunt field which assists in slowing down the motor	"FR" contacts open weakening the shunt field which assists in stopping the motor	shunt Field Relay "FR-B.O." opposes the series coil's flux and sets the mechanical brake	See illustration number(s): EL-0102
12	1019	D	Which of the following conditions indicates that a lead-acid battery is being charged too rapidly?	Sparks occurring at the positive terminal.	Unusually high electrolyte specific gravity.	Low plate potentials being developed.	Excessively high temperatures and gassing rates.	

12	1020	B	A device which can be used to check the calibration of a circuit breaker is a _____.	500 volt megohmmeter	portable low voltage high current testing unit	standard digital multimeter	clamp-on voltmeter	
12	1021	C	Propulsion DC motor brush pressures can be calculated by _____.	dividing the brush contact area by the spring pressure	subtracting the brush contact area from the spring pressure	dividing the spring force by the brush contact area	subtracting the spring pressure from the brush contact area	
12	1022	C	How is a wattmeter electrically connected in a circuit?	In series	In parallel	In series-parallel	Inductively	
12	1023	B	An AC generator panel is fitted with both synchronizing lamps and a synchroscope. When the synchroscope pointer reaches the noon position, one synchronizing light is bright and the other is dark. This means _____.	there is a ground on the phase with the dark lamp	the phase sequence is incorrect	the phase sequence is correct	the generator breaker may be closed	
12	1024	B	Which of the listed faults cannot be eliminated, EXCEPT by turning or grinding a commutator with a rigidly supported tool?	Sparking brushes	Eccentricity	High mica	Blackened commutator	
12	1026	C	The dielectric strength of a vacuum or dry air is approximately _____.	450 volts/inch	1000 volts/inch	20-kv/inch	50-kv/inch	
12	1027	D	The operating torque of the upper induction disc-type element, or timer element, of an AC reverse power relay is obtained from _____.	the main bus	a separate battery source	line voltage	electromagnets	
12	1028	C	If the total source voltage of the three-wire distribution system shown in the illustration is 240 volts, what is the voltage across load L2? [NOTE: Kirchhoff's voltage and current laws apply.]	110.4 volts	112.2 volts	113.0 volts	114.8 volts	See illustration number(s): EL-0075
12	1029	B	As shown in the illustration, the dry-cell batteries are connected in _____.	compound	series	parallel	tandem	See illustration number(s): EL-0071
12	1030	B	In the illustration the symbol for an N/O contact is_____.	A	B	C	D	See illustration number(s): EL-0005
12	1031	B	Which of the following statements represents the action of a megohmmeter when testing a small capacitor in good condition?	The meter pointer should immediately swing to the maximum resistance value for the capacitor.	The meter pointer should first swing quickly to zero and then gradually move up the scale as the capacitor charges.	The meter pointer should immediately swing to infinity and then drop in sharp jerks as the voltage increases.	The meter pointer should immediately swing to a high reading and gradually decrease.	
12	1032	A	A wattmeter is used to determine _____.	the power being consumed by electrical equipment	partial circuit resistance	current flowing in a circuit	voltage existing between two points in a circuit	
12	1033	A	In the illustrated circuit, if the battery is 24 VDC, the resistance of R1 is 24 ohms, and the resistance of R2 is 24 ohms, the total current is _____.	2 amps	1 amp	1/2 amp	2.4 amps	See illustration number(s): EL-0019
12	1035	C	The contacts operated by the D.C. relay coil shown in the illustration are located in the schematic diagram prints at coordinates _____.	"41Y" on this page	"52M52M" and "52H35M"	"57R" on this page	"52N" on page "57R"	See illustration number(s): EL-0100
12	1037	C	Which of the following statements is true concerning a stepdown transformer in an operating AC power circuit?	Voltage and current will both be increased.	Voltage and current will both be decreased	Voltage decreases as current increases.	Voltage increases as current decreases.	
12	1038	D	The motor starts when the start button in the illustration is pushed, but stops when the button is released the trouble is _____.	the incorrect thermal overload coil	a faulty "M" coil	a dirty contact on the Disc.Sw. at "L3"	a faulty holding relay contact	See illustration number(s): EL-0007
12	1039	C	The dry-cell batteries, shown in the illustration are connected in _____.	compound	series	parallel	tandem	See illustration number(s): EL-0070

12	1040	B	In the illustrated one line diagram, if the turbo generator fails, the diesel generator_____.	will automaticly start and supply power to the emergency power switchboard, the power distribution panel, and the lighting main	will automaticly start and supply power to the emergency power switchboard and the lighting main	will automaticly start but the auto. bus trans. equip. must be manually shifted to "Emergency Power" to supply the lighting main.	must be manually started but once running will supply power to the lighting main through the ABT.	See illustration number(s): EL-0014
12	1041	B	When a megohmmeter is used to test the insulation of a large motor, the initial dip of the pointer toward "zero" is caused by _____.	good insulation	the capacitance of the windings	the leakage of the current along the surface of dirty insulation	the dielectric-absorption effect of the insulation	
12	1042	B	The illustrated motor fails to start and gives a loud hum when the start button is depressed, your first action should be to _____.	disassemble the motor to fix the centrifical switch so the start windings will be energized	push the stop button to deenergize the "M" coil	reset the thermal overload	hold the "M" contactor closed by hand while wearing electrical safety gloves to get motor started	See illustration number(s): EL-0007
12	1043	D	In the illustrated circuit, what is the total current if the voltage is 12 VDC, the resistance of R1 is 15 ohms, and the resistance of R2 is 10 ohms?	.8 amps	1.5 amps	.55 amps	2 amps	See illustration number(s): EL-0019
12	1044	C	For routine cleaning of a commutator, you should apply _____.	course sandpaper in a slow back and forth motion across the commutator slots	an emery cloth parallel to the axis of the machine	a canvas wiper to the machine while running	cotton swabs between the commutator bars	
12	1045	C	The purpose of resistor bank "R1-R5" in the winch circuit shown in the illustration is to _____.	limit armature current in lower and "series field" current in hoist to obtain required speeds	divert shunt field current for speed control in both directions of operation	limit armature current in hoist and "series field" current in lower to obtain required speeds	regulate the strength of the brake solenoid "B1-B2" in both directions of operation	See illustration number(s): EL-0102
12	1046	C	Pin #6 of the ahead valve position sensor as shown in the illustration is connected _____.	to (-) 50 volts D.C.	in parallel with PCOM	to (+) 50 volts D.C.	to analog common	See illustration number(s): EL-0099
12	1047	C	Which of the listed transformer uses a single winding to produce voltage transformation?	Stepup transformers	Stepdown transformers	Autotransformers	Isolation transformers	
12	1049	A	The dry-cell batteries, when connected as shown in the illustration, would produce _____.	1.5 volts	2.5 volts	3.5 volts	4.5 volts	See illustration number(s): EL-0070
12	1050	B	In the illustration what is the minimum wattage needed for a 3 ohm resistor with a 12 VDC power source in circuit "A"?	12 watts	48 watts	64 watts	232 watts	See illustration number(s): EL-0041
12	1051	B	A capacitor is to be tested with a megohmmeter. If the meter is connected to a shorted capacitor, the meter pointer should _____.	immediately swing to the maximum resistance value	deflect to zero and remain at that position	swing to a high reading and gradually decrease	swing to zero then gradually increase with slight pointer movements down scale	
12	1052	C	The RPM of an AC generator can be measured with a/an _____.	ammeter	voltmeter	vibrating reed meter	synchroscope	
12	1053	D	The "dielectric constant" is a numerical value indicating the effectiveness of a dielectric material in comparison to that of a standard, which is _____.	paper or cloth	glass or mica	plastic or Teflon	dry air or a vacuum	
12	1054	A	The air gap in an induction motor should be periodically checked with a feeler gage to prevent possible _____.	rotor contact with the stator	axial misalignment of the rotor	damage to the motor bearings	electrical damage to the bearings	
12	1055	B	In the illustrated circuit "A", what power is consumed by a 3 ohm resistor with a 12 volt source?	12 watts	48 watts	64 watts	232 watts	See illustration number(s): EL-0041

12	1057	D	Undervoltage trips are frequently installed on switchboard circuit breakers to trip _____.	out generators in the event of severe arcing or sparking	out generators when there is reversal of power in the main circuit	the breaker if the generator overspeeds by 5%, but continues to run	out generators when there is low voltage in the main circuit	
12	1058	C	In the illustrated circuit the voltage is 12 VDC and the resistance is 3 ohms. If the battery is rated for 120 amp-hours, how long before the voltage will drop to 1.75 volts per cell?	12 hours	1.75 days	30 hours	2.5 days	See illustration number(s): EL-0018
12	1059	C	The circuit illustrated represents a 2 wire DC ground detecting system. If the positive bus is grounded and the test button is pushed, which of the lamps will be brightest?	X	Y	both will be equal brightness.	both will go out.	See illustration number(s): EL-0008
12	1060	D	How long after energizing "ATMX" at "41Y" shown in the illustration do the contacts of "ATM" operate?	3 minutes	27 minutes	30 minutes	33 minutes	See illustration number(s): EL-0100
12	1061	C	The hook-on AC volt-ammeter consists essentially of a split-core and a rectifier-type instrument connected to the secondary winding of a _____.	potential transformer	control transformer	current transformer	reactance transformer	
12	1062	B	Which type of flux should be used when soldering electrical wire connections and electronic components?	Silver flux	Rosin flux	Solid flux	Acid flux	
12	1063	B	If the pointer of the synchroscope is rotating in the slow direction when you are preparing to parallel two alternators, the _____.	incoming machine is turning faster than the load alternator	loaded alternator is turning faster than the incoming machine	load on the loaded alternator is ready to split	incoming machine is beginning to pick up some of the load	
12	1064	C	The air gap in an induction motor should be checked periodically with a feeler gage to detect _____.	rotor contact with the laminations	changes in armature magnetic strength	excessive bearing wear	electrical damage to the rotor	
12	1065	C	In the illustration, the assembly labeled 2 is a _____.	wound rotor and shaft for a single phase induction motor	conduction rotor and shaft for a polyphase induction motor	squirrel cage rotor and shaft for a polyphase motor	squirrel cage rotor for a single phase induction motor	See illustration number(s): EL-0001
12	1067	D	A shore power circuit breaker should be closed only _____.	when the ship's generators have been paralleled to those on shore	in a shipyard	if a quick disconnect coupling is used	when the ship's generators have been removed from the bus	
12	1068	D	In the illustrated motor, roller bearings are used because _____.	of their ability to absorb moderate thrust loads	they electrically insulate the rotor from the frame reducing cross-currents	the shafting and end bells do not require as close a tolerance to properly fit this type of bearing	the clearance between the rotor and stator is generally as close as mechanical tolerance will permit	See illustration number(s): EL-0001
12	1069	B	In the illustrated device, the part labeled "1A" _____.	are start and run windings for a single phase shaded pole induction motor	is the stator for a polyphase induction motor	is the armature for a squirrel cage rotor motor	are direct current shunt field windings for a universal motor	See illustration number(s): EL-0001
12	1070	C	The progressive operation of the contactors marked "A" provide the winch shown in the illustration with _____.	accumulation	dynamic braking	acceleration	regenerative braking	See illustration number(s): EL-0102
12	1071	C	When a resistor is used as a shunt and is connected in parallel with a meter movement coil, it will provide _____.	a measurement of circuit resistance	an increased accuracy of approximately 1.5 percent	an extended meter range	none of the above	
12	1072	C	An internal resistance is placed in series with the meter movement of which of the following instruments?	AC ammeter	DC ammeter	DC voltmeter	Frequency meter	
12	1073	A	When paralleling two alternators using three synchronizing lamps, the flickering of all three lamps becomes progressively slower and slower. This means the _____.	frequency of the incoming generator is approaching that of the bus	frequency of the incoming alternator is less than that of the bus	phase rotation of the incoming alternators is opposite to that of the bus	terminal voltage of the incoming alternator is approaching that of the bus	

12	1074	A	The following air gap readings were obtained from a horizontally mounted, bilge pump, induction motor, equipped with sleeve bearings: FWD END AFT END Top .045 .049 Right Side .045 .047 Left Side .045 .047 Bottom .045 .041 Which of the following statements is true?	The aft bearing should be realigned or replaced.	Shims should be removed from the aft bearing.	The forward bearing should be lowered.	The aft bearing should be lowered.	
12	1075	B	What is the power rating safety factor for the light dimming rheostat shown in the illustration at "77H"?	1	2	3	6	See illustration number(s): EL-0100
12	1076	A	The "dielectric constant" of dry air or a vacuum is _____.	1	10	100	1000	
12	1077	A	You can determine if a circuit breaker is tripped by _____.	examining the position of the handle	checking for the warm breaker	looking for a burned-out link	looking for the tripped breaker light	
12	1079	A	In addition to undercutting the mica, proper maintenance of a D.C. motor's commutator includes _____.	side-cutting the copper segments and insulating the slots	coating the copper surface with light machine oil for the first four hours of operation	baking the armature in an oven at a maximum of 95, C for not over 8 hours	all of the above	
12	1081	B	If the illustrated test is being performed to determine which winding is grounded and the light does not come on then _____.	winding is grounded and you should continue on to the next winding to see if any others are grounded	winding is not grounded and you should continue on to the next winding until the light comes on designating that winding as grounded	test is meaningless because you can not determine if a winding is grounded without a megger.	ground is not in the windings but probabily in the pecker head, you should check and retape the line lead connections	See illustration number(s): EL-0027
12	1082	C	AC voltmeters are generally calibrated to read the _____.	instantaneous voltage	average voltage	RMS voltage	peak voltage	
12	1083	C	When paralleling two AC generators, the synchroscope selector switch and frequency meter switch should be set up to sense the frequency of the _____.	bus	generator on the line	oncoming generator	bus transfer relay	
12	1084	C	In the illustrated circuit, what is the resistance of R2 if the total current is .75 amps, the voltage is 12 VDC and the resistance of R1 is 24 ohms?	24 ohms	16 ohms	48 ohms	the answer can not be determined from the information given	See illustration number(s): EL-0019
12	1085	B	In the illustrated ground detection system with a ground on phase A, if the switch is opened _____.	lamp A will dim or go out depending on the severity of the ground	all three lamps will return to their normal brightness indicating that the bulbs are not burnt out	lamps B and C will dim lamp A will be brighter	lamp A will start flickering if the ground is in an AC induction motor	See illustration number(s): EL-0009
12	1086	A	In the illustrated circuit, what is the total resistance if the voltage is 10 VDC, the resistance of R2 is 40 ohms and the total current is .75 amps?	13 1/3 ohms	20 ohms	60 ohms	the answer can not be determined from the information given	See illustration number(s): EL-0019
12	1087	C	When the operating handle of a molded case circuit breaker is in the mid-position, it indicates the circuit breaker is _____.	in the "opened" position	in the "closed" position	tripped	reset	
12	1088	B	On the meter scale illustrated, while using the R X 100 scale, the reading at "A" will be _____.	2,000 ohms	20 Kohms	200 Kohms	3 Megohms	See illustration number(s): EL-0047
12	1089	C	During maintenance of circuit breakers, _____.	always smooth roughened contact surfaces with a file	never pass more than rated breaker current through the overload heater element	inspect for wear and misalignment of main contacts	assume heater elements installed are of correct size	
12	1090	D	Which of the listed conditions occur when selection is made for "third point hoist" on the winch shown in the illustration?	Master switch contacts "5", "6", "7", "8", and "9" close.	Contactors "2M", "3M", "4M" and "1A" pick up.	Contactors "1M", 3M", "1A" and "2A" drop out.	Master switch contacts "3","4", "6", "8", and "9" close.	See illustration number(s): EL-0102

12	1091	A	If there is a reduction in the normally supplied frequency to a 120/240 volt, three-phase AC current motor from 60 hertz to 55 hertz, the motor would _____.	run at a slower speed	operate at a lower current	overheat	trip off the line	
12	1092	A	Which of the following electric meter movements uses a stationary permanent magnet and movable coil?	D'Arsonval	Electrodynamometer	Moving iron-vane	Inclined coil iron-vane	
12	1093	D	On the meter scale illustrated, while using the R X 100 scale, the reading at "D" will be _____.	3.6 ohms	36 ohms	193 ohms	360 ohms	See illustration number(s): EL-0047
12	1094	B	If a small electric motor has been submerged in saltwater for a short period of time, you should _____.	send it ashore for rewinding	rinse it with warm freshwater and bake it dry in an oven	soak it in a bucket of commercial solvent and bake with internal heat	clean it with carbon tetrachloride and blow it out with compressed air	
12	1095	C	On the meter scale illustrated, while using the R X 100 scale, the reading at "C" will be _____.	13 ohms	130 ohms	1.3 kohms	13 kohms	See illustration number(s): EL-0047
12	1096	D	On the meter scale illustrated, while using the R X 100 scale, the reading at "B" will be _____.	70 ohms	35 ohms	700 ohms	7 kohms	See illustration number(s): EL-0047
12	1097	A	How will a molded-case circuit breaker react after it has tripped, as a result of an overloaded circuit?	The breaker will trip again if immediately reset.	The breaker handle will lock in the OFF position.	The breaker handle will lock in the tripped position until the thermal element cools down.	The breaker handle cannot be moved to the OFF position until the thermal element cools down.	
12	1098	A	On the meter scale illustrated, while using the R X 100 scale, the reading at "F" will be _____.	60 ohms	40 ohms	30 ohms	3 kohms	See illustration number(s): EL-0047
12	1099	D	For console circuit card "LLEA" as shown in the illustration at coordinates "63R/S", the input(s) and output(s) are respectively on pin numbers _____.	"5" and "3" & "4"	"2" & "3" and "5" & "6"	"5" & "6" and "2" & "3"	"3" & "4" and "5"	See illustration number(s): EL-0100
12	1101	A	In a three-phase, open-delta connected transformer, the line current is equal to _____.	the phase current	three times the phase current	the sum of any two phase currents	the difference of any two phase currents	
12	1102	B	Most AC voltmeters are calibrated to indicate _____.	peak-to-peak voltage	root-mean-square voltage	average voltage	peak voltage only	
12	1103	C	When paralleling two alternators the synchronizing lamps grow dim and are totally darkened as the synchroscope pointer approaches the 0, position. This indicates the _____.	alternator voltages are 180, apart	incoming alternator is running too fast	incoming alternator is in phase with the bus voltage	synchroscope pointer is defective or broken	
12	1104	D	D.C. motor brush adjustment includes attention to _____.	angle with the commutator and clearance within the holder	brush length and pigtail tightness	grade of material and surface dirt conditions	all of the above	
12	1105	D	If the total source voltage of the three-wire distribution system shown in the illustration is 240 volts, what is the voltage across load L1? [NOTE: Kirchhoff's voltage and current laws apply.]	110.4 volts	112.2 volts	113.3 volts	114.8 volts	See illustration number(s): EL-0075
12	1106	A	On the meter scale illustrated, while using the R X 1 scale, the reading at "Z" will be _____.	30 ohms	72 ohms	720 ohms	7.2 Kohms	See illustration number(s): EL-0047
12	1107	D	When a fluorescent lamp has reached the end of its useful life, it should be replaced immediately, or the resultant flashing may _____.	blow the lamp's circuit breaker	explode, causing glass to fly in all directions	short circuit the ballast transformer	damage the starter and the ballast	
12	1108	B	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1 and the needle is at the position indicated by the letter "Y"?	2.2 ohms	24 ohms	240 ohms	2,400 ohms	See illustration number(s): EL-0047
12	1109	C	The transistors in the illustrated circuit are connected using what type of coupling?	RC coupling	transformer coupling	Impedance coupling	direct coupling	See illustration number(s): EL-0050
12	1110	B	Which of the listed conditions occur when "4th point lower" is selected on the winch shown in the illustration?	Master switch contacts "3", "4", "6", "8", "9", & "10" close.	Contactors "2, 3, & 4M" and "1A" pick up.	Master switch contacts "5", "6", "7", "8", and "9" close.	Contactors "1 & 3M" and "1, 2, & 3A" pick up.	See illustration number(s): EL-0102

12	1111	D	One of the generator or motor bearings is generally insulated from the end housing in order to prevent _____.	rapid brush wear	current leakage from the shaft	excessive field winding heat	circulation of shaft currents induced in the machine's frame	
12	1112	A	To limit the current flow through a DC voltmeter to as low a value as possible, the moving coil circuit is provided with a/an _____.	high series resistance	high parallel resistance	series inductor	external shunt	
12	1113	D	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "B"?	1.45 ohms	7.2 ohms	37 ohms	70 ohms	See illustration number(s): EL-0047
12	1114	A	Encrusted dirt accumulated inside a motor should be removed with a _____.	fiber scraper	pointed welding rod	hammer and chisel	paint scraper	
12	1115	C	What do the arrow-like symbols at coordinate "33J" shown in the illustration represent?	Connection to ground.	Connection to the analog common bus.	Plug-in connection.	Screw connection on a terminal board.	See illustration number(s): EL-0099
12	1116	C	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "C"?	1.3 ohms	4.8 ohms	13 ohms	121 ohms	See illustration number(s): EL-0047
12	1117	A	If all three ground-detection lamps continue to burn at equal intensity after the test button is depressed and released, which of the listed conditions is indicated?	No grounds exist	All three phases are grounded	The test switch is faulty	The current transformers are shorted out	
12	1118	A	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "X"?	8 ohms	6.2 ohms	1.57 ohms	150 ohms	See illustration number(s): EL-0047
12	1119	A	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "R"?	6 ohms	6.8 ohms	1.7 ohms	167 ohms	See illustration number(s): EL-0047
12	1120	C	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "D"?	7.8 ohms	8 ohms	3.6 ohms	.36 ohms	See illustration number(s): EL-0047
12	1121	D	One of the generator bearing shells is generally insulated from the end housing in order to prevent _____.	rapid brush wear	residual magnetism leak off	excessive field winding heat	circulation of shaft currents	
12	1122	D	Electrostatic forces in high voltage circuits cause indicating instruments to give _____.	parallax readings	highly intuitive readings	highly accurate readings	inaccurate readings	
12	1124	C	The direction of rotation of the winch shown in the illustration is changed by reversing the _____.	direction of current through the shunt field	polarity of voltage at "S1" and "S2"	direction of current through the armature	polarity of voltage at "L1" and "L2"	See illustration number(s): EL-0102
12	1125	D	If a circuit breaker that utilizes built-in, current limiting fuses (CLF's) cannot be closed, the problem may be traced to _____.	a blown CLF plunger holding the trip bar in the open position	a missing CLF	a misaligned limiter housing assembly	all of the above	
12	1126	A	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "F"?	0.6 ohms	6 ohms	9.6 ohms	.38 ohms	See illustration number(s): EL-0047
12	1127	A	To check the three line fuses of a three-phase system consisting of a three-phase motor, you must _____.	place the starter in the "stop" position	make sure the motor is operating at full load to guard against a false reading	place the leads across the "hot" ends of the fuses	place the leads across the bottom ends of the fuses	
12	1128	B	If reading the AC voltage from a typical wall outlet, the range switch of the device illustrated should be set to _____.	1,000 V	250 V	R X 10,000	10 ma/amps	See illustration number(s): EL-0047
12	1129	A	If reading the AC voltage from the line lead of a 440 VAC controller the range switch illustrated should be set to _____. (See illustration EL-0047)	1,000 V	250 V	R X 10,000	Unable to safely read with this meter.	See illustration number(s): EL-0047
12	1130	D	What does the arrangement at coordinates "62E" shown in the illustration represent?	Position recording drum and stylus	Temperature compensating thyristor	Miniature bridge rectifier	Twisted wire pair within a shield	See illustration number(s): EL-0099

12	1131	C	If the voltage applied to a moving disk frequency meter decreases, while the applied frequency remains the same, the frequency indication will _____.	increase	decrease	remain the same	oscillate	
12	1132	A	You are calibrating a multimeter using internal batteries to supply power for resistance measurements. However, you are unable to adjust the pointer to "zero" using the adjustment knob. Therefore, you should _____.	replace the batteries in the instrument	measure resistance by dividing the voltmeter indication by the ammeter indication	set the pointer using a bridge	change scales to the R X 100 scale and adjust using the "zero ohms" adjusting knob	
12	1133	C	When paralleling two alternators, the synchronizing lamps remain lit as the synchroscope pointer approaches the 0°. This indicates the _____.	incoming alternator is running too fast	alternator voltages are 180 degrees apart	synchroscope is defective or broken	alternator power factors are in phase	
12	1134	D	Which of the following procedures should be used to maintain a large electric motor during periods of inactivity?	A thin layer of air-drying varnish should be applied on the windings.	Compressed air should be blown over areas where dust is deposited.	Spraying a solvent periodically to remove carbon dust.	Space heaters should be used to prevent condensation of moisture.	
12	1136	D	If reading the AC current with the illustrated device and you are unsure of the range, the range switch should be set to _____.	10 MA/ 10 AMP with leads in the (-10 A) and (+10 A) jacks	10 MA/ 10 AMP with leads in the (-COMMON) and (+) jacks	10 MA/ 10 AMP with leads in the (-COMMON) and (+10 A) jacks	unable to measure AC current with this device	See illustration number(s): EL-0047
12	1137	B	In replacing a defective transformer with a new one, which of the following actions must be carried out to insure proper operation of the equipment it serves?	The secondary leads must be grounded for 10 minutes to remove static charges.	The transformer connections must be made as before with regard to the indicated polarity.	The iron core of the transformer must be flashed to pre-magnetize it.	The iron core must be grounded for 10 minutes to remove any residual magnetism.	
12	1138	B	The illustrated motor controller _____.	is a low voltage release controller because the motor will stop when voltage falls below a certain value and automaticly start when normal voltage resumes	has no low voltage protection and the motor may be damaged if the voltage drops below a certain level	is a low voltage protection controller and must be reset if the voltage falls below a certain level	must be used with a generator or transformer bank that is "wye" wound with T2 connected to the neutral	See illustration number(s): EL-0023
12	1139	D	Which of the listed conditions could indicate the need for cleaning electrical insulation?	Low ambient temperature	Low operating temperature	High dielectric strength	Low megger readings	
12	1140	C	In the illustration, the component "B" is attached to the component "G" by _____.	melting the top of "G" and pressing "B" onto it	"C" holding it in place	sealing compound made of bituminous substance	vacuum created in the battery by electrolytic action	See illustration number(s): EL-0031
12	1141	A	The reactive power drawn by a motor from an AC generator is the power which is _____.	used to establish the magnetic field of the motor	lost in overcoming friction in the bearings	strictly converted to heat generated by current flow through the windings	transmitted directly through the rotor shaft to perform useful work	
12	1142	A	A multimeter may be damaged by taking a _____.	voltage reading while in the ammeter mode	current reading while in the voltmeter mode	resistance reading while in the ammeter mode	resistance reading while in the voltmeter mode	
12	1143	C	When two AC generators are being paralleled, the breaker should be closed with the synchroscope pointer rotating in the _____.	"slow" direction, just before the 12 o'clock position	"fast" direction, just after the 12 o'clock position	"fast" direction, just before the 12 o'clock position	"slow" direction, just after the 12 o'clock position	
12	1144	C	The speed of a synchronous motor is varied by _____.	interchanging any two of the three live leads	changing the voltage of the system	changing the input frequency	increasing the field excitation	
12	1146	B	In the illustration, the component labeled "G" _____.	is lined with cardboard to maintain a moisture (electrolyte) barrier between cells	is a one piece container with compartments for each individual cell	must be UL approved for shipboard use	can only contain one cell	See illustration number(s): EL-0031

12	1147	C	When working on electrical circuits containing large capacitors, in addition to de-energizing the circuit, which of the listed precautions should also be taken?	Keep all radio equipment away.	Measure capacitor insulation resistance.	Ground the capacitor terminals.	Check capacitor circuit polarity.	
12	1148	D	The transistors in the illustrated circuit are connected using what type of coupling?	RC coupling	transformer coupling	impedance coupling	direct coupling	See illustration number(s): EL-0051
12	1149	D	Which of the following statments is true of the illustrated motor controller?	The low speed is used for starting the motor and when the controller automaticly shifts to High speed.	The HOL relay will open the HS contacts in the event of an overload while operating in high speed.	This controller must be used with a generator or transformer that is "Wye" wound with the L2 lead connected to neutral.	If the overload relay opens for high speed the motor can still be run in low speed.	See illustration number(s): EL-0023
12	1150	D	In order to prevent the winch shown in the illustration from turning while troubleshooting the controller circuit, _____.	set the dynamic brake by clamping contact "DB" closed	set the mechanical brake by the jackscrew provided	disconnect the brake solenoid at "B1" and "B2"	open the test link preventing current flow to the armature	See illustration number(s): EL-0102
12	1151	C	The most inefficient method of voltage reduction, from the standpoint of power loss, even when placed in series with the load, is the use of a/an _____.	capacitor	inductor	resistor	transistor	
12	1152	A	When using a multimeter for resistance measurements, it should be calibrated by clipping the loose ends of the leads together and _____.	setting the instrument pointer at "zero" ohms	adjusting the line voltage to calibrate the instrument	plugging each end of one test lead into the plus and minus terminals	using a special purpose resistance measuring instrument (a bridge)	
12	1153	C	If two AC generators have just been placed in parallel, the true power load is initially distributed evenly by _____.	a balance coil	changing field excitation	adjusting the governor control settings	a rheostat	
12	1154	A	In the illustrated motor controller circuit, which statment is true?	The high and low speed lights operate at less than line voltage with a resistor in series.	This controller can be converted for use with a three phase motor by connecting the L3 lead to the LS contact attached to the overload relay.	The lights must be rated at a wattage equal or greater that the motor output wattage.	The wattage of the high speed light must be greater than the wattage of the low speed light.	See illustration number(s): EL-0023
12	1155	A	What type of circuit is on card "A0AA2" at coordinate "29Q" shown in the illustration?	Operational amplifier	Digital logic inverter	Square wave pulse generator	Binary counter	See illustration number(s): EL-0099
12	1156	A	Federal Regulations (46 CFR) require the circuit in the illustration to _____.	be at the vessel's ship's service generator distribution switchboard for normal power, normal lighting and emergency lighting systems.	not have any resulting ground currents flow through hazardous locations on a tank vessel where line to line voltage exceeds 3,000 VAC	not be used on systems where the resulting ground will interfere with the operation of electronic equipment	All the above are correct	See illustration number(s): EL-0009
12	1157	B	Which of the following types of insulation will begin to deteriorate FIRST as a result of the heat generated in the conductor it surrounds?	Varnished cloth	Rubber	Silicon	Asbestos	
12	1158	B	In the illustration, the purpose of part B is to _____.	increase resistance in series with the contacts as they close to prevent arcing	create a magnetic field in the steel plates that interacts with the arc to cool and extinguish the arc	cause the contacts to open in the event of an overload	provide ventilation to the contact when the breaker is close to rated capacity	See illustration number(s): EL-0033
12	1159	B	Seating the brushes on a D.C. motor is first accomplished using _____.	a file for cutting the approximate curvature followed by sandpaper for the final fit	sandpaper with the motor not operating and then a seating stone while running the machine	emery paper for the initial cut and crocus cloth for the finishing cut	course lapping compound, followed by a medium and then a fine grade	

12	1160	B	The basic type of D.C. motor speed control where a generator armature directly feeds the motor armature and the motor and generator fields are excited by a separate D.C. source is called _____.	Burmeister-Wain	Ward-Leonard	Sperry-Rand	Atlas-Copco	
12	1161	C	In the illustration, the the device E is the_____.	bimetal strip	moving contact	trip bar	handle	See illustration number(s): EL-0033
12	1162	A	Which of the following statements regarding the use of a current measuring instrument is correct?	It must be connected in series with the circuit.	You should always start with the lowest range until a suitable reading is obtained.	The indicating needle is deflected from left to right regardless of polarity.	An external shunt is generally utilized where current is less than 10 amperes.	
12	1163	A	If a voltage of 125 VDC is applied to the illustrated circuit where the resistance of R1 is 12 ohms, and R2 is 115 ohms, the current will be_____.	11.5 amps	12.5 amps	115 amps	125 amps	See illustration number(s): EL-0019
12	1164	A	In the illustration the component C is the _____.	fixed contact	moving contact	connection terminal	trip bar	See illustration number(s): EL-0033
12	1165	A	The illustrated circuit is a wheatstone bridge. If the meter "G" reads 0 with the switch closed then _____.	the current through R1 - R2 is equal to the current through R3 - Rx	the voltage across b - d is equal to the voltage of E	the resistance of Rx is equal to the resistance of R2	all the above are true	See illustration number(s): EL-0024
12	1166	A	The transistors in the illustrated circuit are connected using what type of coupling?	RC coupling	transformer coupling	LC coupling	direct coupling	See illustration number(s): EL-0048
12	1167	A	In the illustrated 450 VAC system, what should be provided between the bus and the device labeled "F"?	a potential transformer	a current transformer	an emergency disconnect device	an audible alarm and indicating light	See illustration number(s): EL-0003
12	1168	B	The transistors in the illustrated circuit are connected using what type of coupling?	RC coupling	transformer coupling	LC coupling	direct coupling	See illustration number(s): EL-0049
12	1169	D	On the meter scale illustrated, while using the R X 1 scale, the reading at "F" will be _____.	1.8 ohms	6.0 ohms	9.4 ohms	0.6 ohms	See illustration number(s): EL-0047
12	1170	A	The winch shown in the illustration operates in any of the positions with the master switch in the "lower" direction, but will not "hoist" in any of the master switch hoist positions. Which of the listed faults could be the cause?	Master switch contact "MS3" may have defective springs.	Contactor "3M" coil could have an open winding.	Contact "2M" in the power circuit may be badly corroded.	Series relay "FR" may be open.	See illustration number(s): EL-0102
12	1171	B	How many possible states does a binary logic circuit have?	One	Two	Three	Four	
12	1172	D	A multimeter can be used to measure _____.	resistance	voltage	current	all of the above	
12	1173	B	The KW load is evenly distributed between two alternators just placed in parallel by adjusting _____.	a balance coil	the governor settings	the field excitation	a rheostat	
12	1174	D	Which of the following problems will most likely occur if the starting winding of a split-phase induction motor failed to cutout once the motor was in continuous operation?	The motor will overspeed.	The motor will run at a reduced speed.	A time delay will stop the motor.	The winding will burn out.	
12	1175	B	The signal to the circuit on card "A0AA2" at coordinate 29Q shown in the illustration is on the _____.	non-inverting input at pin "20"	inverting input at pin "16"	non-inverting input at pin "14"	inverting input at pin "46"	See illustration number(s): EL-0099
12	1176	A	On the meter scale illustrated, while using the R X 1 scale, the reading at "E" will be _____.	2.0 ohms	20 ohms	200 ohms	none of the above	See illustration number(s): EL-0047
12	1177	B	When insulation failure produces a low resistance current path between two conductors, the resulting condition is known as _____.	an open	a short circuit	a ground	a surge	
12	1178	B	Which of the listed pairs of materials make the best insulators?	copper and aluminum	glass and mica	dry air and a vacuum	doped silicon and germanium	
12	1179	B	In the illustrated circuit, what is the phase relationship of the amplifier output compared to the input?	0° in-phase	180° out of phase	phase angle of the input divided by power factor	unable to determine without the value of the bias voltage	See illustration number(s): EL-0022

12	1180	B	If the illustrated lighting branch distribution box is not for cargo or deck lighting, the Coast Guard Regulations (46 CFR) requires the designed load attached to Branch NO.2 to be no more than _____.	5 amps	16 amps	30 amps	50 amps	See illustration number(s): EL-0013
12	1181	D	In a logic circuit, the NOT gate function _____.	does not alter a logical input	serves to amplify a given signal level	must be accomplished with a common collector transistor arrangement	reverses an input logic condition	
12	1182	D	Before using an all-purpose electric measuring instrument (multimeter) utilizing internal batteries to supply power for resistance measurements, you should FIRST _____.	remove one of the batteries	remove all the batteries	calibrate using a known external resistance	select the proper resistance range	
12	1183	C	When paralleling two AC generators, the frequency of the incoming machine immediately prior to closing its breaker should be _____.	controlled by placing the governor switch in the automatic position	adjusted with the voltage regulator	slightly greater than the bus frequency	slightly less than the bus frequency	
12	1184	D	A single-phase induction motor fails to start. The rotor is spun rapidly with the line switch closed. Having started by this method it is noted that the motor fluctuates between a very slow speed and half speed. The problem probably lies in the _____.	starting winding	centrifugal mechanism	centrifugal switch	running winding	
12	1185	A	Pin #8 of the astern valve position sensor shown in the illustration is connected _____.	to analog common	in series with PCOM	to (-) 50 volts D.C.	to (+) 50 volts D.C.	See illustration number(s): EL-0099
12	1186	C	In the illustration if BRANCH NO. 1 is a lighting circuit for crew's berthing, 46 CFR requires the maximum fuse rating for that branch to be _____.	15 amps	80% of the connected load	20 amps	30 amps	See illustration number(s): EL-0013
12	1188	D	If reading the AC current with the illustrated device and are unsure of the range, the range switch should be set to _____.	500 MA	10 MA/ 10 AMP with leads in the (-COMMON) and (+) jacks	10 MA/ 10 AMP with leads in the (-COMMON) and (+10 A) jacks	10 MA/ 10 AMP with leads in the (-10 A) and (+10 A) jacks	See illustration number(s): EL-0047
12	1190	D	When disassembling motors for maintenance or overhaul, _____.	punch mark frame and end bells for proper assembly	wrap bearings in lint free cloths if they are to be reused	tag and store small parts in a box	all of the above	
12	1191	D	In a logic circuit the NOR and NAND gate functions _____.	must be accomplished with a common base transistor arrangement	are available in diode form	are exact opposites with the same NOR and NAND inputs	have output conditions that are exact opposites to the output condition for OR and AND, respectively	
12	1192	C	Conductor resistance may be INDIRECTLY measured by using a/an _____.	voltmeter only	ammeter only	voltmeter and an ammeter	ohmmeter only	
12	1193	B	The winch shown in the illustration will not operate in any speed in the lowering direction and at an abnormal speed in "first point hoist". The possible cause is that _____.	contactor coil "3M" has many shorted turns	resistor "R8-A2" has an open	contacts "1M" in the power circuit are badly corroded	master switch contacts "MS6" have weak springs	See illustration number(s): EL-0102
12	1194	B	If the centrifugal switch or relay used for cutting out the starting winding of a split-phase induction motor fails to open once the motor is in operation, the _____.	motor will overspeed	starting winding will burn out	motor will immediately stall under load	motor torque will be above normal at rated speed	
12	1195	B	In the illustration, the component labeled D is a _____.	fixed contact	moving contact	trip bar	bimetallic strip	See illustration number(s): EL-0033
12	1196	A	The method of D.C. motor speed control shown in the illustration is known as _____.	Ward-Leonard	Sperry-Rand	Atlas-Copco	Burmeister-Wain	See illustration number(s): EL-0101
12	1197	B	A flickering ground detection lamp on a DC system would indicate a _____.	multiple-ground condition in the distribution system	ground in an armature coil of an operating machine	ground in a motor accompanied with a short	short between two adjacent bars of the generator commutator	

12	1198	D	In the illustration, the large battery and R(L) are in the circuit to _____.	forward bias the emitter-base	reverse bias the emitter-base	forward bias the emitter/collector	reverse bias the emitter/collector	See illustration number(s): EL-0022
12	1199	A	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 1.74 ohms the current will be _____.	66.09 amps	116.74 amps	.026 amps	.015 amps	See illustration number(s): EL-0018
12	1200	C	What is the total resistance of the electrical circuit illustrated if the resistance of R1 is 2 ohms, R2 is 4 ohms, and R3 is 4 ohms with a 6 volt battery?	0.01 ohms	0.10 ohms	1.00 ohms	10.00 ohms	See illustration number(s): EL-0021
12	1201	C	When a voltage of 95 VDC is applied to the circuit illustrated with a resistance of 17.8 ohms the current will be_____.	.187 amps	3.34 amps	5.34 amps	112.8m amps	See illustration number(s): EL-0018
12	1202	A	The true power indicated by a wattmeter depends on the current flow through the load, the magnitude of the potential across the load, and the _____.	power factor of the load	angle of coil displacement	inertia of the movable coil	high resistance from the load	
12	1203	C	When paralleling two AC generators, the frequency of the machine coming on-line, immediately prior to closing its breaker, should be _____.	slightly less than the oncoming generator frequency	the same as the bus frequency	slightly greater than the bus frequency	the same as the bus voltage	
12	1204	A	A three-phase, squirrel cage, induction motor will run hot due to _____.	open stator coils	high power factor	dirty or corroded slip rings	reversed commutating poles	
12	1205	C	In the illustration, the function generators will accept only a signal of a given polarity, if negative is used for ahead and positive for astern, moving the bridge reference in the direction indicated will _____.	pass through the amplifier M to the astern function generator to open the astern steam valve	pass through the amplifier M to the ahead function generator to open the ahead steam valve	do nothing because engineroom control is selected	not cause a speed change until the output voltage exceeds the value of the lube oil pressure override	See illustration number(s): SE-0002
12	1206	A	In the illustration, moving the engine room reference in the direction indicated will _____.	cause a positive signal to be sent to the ahead function generator creating a more positive signal at the ahead motor supply (SCR's) causing the ahead valve to open	cause no change unless the ahead speed error contact is closed	not cause a change until the feedback signal from the ahead turbine pressure reaches a preset level	not cause the ahead valve to open until the negative signal exceeds the low lube oil pressure override signal	See illustration number(s): SE-0002
12	1207	C	The ground indicating light on the main electrical switchboard is indicating a ground. The best procedure for locating the grounded circuit is to _____.	trace the circuit paths while looking for burned spots	check circuit resistances with a megohmmeter connected between the grounded line and the distribution panel framework	open the circuit breakers on the distribution panel, one at a time, until the lights no longer indicate a ground	check all circuits for continuity	
12	1208	D	When the operating handle is in the "off" position, which master switch contacts for the winch shown in the illustration are closed?	"MS-DB & OL"	"MS-3, 5, 6, 7, & 8"	"MS-LVa & OL"	"MS-3, 7 & Reset"	See illustration number(s): EL-0102
12	1209	C	Peripheral components for the operation of the astern valve position amplifier circuit shown in the illustration are _____.	resistors	operated on +28 volts D.C.	located on a separate circuit card	all of the above	See illustration number(s): EL-0099
12	1210	C	D.C. propulsion motor brush pressure depends on the brush grade used and in practice is set with a _____.	multimeter	manometer	spring scale	compound gauge	
12	1211	D	The unit "hertz" is equivalent to _____.	coulombs per second	revolutions per second	revolutions per minute	cycles per second	
12	1212	C	A multimeter can be used to directly measure _____.	watts	field flux	current	all of the above	

12	1213	B	The kilowatt load can be adjusted on a paralleled generator by using the _____.	field rheostat	governor control	automatic voltage regulators	hand tachometer	
12	1214	C	A three-phase, squirrel cage, induction motor will run hot due to a/an _____.	improper brush position	reversed commutating pole	shorted stator	high power factor	
12	1215	D	Which of the listed pairs of materials make the best insulators?	dry air and a vacuum	tin and lead	doped silicon and germanium	paper and oil	
12	1216	D	In the illustration, the tan and white wires are connected to the solenoid valve. The solenoid valve is_____.	in the liquid line before the TXV	energized and open whenever the unit is plugged in	not grounded so the unit must be modified before using aboard ship	the water inlet for the ice maker	See illustration number(s): EL-0042
12	1217	D	A current carrying conductor making an electrical contact with a wiring metal conduit is indicated by a _____.	low switchboard wattmeter reading	reading of 1.0 on the power factor meter	high switchboard voltmeter reading	totally darkened switchboard ground-detecting light	
12	1218	C	In the illustration if the compressor fails to start but the condenser fan motor is running the problem is _____.	no power between L1 and L2	the yellow wire is open at the freezer temperature control switch	the overload is open	the blue wire from the defrost heater is open	See illustration number(s): EL-0043
12	1219	B	The reading at "P" on the megger scale shown in the illustration, is _____.	15 meg ohms	1.5 meg ohms	1.5 kilo ohms	150,000 ohms	See illustration number(s): EL-0044
12	1220	D	The advantage(s) of the method of D.C. motor speed control shown in the illustration is/are _____.	elimination of armature starting resistor losses	elimination of speed instability with variable loads	the ease of reversing motor direction	all of the above	See illustration number(s): EL-0101
12	1221	C	A DC generator is used to supply direct current in order to maintain an AC generator field and is known as a/an _____.	rotor	stator	exciter	armature	
12	1222	D	A volt-ohm-millimeter can be used to check for _____.	continuity	grounds	voltage	all of the above	
12	1223	C	When paralleling two AC generators, the frequency (cycles) of the incoming generator, just prior to closing the circuit breaker, should be _____.	slightly less than the frequency of the generator on the line	the same as the frequency of the generator on the line	slightly more than the frequency of the generator on the line	all of the above	
12	1224	D	A split-phase induction squirrel-cage motor will not come up to speed, even though the rated voltage, rated frequency, and rated load are applied. The suspected trouble could be due to _____.	a faulty centrifugal switch	broken rotor bars	worn bearings	all of the above	
12	1225	A	The power requirements for operating the circuits shown in the illustration are _____.	(+) and (-) 50 volts D.C.	(+) 28 and (+) 50 volts D.C.	(+) 28 volts D.C. and 115 volts A.C.	(+) 28 volts and (-) 50 volts D.C.	See illustration number(s): EL-0099
12	1226	D	The reading at "V" on the megger scale shown in the illustration, is _____.	40 meg ohms	0.40 meg ohms	4.0 kilo ohms	40,000 ohms	See illustration number(s): EL-0044
12	1227	B	A ground is indicated by the ground-detecting system on the main electrical switchboard. The FIRST step in locating the actual ground is to _____.	close all circuit breakers in the distribution panel until the ground detector indicates normal	open the individual circuit breakers, one by one until the ground detection system indicates normal	change over generators	check each circuit with a megohmmeter	
12	1228	D	In the illustrated circuit, the amplifier is connected in what basic configuration?	common emitter	common collector	darlington paired, capacitor coupled	common base	See illustration number(s): EL-0045
12	1229	C	The advantage of using the illustrated circuit configuration is _____.	high input resistance	high current gain	the best stability with an increase in temperature	the input and output are 180 degrees out of phase	See illustration number(s): EL-0045

12	1230	A	In the illustrated electronic governor, the circuit card connected to the potential and current transformers is for _____.	increasing the signal strength to the governor to maintain constant engine speed with increased load	send a kilowatt signal to the metering circuit	shutting down the prime mover in the event of reverse power to protect from motorization	conditioning the load through the use of a magnetic amplifier current transformer	See illustration number(s): EL-0046
12	1231	D	Fuses are usually rated in _____.	watts	amps only	volts only	amps and volts	
12	1232	B	When used for taking resistance measurements, a volt-ohm-milliammeter is normally powered by _____.	a hand cranked generator	internal storage batteries	the current in the circuit being tested	a step down transformer	
12	1233	D	When paralleled, AC generators must have the same _____.	frequency	number of phases	phase rotation	all of the above	
12	1234	B	Discoloration of the rotor bars in a squirrel-cage motor is typical evidence of _____.	moisture	overheating	vibration	all of the above	
12	1235	C	In the illustration, the contacts between terminals 26 and 27 should be closed when _____.	using one generator in isochronous mode only	using two or more generators in parallel only	the prime mover speed is to remain constant through varying loads in parallel or single operation	the circuit breaker is closed for that generator	See illustration number(s): EL-0046
12	1236	C	When the master switch for the winch shown in the illustration is in the "off" position, and the line & safe switches are closed, which of the listed relays should be energized?	"DB" & "2T"	"DB" & "4M"	"FR-B.O." & "LV"	"1M" & "1A"	See illustration number(s): EL-0102
12	1237	B	Multiple grounds have developed and were initialy indicated by the ground-detecting system as one ground. The FIRST step in locating the grounds is to _____.	examine the main bus bars for signs of overheating	eliminate the individual circuits one by one until the ground detecting system no longer indicates any grounds	change over generators	check each circuit with a megohmmeter	
12	1238	B	To protect the rotor of a motor disassembled for maintenance or overhaul, it should be _____.	suspended by wire slings in one corner of the shop	wrapped in several layers of heavy paper or cardboard	supported by flat wood blocks on the workbench	returned to the frame as soon as the bearings are removed	
12	1239	C	Which of the following materials is a good insulator?	steel	aluminum	glass	copper	
12	1240	D	In order to decrease the resistance of the 50K pot located at "21Q/R" shown in the illustration, the wiper of the actual component must be moved _____.	to the left	to the right	clockwise	counterclockwise	See illustration number(s): EL-0099
12	1241	D	Electrical power is expressed in _____.	ohms	volts	amps	watts	
12	1242	C	A voltmeter located on a control panel has been operating correctly for six months, suddenly burns out. After removing it, it is found that neither side of the meter has been grounded. When installing the new meter it should be _____.	grounded to the negative side	connected to a large resistor between the positive side and the ground	installed exactly as the old installation	grounded to the positive side	
12	1243	C	Which of the following should be the FIRST step in removing a generator from parallel operation?	Trip the generator off the switchboard.	Turn off all electrical equipment.	Remove the load from the "off going" generator.	Increase the cycles of the generator staying on the line.	
12	1244	B	An overload in which of the listed motors will result in the illumination of an indicating light at the propulsion control station alarm panel?	Fuel pump motor	Steering motor	Condensate pump motor	Forced draft blower motor	
12	1245	C	In the illustration, the diode between terminals 16 and 17 is to _____.	insure that the voltage across the governor coil (EG-3P) never exceeds .6 VDC	compensate for the temperature difference of the governor oil heating up	protect the electronic governor from counter EMF	act as a filter to prevent hunting	See illustration number(s): EL-0046

12	1246	A	In the illustration, the diode between terminals 16 and 17 is to _____.	act as a short circuit for the sensing coil when CEMF is applied	insure that the voltage across the coil does not exceed 9 volts	improve response time	act as a filter to prevent hunting	See illustration number(s): EL-0046
12	1247	C	A current-carrying conductor makes accidental contact with a wiring conduit. This will be indicated by a _____.	low switchboard wattmeter reading	high switchboard wattmeter reading	darkened switchboard ground detecting lamp	darkened switchboard synchronizing lamps	
12	1248	C	In the illustration, the component VR1 on the A1A1 PCB is _____.	a zener diode to regulate the +9 volt power supply	a variable resistor diode to control the output to terminal 9 that controls the input to terminal 10	a zener diode that regulates the voltage to terminal 9 at 6.6 volts DC	a tunnel diode with a breakdown voltage of 6.6 Volts DC	See illustration number(s): EL-0060
12	1249	B	In the illustrated amplifier, the RESET potentiometer A1R2 sets the stability of the control loop by changing the reset time constant. As the potentiometer is turned clockwise _____.	the gain is increased	the stability is increased by slowing the response time	feedback is increased to the summing point at terminal 5	response time is increased decreasing stability	See illustration number(s): EL-0060
12	1250	C	In the illustration, the chemical reaction depicted indicates that the _____.	battery is being charged at a high rate	cell is short circuited	cell is discharging	battery is attached to a trickle charger	See illustration number(s): EL-0061
12	1251	B	An electrical connection between the wiring of an electric motor and its metal frame is known as a/an _____.	eddy current	ground	impedance	flux leakage	
12	1252	A	If the illustrated device is fully discharged, what will be the result?	The plates will be maximum lead sulfate minimum sponge lead and lead oxide, the electrolyte will be maximum water minimum sulfuric acid.	The plates will be maximum sponge lead and lead oxide minimum lead sulfate, the electrolyte will be maximum sulfuric acid minimum water	The plates will be maximum lead sulfate minimum sponge lead and lead oxide, the electrolyte will be maximum sulfuric acid minimum water.	The plates will be maximum lead oxide and sponge lead minimum lead sulfate, the electrolyte will be maximum water minimum sulfuric acid	See illustration number(s): EL-0061
12	1253	C	Prior to closing the breaker when paralleling two AC generators, the recommended practice is to have the frequency of the incoming machine _____.	slightly less than the line frequency	the same as the line frequency	slightly greater than the line frequency	all of the above	
12	1254	D	If a synchronous motor begins to vibrate severely and pull out of synchronism, the cause may be _____.	an overload	an open in the field coils	no exciter voltage	all of the above	
12	1255	C	If the illustrated device is fully discharged, what will be the result?	The battery will be short circuited because the mud space will be filled with lead sulfate	The electrolyte will be maximum sulfuric acid minimum water	The electrolyte will be maximum water minimum sulfuric acid.	The plates will be maximum lead oxide and sponge lead minimum lead sulfate.	See illustration number(s): EL-0061
12	1256	A	In the illustration, the component VR1 on the A1 AMPLIFIER MODULE is _____.	a zener diode to regulate the +9 volt power supply from common	a variable resistor diode to control the output to terminal 9 that controls the input to terminal 10	a zener diode that regulates the voltage to terminal 9 at 6.6 volts DC	a tunnel diode with a breakdown voltage of 6.6 Volts DC	See illustration number(s): EL-0060
12	1257	D	Accidental grounds in a shipboard electrical system must be repaired as soon as possible as they will _____.	result in immediate power outages	damage circuit breakers	appear on the ground detection system	damage insulation and may cause outages	
12	1258	C	In the illustration, the component VR2 on the A1 AMPLIFIER MODULE is _____.	a zener diode to regulate the +9 volt power supply from common	a variable resistor diode to control the output to terminal 1 that controls the input to terminal 10	a zener diode that regulates the voltage to terminal 2 at 9.1 volts DC	a tunnel diode with a breakdown voltage of 6.6 Volts DC	See illustration number(s): EL-0060

12	1259	D	The illustrated test is being conducted on the motor shown in the illustration, if the lamp lights dimly then _____.	the bulb needs to be changed to one with a higher wattage rating	safety procedures need to be reviewed because the test presents a severe electrical shock hazard to the person conducting the test and anyone touching the motor frame	the disconnected wires are touching, they need to be seperated and the test conducted again	a ground or partial ground is indicated, a check with a megger should confirm the lamp test	See illustration number(s): EL-0027
12	1260	A	Which component is responsible for energizing solenoid "B1-B2" and releasing the brake for the winch motor shown in the illustration?	Contactor "3M"	A spring not shown in the schematic diagram	Resistor "B2-R1"	Relay "FR-B.O."	See illustration number(s): EL-0102
12	1261	B	The standard measuring unit of wire by its cross-sectional area, as used in American wire tables is the _____.	AWG	circular mil	square millimeter	cubic inch	
12	1262	D	The electrical device shown in the illustration is a/an _____.	operating coil	indicating lamp	motor armature	potentiometer	See illustration number(s): EL-0077
12	1263	C	A change in field excitation of an alternator operating in parallel will cause a change in its _____.	alternator frequency	kilowatt load	voltage output	all of the above	
12	1264	C	The effect of carrying field excitation excessively high on a synchronous motor will result in a _____.	tendency for the motor to fall out of step	tendency for the motor to overspeed	tendency for the motor to overheat	loss of motor speed regulation	
12	1265	B	What is the value of the capacitor in the astern valve position circuit shown in the illustration?	100 kFarad	0.5 microfarad	0.5 millifarad	50 kFarad	See illustration number(s): EL-0099
12	1266	C	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 1, and the needle is at the position indicated by the letter "A"?	10 ohms	100 ohms	200 ohms	1,000 ohms	See illustration number(s): EL-0047
12	1267	A	In addition to short circuits and sustained overloads, fuses are likely to blow due to _____.	loose fuse clips	low ambient temperatures	low contact resistance	all of the above	
12	1268	A	In the illustration, the small battery and Rb are in the circuit to apply _____.	forward bias to the emitter-base	reverse bias to the emitter-base	a "reference charge" on the input capacitor	a buffer between the input ground and the emitter ground	See illustration number(s): EL-0022
12	1269	D	In the illustration, the tan and white wires are connected to the solenoid valve. The solinoid valve is_____.	in the liquid line before the TXV	energized and open whenever the unit is plugged in	not grounded so the unit must be modified before using aboard ship	the water inlet for the ice maker	See illustration number(s): EL-0043
12	1270	A	The greatest single cause of electrical failures is _____.	the breakdown of insulation	overcurrent	high inductance	too frequent testing	
12	1271	B	A device used in an electrical circuit to change alternating current to direct current, is known as a _____.	current transformer	rectifier	condenser	shunt	
12	1272	A	In the illustration, when the energy saver switch is in the "lo" position _____.	the mullion and frz flange heaters will not energize	the mullion heater and refrig light will not energize	the mullion, frz flange, defrost heaters will not energize	the range of the freezer temperature control is increased causing the cut-in temp to become warmer	See illustration number(s): EL-0042
12	1273	B	Two AC generators of the same capacity are operating in parallel. One with a zero speed droop setting and the other with a 5% speed droop. If its capacity is not exceeded, the unit whose governor has the zero speed droop setting will _____.	assume the smaller share of the load	maintain the frequency of the system	have poor sensitivity characteristics	have poor power response	

12	1274	C	In the illustrated test, if the lamp fails to light on any of the three windings then _____.	all three windings are grounded and the motor should be sent out for repair	the brushes should be set back on the commutator and the test redone	the ground is not in the windings and the connections to the motor controller and the controller should be checked	the test should be redone at a higher voltage	See illustration number(s): EL-0027
12	1275	A	Which of the following statments is true about the illustrated circuit?	The field rheostat is used for manual voltage control.	if the generator is flat compounded then the field rheostat needs to be adjusted up at full load to compensate for excessive voltage droop.	this is a direct current elevator control with the lower and raise corresponding with the direction that the elevator will travel.	the motor will tend to act like a series motor and overspeed with the controller in the full raise position.	See illustration number(s): EL-0030
12	1276	C	In the illustration if the compressor fails to start but the condenser fan motor is running the problem is _____.	no power between L1 and L2	the yellow wire is open at the freezer temperature control switch	the overload is open	the blue wire from the defrost heater is open	See illustration number(s): EL-0042
12	1277	C	A fuse will "blow" if _____.	an electric motor is stopped suddenly by opening a switch	the flow of current to the protection device is reversed	the electrical current exceeds the rated value of the fuse	unequal resistors are connected in parallel	
12	1278	C	In the illustrated circuit, what is the voltage measured across R1 if the battery is 24 volts, the resistance of R1 is 34 ohms, and the resistance of R2 is 126 ohms?	24 volts	18.9 volts	5.1 volts	150 millivolts	See illustration number(s): EL-0036
12	1279	A	In the illustrated circuit, what is the resistance across R2 if the battery voltage is 32 VDC, the resistance of R1 is 1.2 kohms and the current through R2 is 18.82 milliamps?	500 ohms	1,200 ohms	10 ohms	The answer can not be found with the information given.	See illustration number(s): EL-0036
12	1280	B	As the ahead valve opens as shown in the illustration, pin #5 of the Sensor _____.	becomes more negative	becomes more positive	approaches neutral point	approaches ground potential	See illustration number(s): EL-0099
12	1281	C	The inductance of a coil is measured in _____.	ohms	volts	henries	amperes	
12	1282	C	As shown in the illustration, what is responsible for maintaining the "LV" relay energized when the master switch handle is moved away from the "off" position?	Safe switch.	Reset contacts.	Upper set of "LVa" contacts.	Lower set of "LVa" contacts.	See illustration number(s): EL-0102
12	1283	D	In the illustrated circuit, what is the voltage of the battery if the resistance of R1 is 150 ohms, the total resistance is 250 ohms and the current though R2 is 25 milliamps?	12 volts	24 volts	1.5 volts	6.25 volts	See illustration number(s): EL-0036
12	1284	D	You are reconnecting a three-phase induction motor to the supply line. To prevent possible damage to the load, due to the wrong direction of rotation, you should _____.	connect the motor and then use the "jog" button to determine the direction of rotation	connect the phase indicator to the motor leads, rotate the motor by hand and then connect to the supply voltage	connect the phase indicator to the supply voltage then connect the motor	check the supply line phase sequence and motor rotation with appropriate indicators, then connect correspondingly marked leads	
12	1285	C	In the illustrated circuit, one advantage of the capacitor coupling over direct coupling is _____.	as the frequency decreased the capacitive reactance (Xc) increases	the amplifier becomes more efficient at lower capacitance.	the arrangement allows the coupling of the signal while it isolates the biasing of each stage.	good frequency response.	See illustration number(s): EL-0048
12	1286	C	If the electricity represented by the wave form in "B" were applied to the left side of the illustrated circuit, the output on the right side would be _____.	direct current with the top lead positive with repect to the lower lead	direct current, half wave rectified with a ripple frequency of 60 hz	direct current with the top lead negative with repect to the lower lead	clipped to a value equal to the square root of 3 times the input voltage value	See illustration number(s): EL-0064
12	1287	C	The correct term for the illustrated circuit is a _____.	single phase half wave high power rectifier	three phase half wave rectifier	three phase full wave rectifier	a single phase full wave rectifier	See illustration number(s): EL-0063

12	1288	B	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 110 ohms, and R2 is 10 kohms what is the voltage measured across R1	11.86 volts	.131 volts	12 volts	.673 volts	See illustration number(s): EL-0036
12	1289	B	Which of the following statements is true regarding the illustrated circuit?	This full wave bridge should never be used aboard ship because the ground on lead "A" will show on the ship's ground detection system.	Lead "X" will always be positive (+) with respect to ground.	This bridge circuit output will be direct current suitable for electronic circuits requiring voltage regulation.	All the above are true.	See illustration number(s): El-0069
12	1290	D	In the illustrated circuit, if the input to leads "B" and "Y" was 24 VDC the output between "A" and "X" will be _____.	24 VDC	22.8 VDC, 24 VDC minus the 1.2 VDC voltage drop across two diodes	undeterminable without knowing the turns ratio of the transformer	0 VDC	See illustration number(s): EL-0069
12	1291	C	Current flowing in only one direction is called _____.	alternating current	omnidirectional current	direct current	sinusoidal current	
12	1292	D	The proper method of connecting an ammeter in a circuit is demonstrated by which of the diagrams shown in the illustration?	A	B	C	All of the above	See illustration number(s): EL-0041
12	1293	C	An alternator is being paralleled with one on the line. At the INSTANT the circuit breaker is closed, the frequency of the incoming alternator will normally _____.	increase	not change	decrease	be exactly 60 hertz	
12	1294	A	If a three-phase induction motor is operated under a light load and it develops an open in one of its supply lines, the motor will _____.	continue to run, but will vibrate and have reduced torque	speed up due to the reduced number of poles	run cooler due to reduced current flow	stop	
12	1295	A	In the illustrated three phase alternator, line voltage is _____.	1.73 times the phase voltage	equal to the phase voltage	phase voltage divided by 1.73	unable to answer this question without knowing the line current	See illustration number(s): EL-0074
12	1296	A	The illustrated device is a _____.	full wave bridge rectifier	half wave bridge rectifier	solid state voltage regulator	direct current (DC) filter	See illustration number(s): EL-0064
12	1297	D	When a fluorescent lamp fails to light, the trouble can be in the _____.	lamp	starter	ballast	all of the above	
12	1298	D	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 110 ohms, and R2 is 10 kohms what is the total power consumed by the circuit?	3.6 watts	72 watts	.0011286 watts	.014243 watts	See illustration number(s): EL-0036
12	1299	A	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 110 ohms the current will be _____.	1.045 amps	225 milliamps	2.045 amps	965.52 milliamps	See illustration number(s): EL-0018
12	1300	D	In the illustration, 24 volts is applied to the circuit where the resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms. What is the power consumed in R1?	2 watts	3 watts	6 watts	12 watts	See illustration number(s): EL-0020
12	1301	B	Electric current is the flow of electrons through a conductor; the rate of this flow is measured in _____.	volts	amperes	coulombs	ohms	
12	1302	C	In the illustration, 12 volts is applied to the circuit where the resistance of R1 is 10 ohms and R2 is 10 ohms. what is the voltage across R2?	1.2 volts	2 volts	6 volts	12 volts	See illustration number(s): EL-0036
12	1303	D	Why is it a good practice to have the frequency of the incoming alternator adjusted slightly higher than that of the loaded alternator when paralleling two alternators?	This allows the oncoming machine to accept load immediately.	This prevents the machine from floating on the line.	The reverse power relay is prevented from activating.	All of the above.	

12	1304	D	For the illustrated wiring of a three phase alternator, which statement is true about the current?	phase current is 1.73 times the line current	line current is 1.73 times the phase current	there is no relationship between phase current and line current	line current is equal to phase current	See illustration number(s): EL-0074
12	1306	A	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 10 ohms, and R2 is 10 ohms what is the total current in the circuit?	0.6 amp	0.833 amp	1.2 amps	2.4 amps	See illustration number(s): EL-0036
12	1307	A	In an alternating current electrical system, a low system power factor is a direct sign of _____.	wasted energy	efficient operation	a short in the exciter field windings	an excessive number of minor system grounds	
12	1308	A	In the illustration, 24 volts is applied to the circuit where the resistance for R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms. What is the power consumed in R2?	16 watts	20 watts	24 watts	28 watts	See illustration number(s): EL-0020
12	1309	B	In the illustration, 24 volts is applied to the circut where the resistance for R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms. What is the power consumed in R3?	12 watts	20 watts	24 watts	48 watts	See illustration number(s): EL-0020
12	1310	D	Battery capacities are given in _____.	volts	volt-amperes	volt-hours	ampere-hours	
12	1311	D	When a low input voltage is imparted to a device which then delivers a high output voltage, the device is known as a _____.	primary transformer	secondary transformer	stepdown transformer	stepup transformer	
12	1312	C	In the illustration, A, B, C and D are 12 volt batteries. a voltmeter across the output of the circuit will indicate _____.	6 volts	12 volts	24 volts	48 volts	See illustration number(s): EL-0039
12	1313	A	Batteries "A" and "B" shown in the illustration are 6 volts each and batteries "C" and "D" are 24 volts each. If "A" were connected in series-opposing to "C" and "B" was simularly connected to"D", the result would be _____.	18 volts, negative at the top terminal	18 volts, positive at the top terminal	30 volts, negative at the bottom terminal	30 volts, positive at the bottom terminal	See illustration number(s): EL-0039
12	1314	D	The purpose of the item labeled "Z" in assembly No. 2, shown in the illustration is to _____.	keep the rotor in balance	align the rotor to the stator	dynamically balance the rotor	cool the motor	See illustration number(s): EL-0001
12	1315	C	The reading at "C" on the megger scale illustrated, is _____.	200,000 ohms	2,000,000 ohms	20,000,000 ohms	200,000,000 ohms	See illustration number(s): EL-0044
12	1316	A	If reading AC current with the illustrated device and unsure of the range as a precaution , the first step should be to _____.	secure power and test for voltage	disconnect the lead to be tested and connect the meter in series	connect the meter to measure resistance and use Ohm's law to calculate current	unable to safely measure current with the device	See illustration number(s): EL-0047
12	1317	D	Which of the following conditions can lead to the failure of a resistor?	Excessive vibration	Insufficient ventilation	Corrosion	All of the above	
12	1318	A	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 10 ohms, and R2 is 10 ohms what is the current flowing through R1?	0.6 amp	0.833 amp	1.2 amps	2.4 amps	See illustration number(s): EL-0036
12	1319	C	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 10 ohms, and R2 is 10 ohms what is the total power consumed by the circuit?	3.6 watts	72 watts	7.2 watts	36 watts	See illustration number(s): EL-0036
12	1320	A	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 10 ohms, and R2 is 10 ohms what is the total power consumed by R1?	3.6 watts	72 watts	7.2 watts	36 watts	See illustration number(s): EL-0036
12	1321	B	A circuit with a blown fuse would be described as a/an _____.	short circuit	open circuit	bonded circuit	grounded circuit	
12	1322	D	The reading at "K" on the megger scale shown in the illustration, is _____.	400 ohms	4,000 ohms	40,000 ohms	400,000 ohms	See illustration number(s): EL-0044
12	1323	B	Two paralleled alternators are operating near rated load. If one trips out mechanically, which of the listed actions should be taken FIRST?	Restart the tripped machine immediately.	Strip the board of all non-vital circuits.	Start the emergency generator.	Transfer all vital loads to the emergency bus.	

12	1324	A	As shown in the illustration if the applied voltage is 12 VDC, the resistance of R1 is 24 kohms, and R2 is 3610 ohms what is the current flowing through R1?	.434 milliamps	.005 amp	6.00 amps	2.4 milliamps	See illustration number(s): EL-0036
12	1325	B	In the illustrated motor controller, the motor fails to start. A voltmeter reading between 1 and 6 reads line voltage, while the voltmeter reading between 2 and 6 reads 0 VAC. The problem is _____.	the control fuse is the wrong amperage not allowing full current to pass through	the stop switch is open	an open in the "M" coil, "Ma" contact/start switch or overload contacts	fuse "10a" is blown	See illustration number(s): EL-0007
12	1326	D	Routine maintenance of dry-type transformers should include _____.	preventing the entrance of water from broken pipe lines steam lines	keeping protective surfaces and insulating bushings free of dirt and conductive debris	periodic testing of insulation resistance with a megger	all of the above	
12	1327	A	The circuit illustrated represents a single phase AC ground detecting system. If a ground occurs on line "B", which of the lamps will burn the brightest?	X	Y	Both will be equal brightness.	both will go out.	See illustration number(s): EL-0008
12	1328	C	Component F in the illustrated device is for _____.	short circut protection	latching the trip unit closed after resetting the breaker	overload protection	providing a flexible connection between the input terminal G and the tripping unit E	See illustration number(s): EL-0033
12	1329	A	If the illustrated device has a step-up ratio of 10 to 1 what voltage be measured at the secondary shortly after the primary of the device is connected to 110 volts DC with a current of 12 amps?	0 volts	110 volts	1000 volts	1100 volts	See illustration number(s): EL-0055
12	1330	C	In the illustrated circuit, the amplifier is connected in what basic configuration?	common base	reverse bias, negative feedback	common emitter	common collector	See illustration number(s): EL-0022
12	1331	C	The twisting force developed by a motor and applied to a shaft is called _____.	magnetism	electromotive force	torque	voltage	
12	1332	C	The reading at "Z" on the megger scale shown in the illustration is _____.	30,000 ohms	300,000 ohms	3,000,000 ohms	30,000,000 ohms	See illustration number(s): EL-0044
12	1333	C	If field excitation is suddenly lost to an alternator operating in parallel, that alternator will _____.	supply excessive current to the bus	operate at the same load, but with reduced voltage	lose its load and tend to overspeed	become overloaded and slow down	
12	1334	A	Which of the conditions listed will indicate the need to clean the insulation on the windings of an electric motor?	Higher than normal operating temperature.	Excessive vibration at normal speed.	Sparking at the brushes.	High megger readings.	
12	1335	A	In the illustrated amplifier, the base of the transistor is what type of material?	N type	P type	metal oxide insulator	alloy junction material	See illustration number(s): EL-0022
12	1336	B	Which of the listed devices may be used as a digital device?	variable resistor	diode	strain gauge	thermistor	
12	1337	A	If all of the ground detection lamps burn with equal brilliance, whether the test button is depressed or released, then _____.	no grounds exist	all phases are grounded	all lamps show a ground	all of the above	
12	1338	B	A capacitor discolored due to excessive heat should be _____.	calibrated using a capactance wheatstone bridge	replaced and the reason for the overheating found	cooled with a spray can of refrigerant approved for this purpose	resoldered with care taken to insure that the origional cold solder joint is repaired	
12	1339	C	In the illustration if BRANCH NO. 1 is a lighting circuit for crew's berthing, Federal Regulations (46 CFR) require the maximum fuse rating for that branch to be _____.	80% of the connected load	15 amps	20 amps	30 amps	See illustration number(s): EL-0013
12	1340	A	Which of the illustrated lamps would be brighter? I. X II. Y	I only	II only	Both I and II would be equally bright	Neither would be lit	See illustration number(s): EL-0008
12	1341	C	The unit of electrical power is the _____.	ampere	kilovolt	watt	farad	
12	1342	A	On the meter scale illustrated, while using the R X 100 scale, the reading at "Z" is_____.	3,000 ohms	30,000 ohms	300,000 ohms	3,000,000 ohms	See illustration number(s): EL-0047

12	1343	C	If the energy input is significantly reduced to the prime mover of one shipboard alternator operating in parallel with others, that alternator will _____.	continue to operate at no load	lose its load and overspeed	begin to motorize and then trip out	slow down and operate at reduced load	
12	1344	A	Which of the listed procedures is the best way to tell if a motor has become overloaded?	Measure the current flow and compare it with the motor full load current flow as shown on the nameplate.	Feel the motor and judge by the temperature.	Watch for telltale signs of smoke coming from the motor.	Periodic opening of the O/L relay coil	
12	1345	D	In the illustration, A, B, C, and D are 12 volts in the circuit. What is the voltage of the lead connected to C and D with respect to the lead connected to A and B?	(-) 48 volts	(+) 48 volts	(-) 24 volts	(+) 24 volts	See illustration number(s): EL-0039
12	1346	C	If a small electric motor is imersed in salt water it should be _____. I. washed in fresh water II. dried in an oven	I only	II only	both I and II	neither I or II	
12	1347	A	In order to change the direction of rotation of a D.C. motor_____. I. the field leads must be changed II. the input leads must be changed	I only	II only	either I or II	neither I or II	
12	1348	D	In an A.C. generator, pitting of collector rings will cause _____. I. sparking II. chattering	I only	II only	both I and II	neither I or II	
12	1349	C	Some large A.C. motors are equipped with with heaters. These could be _____. I. resistance heaters bolted directly to the frame II. low voltage windings embedded in the motor windings	I only	II only	either I or II	neither I or II	
12	1350	A	Which way does electron current flow in the illustrated device? I. A to B II. B to A	I only	II only	both I and II	neither I or II	See illustration number(s): EL-0079
12	1351	D	The unit of electrical resistance is the _____.	ampere	volt	watt	ohm	
12	1352	C	With the selector switches set for R X 10,000 and the leads placed in the proper receptacles, the needle settles on the "150" mark. What is the resistance value between the leads?	1500 ohms	150,000 ohms	1,500,000 ohms	1.5 ohms	See illustration number(s): EL-0047
12	1353	B	On some electrical generating equipment one outboard bearing pedestal is insulated from the bedplate. To check this insulation with the machine assembled you should use a_____.	ohmmeter with the machine secured	millivolt meter and a jumper with the machine running	megohm meter with the machine running	voltmeter and ampmeter with the machine running	
12	1354	C	When an AC or a DC motor fails to start, the FIRST step in troubleshooting should be to check the _____.	motor windings for obvious opens	motor controller leads for continuity	fuse or circuit breaker	motor controller leads for grounds	
12	1355	B	Air gap readings should be taken periodicly on electrical generation equipment to _____.	determine the amount of varnish that can be applied to correct insulation problems	determine the condition of the bearings	provide for the correct proper tightening of the field coil bolts and correct lateral adjustment of the field coils	increase machine efficiency	
12	1356	D	On some electrical generating equipment one outboard bearing pedestal is insulated from the bedplate. This should be checked with a millivolt meter and a jumper. With the millivolt meter connectd between the shaft and the bedplate how should the jumper be used?	It should be placed from one end of the shaft to the other to eliminate shaft currents.	It is used to short the + and - in a D.C. generator or Phase A and Phase C in an alternator to eleminate the effects of CEMF.	It should be placed across the insulating block to increase the shaft current to a point where it can be measured with the millivolt meter.	It should be placed from the shaft to the pedestal while one reading is taken, then removed to take a second reading. This eliminates the insulating effect of the bearing.	
12	1357	B	A current-carrying conductor making electrical contact with a wiring conduit will be indicated by a _____.	high switchboard wattmeter reading	totally dark switchboard ground detecting light	low switchboard wattmeter reading	all of the above	

12	1358	C	Maintenance of alkaline batteries should include _____.	checking the electrolyte weekly using a hydrometer	replacing the electrolyte every 5 years	trickle charging	replacment when the volts per cell drops below 1.8 VDC	
12	1359	B	When reassembling the equipment shown in the illustration, _____.	item 2A and 2B should not be installed on assembly #2 until assembly #3 or #4 have been secured to assembly #1	item 2A and 2B should be installed on assembly #2 regardless of when assembly #3 has been secured in place	assembly #2 should be aligned into it's position in assembly #1 before assembly #3 or #4 have been positioned on assembly #1	item 5 should be secured to assembly #1 to provide support to assembly #2 during the reassembling of the entire unit	See illustration number(s): El-0001
12	1360	D	If deck machinery is expected to be idle for an extended period of time you should_____.	have electrical safety gloves available in case of electrical shock before running	perform a "high pot" test to determine the condition of the insulation	water wash the motor and controller to remove any salt that may interfere with smooth operation	check run at regular intervals to inusre correct operation and to renew the internal coating of lubrication	
12	1361	C	Ambient temperature is the _____.	amount of temperature rise with no load	amount of temperature developed by an operating motor	temperature of the compartment where the motor is located	normal operating temperature, less the room temperature	
12	1362	C	What is the resistance value indicated by the multimeter scale illustrated, if the range switch is set at R X 100, and the needle is at the position indicated by the letter "Y"?	220 ohms	240 ohms	2,400 ohms	24,000 ohms	See illustration number(s): EL-0047
12	1363	C	After closing the circuit breaker to place two similar alternators in parallel, the NEXT step is to balance the _____.	power factor	voltage load	kilowatt load	ampere load	
12	1364	D	The failure of ball bearings used in electric motors can result from _____.	failure to clean the bearing before repacking	failure to maintain proper alignment	excess lubrication forcing the bearing full of grease and eliminating all areas of expansion	all of the above	
12	1365	A	If air gap readings for an electical generating machine have changed significantly from the last reading, you should check _____.	the bearings	insulation readings and machine cleanliness	the prime mover thrust bearing	the field coil bolts for the proper torque values	
12	1366	C	In the event of a power failure during cargo loading operations, the movement of an electric powered cargo winch will be stopped by _____.	a manual override switch	the weight of the load on the boom	a spring set brake	a hand operated band brake	
12	1367	A	A switchboard ammeter indicates a reading slightly above "zero" when the leads are disconnected, this is caused by _____.	mechanical misalignment of the meter pointer	a poor ground for the meter case	static electricity in the air	capacitors inside the meter storing charges	
12	1368	D	Air gap readings should be periodicly taken for electrical generation equipment. The best tool to use to take these measurements is a _____.	cloth (non-metalic) tape measure	dial indicator	inside micrometer	tapered, long blade, feeler gage	
12	1369	D	Air gap readings should be taken on electrical generation equipment periodicly to _____. I. check machine effeciency II. determine the need for cleaning	I only	II only	both I and II	neither I or II	
12	1370	A	On some electrical generating equipment one outboard bearing pedestal is insulated from the bedplate. To check this insulation with the machine assembled you should use a_____.	millivolt meter and a jumper	ohmmeter	megohm meter	high potential tester	
12	1371	A	A circuit that has one of two wires in contact with the hull of a ship, is called a _____.	grounded circuit	short circuit	series circuit	closed circuit	
12	1372	C	The reading at "X" while on the R X 100 meter scale illustrated would be _____.	8 ohms	150 ohms	800 ohms	80,000 ohms	See illustration number(s): EL-0047

12	1373	A	Attempting to parallel an AC generator which is out of phase with the bus will result in which of the following problems?	The breaker should trip.	The KVA will decrease.	The synchronizing lamps will burn out.	The power factor will be unitized.	
12	1374	D	Brush sparking during commutation may be caused by _____.	eddy currents in the armature core	laminations in the generator field pieces	induced current opposite to coil inductance	coil inductance discharge occurring at commutation	
12	1376	C	Air gap readings for electrical generating equipment should be taken periodicly. This is to _____. I. determine the condition of the bearings II. prevent damage to the rotor and stator	I only	II only	both I and II	neither I or II	
12	1377	B	Air gap readings should be taken on electrical generation machinery periodicly to _____. I. determine the need for cleaning II. check the condition of the bearings	I only	II only	both I and II	neither I or II	
12	1378	B	If coils "R1-R2-R3" at the receiver of figure "B" shown in the illustration turned opposite of those in the transmitter by design, what corrective action should be taken?	Reverse the 60 Hz supply connections to "S1" and "S2".	No action is needed.	Interchange leads "R1" and "R3".	Interchange leads "R2" and "R3".	See illustration number(s): EL-0092
12	1379	B	A three-phase alternator is operating at 450 volts with the switchboard ammeter indicating 300 amps. The kw meter currently indicates 163.6 KW, with a power factor of 0.7. If the power factor increases to 0.8, the KW meter would then read _____.	181.4 KW	186.8 KW	194.2 KW	201.4 KW	
12	1380	A	If the driving torque, such as that produced by a diesel engine, creates pulsations when coupled with a synchronous generator operating in parallel; the generator rotor may be periodically pulled ahead or behind its normal position as it rotates. This condition is sometimes called _____.	hunting	direct coupling	peaking	harmonic coupling	
12	1381	D	Which of the following statements is true concerning stepdown transformer operation?	The inductance on the primary side is the same as the inductance on the secondary side.	The voltage to the primary side is the same as the voltage from the secondary side.	The current to the primary side is the same as the current from the secondary side.	The voltage to the primary side is greater than the voltage from the secondary side.	
12	1382	C	What is the resistance value indicated on the multimeter scale illustrated, if the range switch is set at R X 100, and the needle is at the position indicated by the letter "R"?	6.0 ohms	162.5 ohms	600 ohms	16,250 ohms	See illustration number(s): EL-0047
12	1383	D	To remove an alternator operating in parallel with another unit from the main electrical bus, you must FIRST _____.	adjust the power factor on both units	set the desired voltage on the outgoing alternator	open the circuit breaker on the outgoing alternator	remove the load from the outgoing alternator	
12	1385	A	The following air gap readings were obtained from a horizontally mounted, bilge pump, induction motor, equipped with sleeve bearings: FWD END AFT END Top .045 .049 Right Side .045 .047 Left Side .045 .047 Bottom .045 .041 Which of the following statements is true?	both the aft and foward bearings should be replaced.	Shims should be removed from the aft bearing.	The forward bearing should be lowered.	The aft bearing should be lowered.	
12	1386	C	As shown in the illustration, the motor generator(M-G) set's three-phase motor drives the _____.	motor and the generator	motor and the exciter	generator and the exciter	main field and the interpole field	See illustration number(s): EL-0101
12	1387	C	A ground on a particular phase of a three-phase low voltage distribution system would be indicated by a _____.	high switchboard wattmeter reading	low switchboard wattmeter reading	dark or dim switchboard ground detecting light	bright switchboard ground detecting light	
12	1388	B	If the bearings of an electrical generator are failing more frequently than expected and the lubricating oil is sludging then you should _____.	check the connections to the output leads	check the bearing insulating block on one end of the unit	replace the bearing with a sealed roller type	replace the thrust bearing of the prime mover	

12	1389	D	On electrical generators one of the bearings is isolated from the bedplate. This insulating block should not be painted and must be kept clean to _____.	protect operating personnel from shock	create an isolated ground for the instrumentation	allow for the expansion of the generator away from the prime mover as it warms up	eliminate shaft currents to prevent damaging the bearings	
12	1390	D	Maintenance of alkaline batteries should include _____.	checking the electrolyte weekly using a hydrometer	replacing the electrolyte every 5 years	top off with sulfuric acid as needed	making certain connections are tight and clean	
12	1391	B	One item listed on the name plate of a cargo pump motor is "degrees centigrade rise." This number is based on _____.	normal temperature change from cold to hot	an ambient temperature of 40°C	minimum heat rise from no load to full load	maximum degrees centigrade rise from absolute zero	
12	1392	A	The reading at "M" on the megger scale shown in the illustration, is _____.	7.1 meg ohms	.71 meg ohms	71 meg ohms	200,000,000 ohms	See illustration number(s): EL-0044
12	1393	A	As part of a routine maintenance program for deck machinery, you should _____.	inspect electrical wiring and pushbutton switches for evidence of corrosion or burned insulation	disassemble pushbutton switches and drain water each week	remove motor covers and ventilate as weather permits	Check drum switch contact pressure every three months	
12	1394	C	Which of the listed conditions will occur if the polarity of the field poles and the direction of current to the brushes of a DC motor were both reversed?	The motor would not start.	The direction of rotation of the armature would be reversed.	The direction of rotation of the armature would be unchanged.	The field pole windings would become overheated.	
12	1395	D	A single-phase induction motor will only start if you spin the rotor rapidly with the line switch closed. After starting, its speed fluctuates between very slow and half-speed. The problem probably lies in the _____.	starting winding	centrifugal mechanism	centrifugal switch	running winding	
12	1396	C	The illustration shows a fluorescent light fixture. The ends of the lamp alternately glow and become dark, but the tube will not light. The most probable cause is that _____.	component "D" is loose and due to the ship's vibrations makes and breaks contact	the power system's voltage is fluctuating in and out of the range necessary for proper operation	component "A" is shorted and therefore unable to produce the high voltage required to start the lamp	component "B" contacts are opening and closing thus prohibiting sufficient current flow	See illustration number(s): EL-0081
12	1397	D	When testing for blown fuses in a three-phase supply circuit to a motor, you should first _____.	apply the megger across the tops of the line fuses	apply an ammeter diagonally across the top of the first line fuse and the bottom of the third line fuse	apply the voltage tester across the bottoms of the line fuses	ensure the circuit is de-energized, and then use a continuity tester	
12	1398	A	The illustrated circuits are used to measure _____.	resistance	gauss or magnetic field strength	battery discharge rate in Amp-hours	current	See illustration number(s): EL-0024
12	1399	D	When reading AC current with the multimeter shown in the illustration and you are unsure of the range, the range switch should be set to _____.	10 MA/ 10 AMP with leads in the (-10 A) and (+10 A) jacks	10 MA/ 10 AMP with leads in the (-COMMON) and (+) jacks	10 MA/ 10 AMP with leads in the (-COMMON) and (+10 A) jacks	unable to measure AC current with this multimeter	See illustration number(s): EL-0047
12	1400	A	If your multimeter gives a reading in ohms when testing each end of each conductor of a three-conductor cable, this indicates _____.	continuity of the conductor	an infinite resistance	the presence of a partial ground	that the conductor is not short circuited	
12	1401	D	What is the rotor speed of a four pole, 60 cycle, induction motor operating at full load with 3% slip?	270 RPM	540 RPM	873 RPM	1746 RPM	
12	1402	C	The armature cores of the D.C. motors are constructed with laminations to _____.	eliminate hysteresis	minimize brush sparking	reduce eddy current losses	compensate for armature reaction	
12	1403	B	Equalization of the power factors of two alternators operating in parallel is accomplished _____.	manually, by adjusting the governor controls	automatically, by automatic voltage regulators	manually, adjusting the output of current transformers	automatically, by the designed action of the governors	
12	1404	C	A short circuit in the armature of a DC motor will cause the motor to _____.	run fast	hum when energized	spark at the brushes	fail to start	

12	1405	A	A disadvantage of using the configuration in the illustrated circuit is _____.	no current gain	high input resistance	high voltage gain	becomes unstable with an increase of ambient temperature	See illustration number(s): EL-0045
12	1406	A	In the illustration, when the energy saver switch is in the "lo" position, the _____.	mullion and frz flange heaters will not energize	mullion heater and refrig light will not energize	mullion, frz flange, defrost heaters will not energize	range of the freezer temperature control is increased causing the cut-in temp to become warmer	See illustration number(s): EL-0043
12	1407	A	In a three-phase electrical system, three ground detecting lamps are provided. One lamp goes dark and the others increase in brightness. When the test button is pushed, all lamps have equal illumination. You should conclude that _____.	there is a ground on the line with the dark lamp	the dark lamp must be replaced	there are grounds on the lines with the bright lamps	this is a normal condition	
12	1408	D	When replacing component "B" of the circuit shown in the illustration, it is important to know that _____.	it is polarity sensitive and must be inserted as indicated on its base	there is a danger of phosphor poisoning should "B"'s bulb break	component "D" must be closed during the replacement to provide the capacitor's initial charge	it must match the circuit voltage and component "C" wattage	See illustration number(s): EL-0081
12	1409	C	After turning on the fluorescent lamp shown in the illustration, you note that the ends of the tube alternately glow and becomce dark without illuminating the center. The most obable cause for this is that _____.	component "D" is loose and due to the ship's vibrations makes and breaks contact	the power system's voltage is fluctuating in and out of the range necessary for proper operation	component "A" is shorted and therefore unable to produce the high voltage required to start the lamp	component "B" contacts are opening and closing thus prohibiting sufficient current flow	See illustration number(s): EL-0081
12	1410	C	A load is connected to the secondary of the transformer illustrated and the current through the load is 10 amps. If the step-up ratio is 10 to 1 and the input voltage is 110 VAC, what will be the current flow through the primary?	1 amp	10 amps	100 amps	1000 amps	See illustration number(s): EL-0055
12	1412	A	The turns ratio of transformer "A" shown in the illustration is four to one and all taps are evenly spaced. If 120 volts were applied to terminals "H1" and "H3", what would appear at "X1" and "X2"?	15 volts	30 volts	480 volts	960 volts	See illustration number(s): EL-0082
12	1413	D	Which of the methods listed is used to start a AC generator turning?	Residual magnetism remaining in the field poles.	Residual magnetism remaining in the field coils.	Residual magnetism remaining in the armature.	Rotation by a mechanical prime mover.	
12	1414	C	The turns ratio of transforme "A" shown in the illustration is four to one and all taps are evenly spaced. If 110 volts were applied to terminals "X1" and "X3", what would be indicated across "H1" and "H2"?	37.5 volts	55 volts	220 volts	440 volts	See illustration number(s): EL-0082
12	1415	B	A load with an impedance of 440 ohms is connected across the secondary of the transformer illustrated. If the input voltage is 110 VAC and the step-up ratio is 10 to 1, what will be the primary current?	2.5 amps	25 amps	250 amps	current cannot be determined with information given	See illustration number(s): EL-0055
12	1416	B	When a megohmmeter is being used on a alternating current machine, the meter pointer will dip toward "zero" and then gradually rise to the true resistance value if the motor insulation is _____.	grounded	good	shorted	dirty	
12	1418	D	Sound powered telephone units "I", "II", and "III" of the circuit shown in the illustration are for 'station numbers' _____.	2, 4 and 6	1, 2 and 3	3, 5 and 8	1, 2 and 6	See illustration number(s): EL-0093
12	1421	C	What current is required to light two 75 watt lamps and one 40 watt lamp when connected in series to a 120 volt power source?	0.161 amperes	0.631 amperes	1.583 amperes	6.199 amperes	

12	1422	A	If a single-phase induction motor fails to start, the problem may be _____.	an open in the run winding	a shorted shunt field	a closed centrifugal switch	low circuit frequency	
12	1423	A	DC generator voltage is decreased by cutting _____.	in field resistance	out field resistance	in armature resistance	out armature resistance	
12	1425	D	The diagram shown in the illustartion represents a/an _____.	magnectic amplifier	common base amplifier	common collector amplifier	common emitter amplifier	See illustration number(s): EL-0022
12	1426	A	The reading at "M" on the megger scale illustrated, is ____.	7.1 meg ohms	71 meg ohms	.71 meg ohms	200,000,000 ohms	See illustration number(s): EL-0044
12	1427	C	In a three-phase electrical system, three ground detecting lamps are provided. If all three lamps REMAIN at half-brilliance when the ground detecting test switch is operated, _____.	there is a slight ground on all three phases	the switch must be replaced	there are no grounds present	the light bulbs are of improper voltage	
12	1428	A	In the illustration, the signal from the device connected to terminals 18 and 19 is _____.	prime mover speed feedback	loss of control alarm when comparing with the input signal from the resistor at the top of the speed sensing circuit card	hall effect current to detect slip between the prime mover and the alternator	to shut down the prime mover if overspeeding	See illustration number(s): EL-0046
12	1429	D	TEst	1	2	3	5	See illustration number(s): EL-0001
12	1430	A	TEST	A	B	C	D	
12	1431	C	A three-phase alternator is developing 300 amps, with a 0.8 power factor, at 450 volts. The true indicated power on the kilowatt meter, located on the main switchboard, will be _____.	133 kw	155 kw	187 kw	212 kw	
12	1434	A	Which of the listed conditions will occur if dirt and grease are allowed to accumulate between the commutator segments of a motor?	A partial short circuit.	A dead short circuit.	Misalignment of the motor shaft.	Overspeeding of the motor.	
12	1435	D	"Corrosion-resistant material" and "noncorrodible material" will include which of the following _____.	plastics	silver	copper-nickel	all of the above	
12	1437	A	A three-phase electrical system is equipped with ground detecting lamps. If one of the lamp goes dark and the other two burn normally before and after the test switch is operated, this indicates _____.	the dark lamp must be replaced	there is a ground in the line with the dark lamp	there are grounds in two of the three phases	the voltage to the dark lamp is less than that of the system	
12	1441	C	The power supplied to a motor is six kilowatts at 120 volts. What is the impedance of the motor?	0.05 Ohms	0.50 Ohms	2.40 Ohms	24.00 Ohms	
12	1444	C	The most effective method of locating a loose commutator bar in a D.C. motor is by _____.	visual inspection	jiggling each by hand	sounding each bar with a light weight hammer	checking with a calibrated torque wrench	
12	1451	D	The distance between a generator and its load is 100 feet. What would be the approximate total voltage drop across a two wire supply cable if the current were 5.5 amperes and the resistance of the wire were 2.525 ohms per 1,000 feet?	0.5 volts	1.38 volts	1.90 volts	2.77 volts	
12	1454	B	An open armature connection in a DC propulsion motor could be caused by _____.	low-load operation	clogged ventilation ducts	sparking at the brushes	a grounded shunt field coil	
12	1457	C	An open coil in a transformer will be indicated by which of the listed conditions?	"zero" resistance accompanied by high inductance	no resistance accompanied by stray inductance	infinite resistance in addition to no inductance	infinite resistance in addition to normal inductance	
12	1461	C	A four-pole induction motor, operating on three-phase 60 cycle current will operate at approximately _____.	850 RPM	1,150 RPM	1,750 RPM	3,550 RPM	
12	1464	A	Which of the listed conditions could cause a DC motor to have excessively hot windings and sparking at the brushes?	Reversed interpole polarity	High bar-to-bar voltage	Loose brushes	Excessive humidity	

12	1467	D	Which of the following statements identifies the difference between the primary windings and the secondary windings of a 2:1 stepdown transformer?	The secondary windings have twice as much resistance as the primary windings.	The secondary windings give off twice as much heat as the primary windings.	The secondary windings require half as much current as the primary windings.	The secondary windings have half as many turns as the primary windings.	
12	1471	C	A conductor with a cross-sectional area of one circular mil would have a diameter of _____.	0.1 inches	0.01 inches	0.001 inches	0.0001 inches	
12	1473	D	An equalizing connection between two compound-wound DC generators when paralleled, serves to _____.	reverse the polarity of the incoming generator as the series field weakens	automatically equalize the power factors	reverse the direction of current in the series field of the incoming generator	parallel the series fields of the generators	
12	1474	D	If a D.C. motor hums, but does not run when energized, which of the listed conditions could exist?	Incorrect lead connections	Incorrect brush setting	A dirty commutator	All of the above are correct.	
12	1484	A	An open in the armature of a DC motor is suspected, but is not found by visual inspection of the commutator. The next step in troubleshooting this problem is to _____.	conduct a bar to bar test of the armature	visually inspect the armature windings	conduct an insulation resistance test of the armature	test the commutator for a ground	
12	1487	B	An autotransformer is equipped with a 50% tap, a 65% tap, and an 80% tap. Which of the following statements is true concerning a load connected to the 50% tap?	The load is receiving minimum voltage and minimum current.	The load is receiving minimum voltage and maximum current.	The load is receiving maximum voltage and minimum current.	The load is receiving maximum voltage and maximum current.	
12	1491	D	When troubleshooting an amplifier, you measure an output of 30 volts. If the gain of the amplifier is 2, what must the input voltage be for the amplifier to work properly?	32 volts	30 volts	28 volts	15 volts	
12	1494	C	If an electric motor fails to start, you should FIRST check the _____.	phase sequence	ampere load	fuse or circuit breaker	line frequency	
12	1497	A	In electric circuit schematics, a transformer is represented by which of the symbols shown in the illustration?	A	B	C	D	See illustration number(s): EL-0059
12	1501	D	Which of the following represents the corrected specific gravity of a lead acid battery, with a temperature of 90,F, and a hydrometer reading of 1160?	1150	1156	1160	1164	
12	1504	A	A shorted armature coil in a DC motor can be detected by _____.	sparking at the brushes	shiny armature coil	worn grooves in the armature	undercut mica	
12	1511	C	A battery is connected to a circuit containing three resistors in parallel. The values of the three resistors are 2 ohms, 3 ohms, and 6 ohms. What is the voltage of the battery if the total circuit current is 12 amps?	2 volts	6 volts	12 volts	24 volt	
12	1513	C	When two generators are on the line and are sharing the load equally, they are said to be operating in _____.	frequency	series	parallel	resonance	
12	1514	A	If a DC motor runs faster than designed, with all other conditions being normal, the possible cause could be a/an _____.	shorted shunt field coil	open armature coil	reversed commutating pole	overload	
12	1517	A	The diagram shown in the illustration represents a/an _____.	stepup transformer	magnetic amplifier	autotransformer	Scott-connected transformer	See illustration number(s): EL-0082
12	1521	C	The formula for computing impedance in a series circuit containing resistance, capacitance, and inductance is _____. [NOTE: the symbol * stands for 'multiplied by']	Z = RT + XL + XC	Z = R + XL - XC	Z * Z = R * R + (XL - XC) * (XL - XC)	Z = R * R + (XL * XC) - (XL * XC)	
12	1524	B	A short in the shunt field of a DC motor is best located by _____.	visual inspection of the commutator	applying AC voltage to each field coil and measuring the voltage drop across each field coil	using a growler and hacksaw blade	isolating each coil from the others and using a megohmmeter	

12	1527	A	The symbol shown as figure "A" represents a/an _____.	transformer	coil	shunt field	inductor	See illustration number(s): EL-0059
12	1531	B	In a three-wire, 230/115 volt DC system, the potential between neutral and negative is _____.	0 volts	115 volts	230 volts	460 volts	
12	1534	C	If a DC motor runs hot, the cause may be _____.	high mica condition	low ambient temperature	clogged ventilation ducts	an open in the shunt field	
12	1537	A	What is represented by the electric symbol figure "D" in the illustration?	Fuse	Plug-in contact resistor	Variable capacitor	Electrolytic capacitor	See illustration number(s): EL-0005
12	1541	B	An electrical component is connected across a 120 volt 60 hertz AC supply. What is the current drawn by the component if the impedance is 200 ohms?	0.01 amperes	0.60 amperes	1.67 amperes	100 amperes	
12	1543	D	Which of the methods listed is used to maintain the division of load between two compound-wound, DC generators operating in parallel?	The shunt fields are interconnected.	The shunt field rheostats are interconnected.	The series fields of both generators are connected in series.	The equalizer connection parallels the series fields of all machines.	
12	1547	C	As shown in the illustration, "B" is a _____.	single-pole, double-throw switch	double-pole, single-throw switch	double-pole, double-throw switch	circuit breaker	See illustration number(s): EL-0058
12	1557	C	In order to determine whether or not "Fuse 1", shown in the illustration is defective, you should connect the voltage tester leads across points _____.	AC	AD	BC	BD	See illustration number(s): EL-0062
12	1561	D	A lamp has a source voltage of 110 volts and a current of 0.9 amps. What is the resistance of the lamp?	0.008 ohms	0.08 ohms	12.22 ohms	122.22 ohms	
12	1564	B	Which of the listed conditions might contribute to very rapid wearing of a DC machine's commutator bars?	A grounded commutator bar	Using improper carbon brushes	Aligning the front and rear mica V-rings improperly	An open circuit in the armature	
12	1567	B	In order to determine whether or not "fuse 2" shown in the illustration is defective, you should connect the voltage tester leads across points _____.	AC	AD	BC	BD	See illustration number(s): EL-0062
12	1571	D	A coil is wound with 200 feet of No. 16 tinned copper wire and connected to a 12 volt battery. What is the current if the resistance per 1000 feet of No. 16 tinned copper wire is 4.26 ohms?	1.14 amps	7.04 amps	10.22 amps	14.08 amps	
12	1577	D	If fuse #1 shown in the illustration is defective, a voltage tester connected across points "C" and "B" will _____.	show a reading of 55 volts	show full line voltage across the fuse	give positive indication that fuse #2 is good	give positive indication that fuse #1 is defective	See illustration number(s): EL-0062
12	1581	C	The prime mover of an AC two pole main propulsion generator drives the generator at 3600 RPM. If the main propulsion motor has 80 poles, what will be the propeller speed?	45 RPM	80 RPM	90 RPM	180 RPM	
12	1587	D	When three-phase AC power is supplied to the device shown in the illustration, the output will be _____.	single-phase AC	split-phase AC	three-phase DC	unidirectional DC	See illustration number(s): EL-0063
12	1591	B	A coil is wound with 400 feet of No. 16 tinned copper wire and connected to a 12 volt battery. What is the current if the resistance per 1000 feet of No. 16 tinned copper wire is 4.26 ohms?	4.8 amps	7.06 amps	10.65 amps	11.27 amps	
12	1594	B	Sparking at the brushes of a running motor could be an indication of _____.	normal operation	a dirty commutator	increased brush capacity	water vapor absorption	
12	1601	C	A three-phase alternator operates at 450 volts with a power factor of 0.8. If the ammeter indicates 250 amperes, what should be the KW meter reading?	90.00 KW	127.27 KW	155.70 KW	194.85 KW	
12	1604	D	Electrical failures in motors are caused by the breakdown of insulation, which may be caused by _____.	penetration of moisture	accumulation of dirt	overheating	all of the above	

12	1611	C	An operational amplifier, as used in today's consoles, has a calculated gain of 5. This means that when the input changes _____.	5 volts, the output changes 10 volts	10 volts, the output changes 5 volts	2 volts, the output changes 10 volts	10 volts, the output changes 2 volts	
12	1614	D	Damp armature windings in a D.C. motor may lead to _____.	reduced voltage	reduced current	increased resistance	overheating	
12	1621	C	If the synchronous speed of a 12 pole, polyphase, induction motor operating at 60 Hz were 600 RPM, how many poles will be required in a similar motor operating at the same frequency but having a synchronous speed of 900 RPM?	4	6	8	18	
12	1624	A	If a single-phase induction motor fails to start, the problem may be _____.	an open in the main winding	a shorted shunt field	a closed centrifugal switch	low circuit frequency	
12	1631	A	A four-pole, 60 cycle, squirrel-cage motor has a full load speed of 1725 RPM. What will be the percent of slip at full load?	4.16	4.34	95.66	95.84	
12	1634	B	A single-phase induction motor starts, comes up to about 75% rated speed, slows down to a lower speed, and accelerates again. The problem is most likely in the _____.	starting winding	running winding	starting capacitor	running centrifugal switch	
12	1641	C	Electric motors intended for use outside the engine room and boiler room are frequently rated to run at a designed ambient temperature of 40°C. What is the equivalent temperature in degrees Fahrenheit?	54.2°F	72.0°F	104.0°F	129.6°F	
12	1651	A	A four-pole 60-hertz induction motor has a synchronous speed of 1800 RPM and a slip of 4 percent at full load. What will be its full load speed?	1728.0 RPM	1730.7 RPM	1800.0 RPM	1872.0 RPM	
12	1654	A	The speed of a squirrel-cage, multi-speed, induction motor, as used aboard ship, is varied by changing the _____.	number of connected poles in the stator	frequency to the motor	excitation voltage	resistance of the rotor circuit	
12	1661	C	When the length and cross sectional area of a wire are both tripled, the resistance _____.	increases nine fold	increases three fold	remains the same	decreases six fold	
12	1664	A	Universal motors will operate on AC or DC current, and are generally found in _____.	portable tools	large pump motors	turbo electric main motors	forced draft fans	
12	1671	D	If the total source voltage of the three-wire distribution system shown in the illustration is 240 volts, what is the voltage across load L5? [NOTE: Kirchhoff's voltage and current laws apply]	110.4 volts	112.2 volts	113.0 volts	114.8 volts	See illustration number(s): EL-0075
12	1674	B	A motor enclosure which protects against falling liquids is classified as _____.	waterproof	drip proof	spray tight	spray proof	
12	1681	C	A bus bar is 3 inches wide and 0.375 inches thick. What size of round conductor (in circular mils) is necessary to carry the same current as the bus bar?	1,125,000 circular mils	1,250,000 circular mils	1,432,000 circular mils	1,547,000 circular mils	
12	1683	B	As a result of a mechanical malfunction in one of the ship's service generators operating in parallel, you must secure that generator. In order to prevent a possible overload to the remaining generator, which of the following sequential courses of action should be taken?	Trip the malfunctioning generator's circuit breaker and prime mover throttle trip.	Trip all nonvital distribution feeder circuit breakers, the malfunctioning generator's circuit breaker, and the prime mover throttle trip.	Trip the malfunctioning generator's circuit breaker and distribution feeder circuit breakers.	Trip all nonvital distribution feeder circuit breakers, the malfunctioning prime mover turbine throttle trip, and the generator circuit breaker.	
12	1684	B	What is the main function in the use of a capacitor for starting a single phase motor?	Reduce radio interference	Split the phase to establish a rotating magnetic field	Reduce the phase angle	Prolong the life of the starting contacts	

12	1691	D	A circuit breaker for a 300 KW alternator is rated at 470 amperes of full continuous load. The amount of overcurrent allowed is 125%. Which of the following conditions will trip the breaker?	Sustained current flow of 470 amperes.	Sustained current flow of 500 amperes for 10 minutes.	Momentary starting load of 550 amperes.	Sustained current flow of 590 amperes.	
12	1694	B	The most practical method of controlling the RPM of a step-speed AC motor is to _____.	change input voltage	vary the number of poles	vary power factor	change the number of brushes	
12	1703	A	A diesel driven emergency generator is prevented from being paralleled with the ship's service generators by _____.	an electrical interlock system	an automatic paralleling trip switch	the synchronizing oscilloscope	the reverse current relay	
12	1704	B	The energy consumed by an AC motor, as strictly reactive power, is _____.	used to do mechanical work	used to establish the magnetic field of the motor	lost as heat generated by the windings	lost in doing work to turn the motor itself	
12	1711	D	A turbogenerator has a rated output of 1200 KW at 60 Hertz, with a no load frequency of 61.5 Hertz. What is its speed droop?	1.03%	1.50%	2.44%	2.50%	
12	1713	C	If an alternator is to be inactive for a considerable period of time, which of the following actions should be taken?	It should be disconnected from the prime mover and raised off its bearing supports.	Insulation resistance readings should be taken weekly to ensure resistance is not deteriorating.	The brushes should be lifted off the slip rings to prevent pitting of the metal by electrolytic action.	The windings and collector rings should be protected with a thin coat of grease or oil.	
12	1714	B	Which of the following is a characteristic of fractional horsepower repulsion start motors?	They start with a rotating stator field.	The short circuiting ring is removed from the commutator while starting.	The brushes are removed from the commutator while starting.	They have a low starting torque.	
12	1721	B	A vessel is equipped with two ship's service generators. Generator #1 is rated at 900 kw and generator #2 is rated at 600 kw. During parallel operation, with a hotel load of 1,000 kw, what should be the kw load on generator #2?	100 kw	400 kw	500 kw	600 kw	
12	1722	B	Which of the devices listed is indicated by the electronic symbol lettered as "A", shown in the illustration?	Thyristor	Diode	Capacitor	Transistor	See illustration number(s): EL-0016
12	1724	A	Which of the listed motors will operate at the highest RPM, assuming that each operates at the same frequency?	A four-pole synchronous motor under normal load.	A four-pole induction motor under no load.	A six-pole synchronous motor under normal load.	A six-pole induction motor under full load.	
12	1731	A	A three-phase alternator is operating at 450 volts, 250 amps at 0.6 power factor. If the power factor increases to 0.8, the kw load potential will increase by _____.	38.525 kw	116.91 kw	155.88 kw	194.85 kw	
12	1733	B	On large generators, space heaters are used to _____.	keep the machine at ambient tmperature of the machinery space	maintain rotor and stator winding temperatures above the dew point to prevent the formation of condensation	prevent condensation in the lube oil	prevent electrolysis due to condensation in the bearings	
12	1743	C	Which of the following materials is recommended for finishing the slip rings after grinding or turning?	grade 00 sandpaper	canvas wiper	crocus cloth	smooth file	
12	1753	A	A megger is being used to test the insulation of an AC generator. The resistance value of a dry, clean winding will _____.	continue to rise as test potential is maintained, becoming fairly steady as the dielectric-absorption effect of insulation stabilizes	remain constant as the temperature of the windings increases	continue to drop as test potential is maintained, becoming fairly steady after 5-7 minutes	stabilize after approximately 2-4 minutes of fluctuation	

12	1754	D	Which statement is true concerning a split-phase induction motor?	Motor rotation can be reversed without changing the windings or leads.	Motor speed can be readily adjusted from zero to full speed.	The motor will run as a generator with the proper wiring.	Motor rotation can be reversed by reversing the leads on the starting winding.	
12	1763	D	Which of the following statements, concerning the general maintenance of a brushless generator, is correct?	Paint should be applied to insulating surfaces on an annual basis.	Alcohol should be used to remove dust and grime from windings.	High pressure air should be used to blow out carbon dust.	Accessible generator parts should be wiped with a clean dry rag on a periodic basis.	
12	1764	D	Which of the listed colors properly describes a DC motor commutator when correct commutation is taking place?	Shiny blue	Burnished green	Brick red	Chocolate brown	
12	1771	B	An AC generator produces 60 Hz at 1800 RPM. If the generator speed is increased to 1830 RPM, the cycles will _____.	remain at 60 Hz	increase to 61 Hz	decrease to 59 Hz	increase to 63 Hz	
12	1773	D	Brushes in a generator must be positioned in the neutral plane to avoid sparking between the brushes and the _____.	yoke	armature windings	field pole windings	commutator	
12	1774	C	If the connections for the field and the armature on a DC motor are reversed, _____.	the motor will run as a generator	the motor will not run	the direction of rotation will be the same	the direction of rotation will be reversed	
12	1781	C	A lead-acid battery can deliver 20 amperes continuously for 10 hours with an ampere-hour rating of _____.	20	40	200	400	
12	1784	C	An advantage of DC motors over AC motors is that they _____.	are less expensive	require less maintenance	offer infinite speed variation	all of the above	
12	1791	C	A twelve volt lead-acid battery is constructed of _____.	one cell	three cells	six cells	twelve cells	
12	1793	A	Moisture accumulating in electric motors and generator windings having a cold insulation resistance greater than 50,000 ohms may be baked out with internal heat. This heat can be developed by _____.	feeding current into the windings at low voltage	short circuiting the armature and field windings	short circuiting the field windings and passing current through the armature	obtaining current from a DC source such as an electric welder and feeding it into the armature while running the motor at full speed	
12	1794	D	A series wound DC motor has its armature and field connected in series with a resistor. When the motor is disconnected from its power supply, this motor will exemplify _____.	the proper connections for across the line starting	the proper connections for an automatic strip heater	a reversing controller circuit	dynamic braking	
12	1801	D	An electric heating element supplied with 120 volts draws 15 amps. How much power will be consumed?	15 watts	45.57 watts	180 watts	1800 watts	
12	1803	C	Uneven wear of the commutator surface on a direct current propulsion motor can be caused by _____.	rapid change in load	excessive operation at light load	incorrect brush staggering	unequal pole spacing	
12	1804	A	An increase in the amount of current flow through the armature of a shunt motor is the final result of a/an _____.	increase in the load on the motor	decrease in the load on the motor	increase in counter EMF	decrease in armature torque	
12	1814	D	The torque produced by a DC motor armature is the product of the force acting at the armature surface multiplied by _____.	work done by the armature in one revolution	effective armature diameter at which the force acts	maximum moment arm at the center of rotation of the armature	perpendicular distance to its center of rotation	
12	1821	D	Which of the following statements is true if a 100 watt lamp and a 75 watt lamp are connected in parallel across a 100 volt power supply?	The 75 watt lamp will draw as much current as the 100 watt lamp.	The 100 watt lamp will have a greater resistance.	Current flow will be the same across each lamp.	The 75 watt lamp will have a higher resistance.	
12	1824	C	As shown in the illustration, the electrical symbol is used to indicate which of the listed types of motors?	Shunt motor.	Series motor.	Compound motor.	Tri-field motor.	See illustration number(s): EL-0054

12	1831	A	Two 100 watt light bulbs are connected in parallel across a 100 volt power supply. The total power developed in the circuit is _____.	200 watts	100 watts	50 watts	equal to the product of the amperes times the voltage in each branch	
12	1833	B	In order to safely carry out repairs to a generator circuit breaker, it must be isolated from the bus. This is accomplished by opening the _____.	reverse power relay	bus disconnect link	generator bus fuse connections	power directional relay	
12	1834	D	Which of the listed electrical devices is represented by the symbol shown in the illustration?	Fixed resistance resistor	Coil with magnetic core	DC motor or generator shunt field	Transformer	See illustration number(s): EL-0055
12	1841	B	If the voltage supplied to the lighting circuit is 110 volts, how much current is used by a 100 watt light bulb?	0.08 amps	0.91 amps	1.10 amps	90.9 amps	
12	1844	D	The torque and current curves for a three-phase induction motor with a cage rotor, are shown in the illustration. Which of the following statements is true concerning the depicted curves?	As slip increases, rotor reactance decreases.	The pullout point on the torque curve is about seven times the normal full load torque value.	At stand still, stator current is 150% of normal.	If the motor is loaded to the point where 40% slip has resulted, it will stall.	See illustration number(s): EL-0056
12	1851	C	Three 12 volt, lead-acid, batteries connected in series will develop _____.	12 volts	24 volts	36 volts	48 volts	
12	1853	A	Unnecessary and frequent applications of varnish to the generator windings to repair defective insulation will result in _____.	heavy coatings of varnish interfering with heat dissipation	deficient air gap clearance and eventual damage to the casing	failure of the rectifier assembly	a built-up of varnish without changing generator operation	
12	1854	B	Which of the following statements describes what will occur if the motor shown in the illustration is required to carry 150% of full load?	The primary counter emf will be increased.	The stator current will increase.	The slip will decrease.	The slip value, stator current curve, and torque curve will all coincide.	See illustration number(s): EL-0056
12	1861	D	What is the wattage of a heating element drawing a current of 30 amperes, at 120 volts?	30 watts	99.97 watts	360 watts	3600 watts	
12	1863	C	The insulation of electric generators during short idle periods should be _____.	allowed to cool slowly to ambient temperatures	flashed with direct current to remove any residual magnetism	kept warm by using strip or space heaters	relieved of all capacitive charge by grounding the conductors	
12	1864	B	Which of the diagrams shown in the illustration depicts the proper method of aligning brushes on a commutator?	A	B	C	D	See illustration number(s): EL-0057
12	1871	A	A four pole, 60 Hz, three-phase synchronous motor comes up to 1760 RPM when started as an induction motor. What is the percent slip after the rotor field is energized?	0	1.1	2.2	3.3	
12	1873	C	In preparing to take insulation resistance readings on a main generator, the windings should be grounded for about 15 minutes prior to the test to _____.	allow accurate zeroing of the meter	help the windings to cool to ambient temperature	release any residual capacitive charge from the windings	help the windings to cool to the same temperature as the ground test connection	
12	1883	B	The removal of paint from electrical equipment, such as generators, should be cautiously undertaken because _____.	the mechanical shock of paint removal lessens the dielectric strength of the insulation	the paint dust is composed of abrasive and semi-conducting materials which impair insulation	paint dust buildup has a tendency to cause corrosion	phase windings frequently become isolated from each other due to dust interference at the terminals	
12	1891	B	What will be the frequency of a three-phase, six pole, AC generator operating at 1800 revolutions per minute?	60 hertz	90 hertz	120 hertz	180 hertz	
12	1893	D	An alternator will fail to produce line voltage as a result of _____.	a closed circuit breaker	oxidized slip rings	improperly staggered brushes	exciter generator failure	

12	1901	D	A lamp is provided with 110 volts and draws a current of 0.8 amps. What is the resistance of the lamp?	12.2 ohms	88.0 ohms	122.2 ohms	137.5 ohms	
12	1911	B	If a circuit has resistances of 5, 10, and 20 ohms connected in parallel, what is the combined resistance of the circuit?	1.5 ohms	2.9 ohms	17.5 ohms	35.0 ohms	
12	1921	D	What power is consumed by a heating element using a current of 20 amperes at 120 volts?	20 watts	66.67 watts	720 watts	2400 watts	
12	1923	A	If an AC generator experiences voltage failure, the cause may be _____.	an open in the field circuit	the brushes shifting out of the neutral plane	excessive locked-rotor current	a rotating slip ring	
12	1931	B	How many volts are necessary to provide a current of 10 amperes to a motor with an in-line resistance of 11 ohms?	21 volts	110 volts	220 volts	240 volts	
12	1951	A	A wire is being used as a replacement having twice the length and one-half the cross-sectional area of the original wire. The resistance of this new wire, when compared to that of the original wire, is _____.	four times as great	twice as much	the same as the original resistance	one-half of the original resistance	
12	1953	C	Chattering of the collector ring brushes on a generator may be remedied by _____.	lubricating brush holders	reinsulating the brushes	cleaning the collector rings	increasing length of pigtail	
12	1961	C	When the current flow in a power transmission line is halved, the power loss _____.	is halved	is doubled	is divided by four	remains the same	
12	1963	C	An alternator operating in parallel begins to vibrate severely and eventually trips out on the reverse power relay. The cause of the vibration was a result of _____.	the dropping of load by that alternator	overspeeding of the vibrating alternator	the alternator was operating out of synchronism	flashover at the alternator collector rings	
12	1971	B	An AC circuit has a capacitive reactance of 30 ohms in addition to an inductive reactance of 40 ohms connected in series. What is the reactance of the circuit?	8.37 ohms	10.00 ohms	50.00 ohms	70.00 ohms	
12	1973	B	Severe vibration, accompanied by flashover at the collector rings of an alternator operating in parallel, is a symptom of _____.	reverse current motorization	loss of synchronism	destructive overspeeding	reversed polarity	
12	1981	C	A common-emitter circuit has an input voltage of 0.1 volt, an output voltage of 2.0 volts, an input current of 0.5 milliamps, and an output current of 10 milliamps. What is the power gain?	20	40	400	4000	
12	1983	C	An open occurring within the field rheostat of an AC generator can be detected by short circuiting its terminals and observing a _____.	negative deflection of the wattmeter pointer	positive deflection of the wattmeter pointer	buildup of alternator voltage	low, but constant alternator voltage	
12	1991	C	A four pole turbogenerator is used in conjunction with a 160 pole propulsion motor. If the generator is turning at 3,200 RPM, what is the current speed of the propeller?	40 RPM	60 RPM	80 RPM	100 RPM	
12	1993	B	If three AC generators are operating in parallel, and one of them were to "pull out" of synchronism with the other two generators, the _____.	normally operating AC generators will vibrate severely	AC generator pulling out of synchronism will vibrate severely	normally operating AC generators will overspeed and unload	AC generator pulling out of synchronism will become motorized	
12	2001	D	As shown in the illustration, the purpose of the item labeled "Z", in assembly No. 2, is to _____.	keep the rotor in balance	align the rotor to the stator	dynamically balance the rotor	cool the motor	See illustration number(s): EL-0001
12	2003	B	If the excitation of an alternator operating in parallel is decreased below normal, its _____.	power factor will change in the lagging direction	power factor will change in the leading direction	ampere load will be greatly increased	kilowatt load will be greatly decreased	
12	2011	A	Which of the following actions must be carried out prior to closing the alternator circuit breaker according to the graph shown in the illustration?	Increase the alternator voltage.	Decrease the line voltage.	Increase the line voltage.	Decrease the line frequency.	See illustration number(s): EL-0002
12	2013	B	Motorization of an alternator is undesirable because _____.	the alternator will be damaged	it puts an additional load on the bus	high voltage pulses are induced in the bus	all of the above	

12	2021	D	As shown in the illustration, the function of the switch labeled "PFSW" is to determine the _____.	bus frequency	reactive volt amperes of the bus	frequency of either generator	power factor of either generator	See illustration number(s): EL-0003
12	2023	B	Which of the following problems will occur if the circuit breaker of the incoming alternator is closed and it is 180° out of phase with the loaded alternator when paralleling?	The rotor of the loaded alternator will hunt.	Severe cross currents will occur which could cause damage.	The rotor of the incoming alternator will stop.	Both alternators will parallel 180° out of phase.	
12	2033	A	Voltage failure of an AC generator may be caused by _____.	failure of the exciter generator	a tripped bus circuit breaker	high mica segments on the stator bus bar	excessive prime mover speed	
12	2041	A	As shown in the illustration, which of the symbols represents a normally closed electrical contact?	A	B	C	D	See illustration number(s): EL-0005
12	2043	D	A loss of field excitation to an AC generator while operating in parallel will cause it to _____.	absorb more and more load due to decreased armature reaction	lose its load due to the inherent speed droop built into the governor	smoke and overload due to field flashover as residual field flux changes polarity	lose its load, begin to motorize, trip out on reverse power relay, and possibly overspeed	
12	2051	D	Which of the following statements is correct concerning the motor performance curves and data table shown in the illustration?	The motor RPM at full load is 1737 RPM.	The motor draws 12.62 kw from the switchboard when operating at full load.	If the motor was developing 10 HP its power factor would be 0.92.	All of the above.	See illustration number(s): EL-0006
12	2053	D	An AC generator operating in parallel loses its excitation without tripping the circuit breaker. This will _____.	not affect the faulty generator due to the compensation of the other generators	cause the slip rings to melt	cause a low voltage differential to develop between the armature and the bus	cause high currents to be induced in the field windings	
12	2073	A	Which of the following statements is true concerning the operation of two alternators in parallel?	The cycles per second of each alternator are the same.	Both alternator governors must be set with the same amount of speed droop.	The number of field poles must be the same on each alternator.	The load must always be divided equally between alternators.	
12	2083	C	An alternator switchboard has a synchroscope and synchronizing lamps. If the synchroscope is broken, which of the steps listed is the most essential before an alternator can be paralleled with the bus?	The breaker should be closed when one synchronizing lamp is dark and the other is bright.	The breaker should be closed when both synchronizing lamps are bright.	The frequency meter should be used to determine that the incoming alternator frequency is slightly higher than the bus.	A portable phase sequence indicator must be used to verify the information from the lamps.	
12	2087	D	According to Coast Guard Regulations (46 CFR), which of the following systems must be arranged so as to be energized by the final emergency power source?	at least one light in the steering gear room	each power operated watertight door system	each charging panel for temporary emergency batteries	all of the above	
12	2091	B	If the circuit shown in the illustration were energized and operating properly, which of the devices listed would be open?	The stop push-button	The start push-button	Contact "Ma"	Contact "OL1"	See illustration number(s): EL-0007
12	2093	C	Hysteresis in a direct current generator is indicated by _____.	arcing at the brushes	pulsating terminal current	heating of the armature core	hunting and over control	
12	2113	C	Etched or burned bands on the contact faces of the brushes in a direct current generator can be caused by _____.	high mica segments	copper drag on the commutator	brushes improperly positioned	copper embedded in the brushes	
12	2131	A	The electrical schematic shown in the illustration represents a/an _____.	across-the-line starter	primary-resistor starter	autotransformer starter	part-winding starter	See illustration number(s): EL-0017
12	2133	B	If only one brush on a commutator is sparking excessively, you should look for _____.	a high commutator bar	copper imbedded in the brush	a loose commutator bar	flux in the commutating zone	
12	2141	B	As shown in the illustration, which of the following conditions will occur as a result of a momentary loss of power?	The motor will automatically restart when power is restored.	"H-4" will open, necessitating a manual restarting of the motor.	"10L" and "20L" will open, necessitating a manual restarting of the motor.	"A-1" or "A-2" will open, necessitating a manual restarting of the motor.	See illustration number(s): EL-0017
12	2143	D	Sparking at the brushes of a DC propulsion motor can be the result of _____.	improper brush pressure	improper brush seating	reversed interpole polarity	all of the above	

12	2151	A	If the motor shown in the illustration will not start when "Q" is depressed, which of the listed components should be checked FIRST?	Fuses "F-1" and "F-2".	Operating coil "C".	Contacts "H-1", "H-2", and "H-3".	Contact "H-4".	See illustration number(s): EL-0017
12	2153	B	When using a megohmmeter to determine which shunt field coil is grounded in a DC machine, you must _____.	insulate the field frame from the ship's hull	disconnect each shunt field coil before testing	use a motor driven high capacity megohmmeter	remove all main line lead connections before testing	
12	2161	C	As shown in the illustration, which listed action will occur first when push button "Q" is depressed?	Contacts "H-1", "H-2" and "H-3" close.	Contact "H-4" closes.	Operating coil "C" energizes.	Switch "R" opens.	See illustration number(s): EL-0017
12	2171	C	As shown in the illustration, which of the operations listed will happen when the "jog button" is pushed?	Coil "CR" closes the normally open "CR" contacts.	Coil "M" opens contact "M".	Coil "M" closes contact "M".	Contact "M" remains open despite the jog button being pushed.	See illustration number(s): EL-0010
12	2173	B	The most practical method used for resurfacing a ship's service motor commutator is to _____.	turn it down in the ship's lathe	use a grinding rig	use a hand stone	burnish it with commutator stones	
12	2181	D	When the motor shown in the illustration is running and the stop button is pushed, which of the following statements will hold true?	Coil "M" will now be energized.	Coil "CR" will now be energized.	Contact "M" will close as contact "CR" opens.	Contacts "M" and "CR" will open.	See illustration number(s): EL-0010
12	2183	A	An open shunt field in a direct current machine may be located by connecting the field circuit to an external power source, equal to the rated field voltage or less, and tested with a voltmeter from _____.	one line terminal to each coil lead in succession	one field coil to each adjacent field coil in turn	any suitable ground to any available line lead	any field pole to each field coil lead	
12	2189	A	Which of the following statements describes the effects of ambient temperature on local action within lead-acid storage batteries?	Increasing ambient temperature increases local action.	Increasing ambient temperature decreases local action.	Ambient temperature has no effect on local action.	At 90°F all local action virtually ceases.	
12	2191	B	When an operating motor is connected to the controller shown in the illustration the a path of current flow through the circuit is _____.	"L1", stop button, start button, coil "CR", "L2"	"L1", stop button, "CR" and "M" contacts, "M" coil, "OL contacts, the "CR" coil in parallel, "L2"	"L1", stop button, jog button, "CR" contact, "CR" relay, "L2"	"L1", stop button, start button, "CR" contact, "M" contact, "CR" coil, "L2"	See illustration number(s): EL-0010
12	2201	B	Refering to the illustrated schematic diagram, which of the following statements is true when the motor is running in the forward direction?	Normally-open contacts "4-5" are closed.	Current flows through the "Reverse" push-button switch.	Normally-closed contacts "R" are open.	The blowout coils must be closed.	See illustration number(s): EL-0011
12	2203	C	Diesel generators #1 and #2 are operating in parallel at near full load capacity. Diesel generator #1 suddenly trips out mechanically due to low lube oil pressure. The reverse power relay functions properly and trips generator #1 electrically off the board. Which of the following actions should you carry out FIRST?	Start the emergency generator.	Ascertain cause of the low lube oil pressure.	Strip the board of all nonvital circuits.	Secure alarms, reset reverse power relay, and restart #1 engine.	
12	2211	C	If the three-phase motor, shown in the illustrated schematic diagram, is running in the forward direction, which of the following actions must occur before the motor will reverse rotation?	Normally-closed contacts "4"-"5" must open.	Normally- open contacts "2"-"3" must close.	"L1" and "L3" must be interchanged via the "R" contacts.	All of the above.	See illustration number(s): EL-0011
12	2221	A	In the illustrated schematic diagram, which of the listed devices prevents the forward and reversing coils from being energized simultaneously?	An "either-or" interlock	A mechanical interlock	Blowout coils	A stop button	See illustration number(s): EL-0011
12	2231	D	The schematic diagram shown in the illustration uses symbol "A" to represent a/an _____.	non-renewable fuse link	circuit breaker coil	overload relay coil	thermal overload heater	See illustration number(s): EL-0011
12	2241	C	To stop the electric motor shown in the illustration, the stop button is depressed, causing _____.	coil "MS" to become de-energized	contacts "CR1" and "MR4" to open	contacts "MR1", "MR2", and "MR3" to open	contacts "MS1", "MS2", and "MS3" to open	See illustration number(s): EL-0012
12	2251	A	In the illustration shown, coil "MR" is a _____.	running contactor coil	rupture (blowout) coil	resistance coil	reversing coil	See illustration number(s): EL-0012

12	2253	B	The main purpose of an electric space heater installed in a large AC generator is to _____.	keep the lube oil warm for quick starting	prevent moisture from condensing in the windings when the machine is shutdown	prevent the windings from becoming brittle	prevent acidic pitting of the slip rings	
12	2271	D	Which of the devices shown in the illustration automatically prevents the simultaneous operation of the windlass from both master switches?	Selector switch	Contact "CR1a"	Contact "CR2a"	Contact "CR1D"	See illustration number(s): EL-0073
12	2281	C	As shown in the illustration, all "MS" contacts are opened and closed by means of _____.	operating coils	magnets	manual operation of the master switches	solenoid switches	See illustration number(s): EL-0073
12	2283	D	In a 60 Hz AC system, the current will pass through one complete cycle in _____.	60 seconds	6 seconds	1 second	.016 of a second	
12	2291	D	In the lighting distribution circuit shown in the illustration, if all switches are closed and fuse "F2" were to open, all lights on branches _____.	"1", "2", and "3" would go out	"1" and "3" would would burn dimly, while branch "2" would burn normally	"1", "2", and "3" would burn dimly	"1" and "3" would go out, while branch "2" would remain lit	See illustration number(s): EL-0013
12	2293	D	Three factors responsible for the change in voltage as load is applied to an AC generator are: 1) the drop in resistance in the armature circuit, 2) the change in flux, and 3) the _____.	armature winding speed	inductance load drop	coil pitch factor	armature reactance voltage drop	
12	2301	A	The electrical schematic shown in the illustration indicates the lighting feeder circuit is _____.	three phase, 450 volt, and 60 cycle	three phase, 120 volt, and 60 cycle	single phase, 120 volt, and 60 cycle	not specified	See illustration number(s): EL-0014
12	2303	B	The division of the reactive KVA load between paralleled AC generators is initiated by the _____.	prime mover governors	voltage regulators	phase balance relay	proportioner	
12	2311	B	The purpose of the automatic bus transfer shown in the illustration is to _____.	stepdown voltage to the lighting distribution panel	provide emergency power to the lighting distribution panel	energize the emergency switchboard from the main switchboard	provide overcurrent protection to the lighting distribution panel	See illustration number(s): EL-0014
12	2321	D	The electrical diagram shown in the illustration is used to depict a/an _____.	resistance circuit	inductive circuit	stepdown circuit	capacitive circuit	See illustration number(s): EL-0015
12	2323	D	Which of the following losses is/are present in every direct current generator armature?	Winding copper loss	Core eddy current loss	Magnetic hysteresis loss	All of the above.	
12	2331	C	Regarding the illustrated electrical schematic, "S1-P", "S1-Q", and "S1-R" represent _____.	capacitors	normally-closed contacts	normally-open contacts	normally-closed pushbutton switches	See illustration number(s): EL-0016
12	2341	C	If fuse "F-1" in the illustrated schematic diagram opens, _____.	the motor will run slowly	"A-1" and "A-2" will open	the motor will not start	the start button will jam in the closed position	See illustration number(s): EL-0017
12	2343	B	Upon failure of the normal power supply, the emergency generator is placed on the line by the _____.	bus tie feeder	automatic bus transfer device	line connection feeder	power failure alarm bus	
12	2351	C	The electrical diagram shown in the illustration represents a _____.	series-wound motor	shunt-wound motor	compound-wound motor	flat-compounded motor	See illustration number(s): EL-0054
12	2353	D	The most common type of AC service generator found aboard ship is the stationary _____.	electromagnetic field, revolving armature type	electromagnetic field, oscillatory armature type	armature, oscillatory electromagnet field type	armature, rotating electromagnetic field type	
12	2363	D	The load sharing characteristics of two diesel alternators operating in parallel are directly related to the setting of their governors' _____.	load limit	idle speed	speed limit	speed droop	
12	2371	D	As shown in the illustration, if "R1" and "R2" have unequal values, the _____.	voltage drop across "R1" will not be equal to the voltage drop across "R2"	current flow through "R1" will equal the current flow through "R2"	the energy dissipated in "R1" will be the same as the energy dissipated in "R2"	current flow through "R1" will differ from the current flow through "R2"	See illustration number(s): EL-0019
12	2391	A	Which of the following statements is correct for the illustrated circuit?	"R1", "R2", and "R3" are connected in series.	"R1", "R2", and "R3" are connected in parallel.	The voltages measured across "R1", "R2", and "R3" are equal.	The total resistance equals 1/R1 + 1/R2 + 1/R3.	See illustration number(s): EL-0020

12	2401	B	The electrical diagram shown in the illustration shows _____.	"R1", "R2", and "R3" are connected is series	"R1", "R2", and "R3" are connected in parallel	the voltages measured across "R1", "R2" and "R3" will be different if "R1", "R2" and "R3" have different values	the total resistance equals R1 + R2 + R3	See illustration number(s): EL-0021
12	2411	D	The electrical schematic illustrated in figure A, depicts a/an _____.	autotransformer	Delta Wye transformer	primary EMF generator	potential transformer	See illustration number(s): EL-0059
12	2413	C	Which of the following statements about a three-phase wye connection is correct?	The line current is 1.73 times the phase current.	The phase current is 1.73 times the line current.	The line voltage is 1.73 times the phase voltage.	The phase voltage is 1.73 times the line voltage.	
12	2421	D	Which of the following statements is true concerning the motor controller diagram shown in the illustration?	Terminal "T2" is hot only on high speed.	Both indicating lights will be lit on both high and low speeds as they are connected to the common lead when the motor is running.	Overload protection is provided for high speed operation only.	"L2" is always connected to "T2" whenever the motor is running.	See illustration number(s): EL-0023
12	2423	C	As shown in the illustration, the generator field is excited with DC current provided by _____.	conductors "1", "2" and "3"	inductor "L1"	rectifier "CR1"	winding "S-2"	See illustration number(s): EL-0016
12	2431	C	The wiring diagram for the motor starting circuit shown in the illustration indicates _____.	resistance starting	reduced voltage starting	low voltage protection	low voltage release	See illustration number(s): EL-0007
12	2433	B	As shown in the illustration, part "X" of the diagram is known as a/an _____.	commutator	interpole	starting pole	auxiliary pole	See illustration number(s): EL-0052
12	2441	A	The graph shown in the illustration represents the speed droop curves of two equal capacity alternators about to be paralleled. When paralleled, the greater portion of the total load above 60% for each unit will be picked up _____.	by unit "A"	by unit "B"	equally by each unit	none of the above	See illustration number(s): EL-0025
12	2443	C	As shown in the illustration, which of the listed actions of the synchroscope pointer is occurring?	Revolving slowly in the slow direction.	Revolving rapidly in the slow direction.	Revolving rapidly in the fast direction.	It would be stationary at the 12 o'clock position since the leading edges of the A phases are in phase.	See illustration number(s): EL-0002
12	2451	C	As shown in the illustration, the symbol is used in electrical drawings to designate a _____.	limit switch with one set of normally open contacts	maintaining type push button with an electrical interlock	sustaining type push button with a mechanical interlock	normally closed contact held open mechanically by an interlock	See illustration number(s): EL-0026
12	2453	D	Which of the synchroscope illustrations depicts the appropriate direction of rotation and position for closing the circuit breaker when paralleling AC generators?	A	B	C	D	See illustration number(s): EL-0053
12	2461	A	When using the test set-up shown in the illustration, the lighted lamp indicates the winding is _____.	grounded	good	open	shorted	See illustration number(s): EL-0027
12	2471	A	The ground detection system, shown in the illustration for a low-voltage, three-phase system has a ground in line "A". Therefore, lamp "A" will burn _____.	dimly or be out, and lamps "B" and "C" will burn brightly	normally, and lamps "B" and "C" will burn dimly or be out	brightly, and lamps "B" and "C" will burn dimly or be out	brightly, and lamps "B" and "C" will burn normally	See illustration number(s): EL-0009
12	2481	D	Which of the diagrams shown in the illustration, indicates the highest induced voltage?	Diagram "A" only	Diagram "B" only	Both diagrams "A" and "C"	Both diagrams "B" and "D"	See illustration number(s): EL-0028
12	2501	C	If a voltage tester is being used to check for defective fuses in the circuit, shown in the illustration, which of the readings will indicate that fuse #2 is open?	C-B full voltage	A-D full voltage	A-D no voltage	C-B no voltage	See illustration number(s): EL-0062
12	2507	C	When a voltage of 442.7 VDC is applied to the illustrated circuit with a resistance of 1.25 ohms the current will be _____.	28.25 amps	35.32 amps	354.16 amps	443.62 amps	See illustration number(s): EL-0018

12	2511	D	Moving the rheostat handle shown in the illustration, that is used to control a DC generator, towards the "raise" direction will increase the _____.	field resistance	armature resistance	armature speed	line voltage	See illustration number(s): EL-0030
12	2519	D	When a voltage of 25 VDC is applied to the illustrated circuit with a resistance of 105.3 ohms the current will be _____.	130.3 amps	4.212 amps	1.237 amps	0.237 amps	See illustration number(s): EL-0018
12	2521	D	A ground detection system is shown in the illustration for a three-phase ungrounded distribution system. Which of the following statements describes the conditions indicated if a full ground occurs in line "A"?	Lamp "A" will burn brightly and Lamps "B" and "C" will go out.	Lamp "A" will burn brightly and Lamps "B" and "C" will burn dimly but not go out.	Lamp "A" will burn brightly and Lamps "B" and "C" will burn with normal intensity.	Lamp "A" will go out and Lamps "B" and "C" will burn brightly.	See illustration number(s): EL-0009
12	2523	B	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 12 ohms the current will be _____.	127 amps	9.58 amps	104.34 amps	1.24 amps	See illustration number(s): EL-0018
12	2527	D	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 32 ohms the current will be _____.	278.26 amps	147.00 amps	8.90 amps	3.59 amps	See illustration number(s): EL-0018
12	2531	A	What type of logic circuit is indicated by the truth table shown in the illustration?	OR	AND	NOR	NAND	See illustration number(s): EL-0072
12	2541	D	If the supply voltage is 220 volts 60 Hz, what is the operating voltage of the motor controller circuitry illustrated?	110 volts DC	110 volts AC	220 volts DC	220 volts AC	See illustration number(s): EL-0011
12	2547	C	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 10,230 ohms the current will be _____	88.95 milliamps	103.45 milliamps	11.24 milliamps	0.91 amps	See illustration number(s): EL-0018
12	2551	A	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 470 ohms the current will be _____.	244 milliamps	4.07 amps	5.85 amps	19.21 amps	See illustration number(s): EL-0018
12	2559	A	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 237 ohms the current will be _____.	0.485 amps	1.485 amps	2.06 amps	0.352 amps	See illustration number(s): EL-0018
12	2561	A	In the illustrated circut, if the resistance of R1 is 10 ohms, R2 is 10 ohms, and R3 is 10 ohms. What is the total resistance?	15 ohms	20 ohms	25 ohms	30 ohms	See illustration number(s): EL-0032
12	2567	C	When a voltage of 115 VDC is applied to the illustrated circuit with a resistance of 17.8 ohms the current will be _____.	0.154 amps	2.755 amps	6.46 amps	0.1328 amps	See illustration number(s): EL-0018
12	2571	D	What is the total current of the illustrated circuit if the battery is 12 VDC and the resistance of R1 is 2 ohms, R2 is 3 ohms and R3 is 6 ohms?	2 amps	4 amps	6 amps	12 amps	See illustration number(s): EL-0021
12	2581	A	What is the calculated voltage at the positive and negative terminals of the battery shown in the illustration if each cell has a voltage of 1.5 volts?	1.5 volts	3.0 volts	6.0 volts	12.0 volts	See illustration number(s): EL-0034
12	2591	D	As shown in the illustration, which set of truth table input signals will result in an output signal at point "Y"?	0-0	0-1	Jan-00	01-Jan	See illustration number(s): EL-0035
12	2599	C	When a voltage of 95 VDC is applied to the illustrated circuit with a resistance of 12 ohms the current will be _____.	6.126 amps	1.515 amps	7.916 amps	107 amps	See illustration number(s): EL-0018
12	2601	A	Which set of truth table input signals will result in an output signal value of 1 from the "AND" gate as shown in the illustration?	01-Jan	Jan-00	0-1	0-0	See illustration number(s): EL-0035
12	2611	B	When a voltage of 95 VDC is applied to the illustrated circuit with a resistance of 32 ohms the current will be _____.	0.336 amps	2.968 amps	103.78 milliamps	127 milliamps	See illustration number(s): EL-0018

12	2617	A	When a voltage of 95 VDC is applied to the illustrated circuit with a resistance of 110 ohms the current will be _____.	0.863 amps	1.16 amps	1.863 amps	205 milliamps	See illustration number(s): EL-0018
12	2621	A	When a voltage of 95 VDC is applied to the illustrated circuit with a resistance of 10.23 kohms the current will be _____ .	9.29 milliamps	107.68 amps	10.32 amps	11.02 amps	See illustration number(s): EL-0018
12	2631	C	In the schematic diagram of the DC compound generator shown in the illustration, the positive ammeter reading is 500 amps and the negative ammeter reading is 475 amps. What is the current flow through the neutral bus?	0 amp	12.5 amp	25 amp	975 amp	See illustration number(s): EL-0037
12	2633	B	When a voltage of 95 VDC is applied to the circuit illustrated with a resistance of 470 ohms the current will be _____.	4.95 amps	202.2 milliamps	565.00 milliamps	2,325 milliamps	See illustration number(s): EL-0018
12	2641	C	In the schematic of the electrical circuit shown in the illustration, what is the value of the total capacitance, when compared to the value of equal individual capacitors?	Equal	Half	Double	Squared	See illustration number(s): EL-0038
12	2643	D	When a voltage of 95 VDC is applied to the circuit illustrated with a resistance of 237 ohms the current will be_____.	1.40 amps	2.49 amps	332 milliamps	400.8 milliamps	See illustration number(s): EL-0018
12	2651	B	What will be the total output voltage if four 1.5 volt batteries are connected in a series-parallel arrangement as shown in the illustration?	1.5 volts	3.0 volts	4.5 volts	6.0 volts	See illustration number(s): EL-0039
12	2657	C	When a voltage of 110 VDC is applied to the circuit illustrated with a resistance of 12 ohms the current will be_____.	.11 amps	1.31 amps	9.17 amps	122m amps	See illustration number(s): EL-0018
12	2667	B	When a voltage of 110 VDC is applied to the circuit illustrated with a resistance of 32 ohms the current will be_____.	.29 amps	3.44 amps	9.31 amps	142 amps	See illustration number(s): EL-0018
12	2671	C	When a voltage of 110 VDC is applied to the illustrated circuit with a resistance of 110 ohms the current will be_____.	.2 amps	.1 amps	1 amps	220m amps	See illustration number(s): EL-0018
12	2679	A	When a voltage of 110 VDC is applied to the circuit illustrated with a resistance of 10,230 ohms the current will be_____.	0.0107 amps	93 amps	10,340 amps	.951 amps	See illustration number(s): EL-0018
12	2687	A	When a voltage of 110 VDC is applied to the illustrated circuit with a resistance of 470 ohms the current will be _____.	.234 amps	4.272 amps	580 amps	2,008 amps	See illustration number(s): EL-0018
12	2691	A	When a voltage of 110 VDC is applied to the illustrated circuit with a resistance of 237 ohms the current will be_____.	.464 amps	1.464 amps	2.154 amps	3.47 amps	See illustration number(s): EL-0018
12	2697	B	When a voltage of 110 VDC is applied to the illustrated circuit with a resistance of 17.8 ohms the current will be_____.	2.88 amps	6.18 amps	127.8m amps	161 amps	See illustration number(s): EL-0018
12	2701	C	When a voltage of 112 VDC is applied to the illustrated circuit with a resistance of 12 ohms the current will be _____.	.107 amps	1.28 amps	9.33 amps	124 milliamps	See illustration number(s): EL-0018
12	2709	B	When a voltage of 112 VDC is applied to the illustrated circuit with a resistance of 32 ohms the current will be_____.	.285 amps	3.5 amps	9.142 amps	144 m amps	See illustration number(s): EL-0018
12	2713	B	When a voltage of 112 VDC is applied to the circuit illustrated with a resistance of 110 ohms the current will be_____.	.982 amps	1.018 amps	2.018 amps	.222 amps	See illustration number(s): EL-0018

12	2719	A	When a voltage of 112 VDC is applied to the circuit illustrated with a resistance of 10,230 ohms the current will be_____.	.010 amps	.913 amps	103 m amps	934 m amps	See illustration number(s): EL-0018
12	2723	A	When a voltage of 112 VDC is applied to the circuit illustrated with a resistance of 470 ohms the current will be_____.	.238 amps	4.196 amps	582 m amps	19.723 amps	See illustration number(s): EL-0018
12	2729	D	When a voltage of 112 VDC is applied to the illustrated circuit with a resistance of 237 ohms the current will be _____.	1.47 amps	2.11 amps	347 milliamps	472.6 milliamps	See illustration number(s): EL-0018
12	2733	C	When a voltage of 112 VDC is applied to the circuit illustrated with a resistance of 17.8 ohms the current will be_____.	.158 amps	5.82 amps	6.29 amps	129.8m amps	See illustration number(s): EL-0018
12	2739	C	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 12 ohms. the current will be _____.	0.096 amps	1.16 amps	10.33 amps	136 m amps	See illustration number(s): EL-0018
12	2749	B	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 32 ohms the current will be _____.	0.258 amps	3.875 amps	8.258 amps	156 amps	See illustration number(s): EL-0018
12	2761	B	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 110 ohms the current will be_____.	0.887 amps	1.127 amps	234 m amps	2.13 amps	See illustration number(s): EL-0018
12	2773	A	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 10,230 ohms the current will be_____.	0.012 amps	82.50 amps	10.354 amps	0.8439 amps	See illustration number(s): EL-0018
12	2779	A	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 470 ohms the current will be_____.	0.263 amps	3.79 amps	594 milliamps	1.7814 amps	See illustration number(s): EL-0018
12	2789	D	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 237 ohms the current will be _____.	1.523 amps	1.911 amps	361 milliamps	523.2 milliamps	See illustration number(s): EL-0018
12	2793	C	When a voltage of 124 VDC is applied to the illustrated circuit with a resistance of 17.8 ohms the current will be _____.	0.143 amps	2.555 amps	6.966 amps	141.8 milliamps	See illustration number(s): EL-0018
12	2797	C	If a voltage of 132 VDC is applied to the illustrated circuit where the resistance is 12 ohms, then current will be _____.	0.090 amps	1.090 amps	11 amps	144 milliamps	See illustration number(s): EL-0018
12	2801	B	When a voltage of 132 VDC is applied to the illustrated circuit with a resistance of 32 ohms the current will be _____.	0.242 amps	4.125 amps	7.757 amps	1.64 amps	See illustration number(s): EL-0018
12	2809	B	When a voltage of 132 VDC is applied to the illustrated circuit with a resistance of 110 ohms the current will be _____.	0.833 amps	1.2 amps	2.2 amps	242 milliamps	See illustration number(s): EL-0018
12	2817	A	When a voltage of 132 VDC is applied to the illustrated circuit with a resistance of 10,230 ohms the current will be _____.	0.012 amps	77.5 milliamps	10,362 amps	0.792 amps	See illustration number(s): EL-0018
12	2833	A	When a voltage of 132 VDC is applied to the illustrated circuit with a resistance of 470 ohms the current will be _____.	0.280 amps	3.560 amps	602 milliamps	1.673 amps	See illustration number(s): EL-0018
12	2841	C	When a voltage of 132 VDC is applied to the illustrated circuit with a resistance of 237 ohms the current will be _____.	1.236 amps	2.048 amps	0.557 amps	4.200 amps	See illustration number(s): EL-0018
12	3011	B	According to Coast Guard Regulations (46 CFR), the talking and calling circuits of a sound powered telephone system must be _____.	intrinsically safe	independent of each other	independently grounded	connected to a common ground	

12	3021	A	Which of the spaces listed is defined as a "location requiring an exceptional degree of protection" when considering the installation of shipboard electrical equipment?	Machinery space	Chart room	Console room	Accommodation space	
12	3031	A	The source of emergency lighting and power at loss of normal ship's power on a cargo vessel should be obtained from the _____.	emergency generator supply to the emergency switchboard	emergency generator supply to the main switchboard	battery supply to the main switchboard	turbogenerator supply to the emergency switchboard	
12	3051	A	Coast Guard Regulations (46 CFR) state that a continuous trickle charge, supplied from the ship's service power system, is required for batteries supplying power to the _____.	emergency diesel starting system	emergency power system for the radar	portable radios for the lifeboats	radios installed in the lifeboats	
12	3081	A	Coast Guard Regulations (46 CFR) require manual contactors for operating the general emergency alarm on tank vessels to be located in the navigating bridge, engine room and the _____.	deck officers' quarters furthest from the engine room	galley / dining room areas	crew accommodations and sleeping spaces	engineering officers' quarters furthest from the bridge	
12	3091	A	Coast Guard Regulations (46 CFR) require that lighting fixture globes must be protected by guards if the fixtures are located in the _____.	steering gear room	galley	living quarters	wheelhouse	
12	3101	C	The emergency electrical power source on tank vessels over 500 GT on an international voyage, should be capable of continuous operation under emergency load for _____.	6 hours	12 hours	18 hours	24 hours	
12	3161	D	Which of the following statements represents the FIRST precaution to be taken prior to working on any installed electrical component?	Wear rubber gloves and boots.	Use only approved nonconducting tools.	Ground the case of the machine before beginning any repairs.	Open the supply circuits and tag the switches.	
12	3171	D	Which of the listed safety features should be provided in small rooms or lockers where batteries are stored?	Installation of a fixed CO2 system.	An exhaust duct is to be provided and led from within three inches of the deck.	Power ventilation is to be provided if trickle charging is utilized.	An exhaust duct is to be provided and led from the top of the locker to the open air.	
12	3191	A	The shipboard general alarm system must receive its main source of power from _____.	a storage battery	the emergency generator	an auxiliary generator	the ship's service generator	
12	3211	A	All electric cables passing through watertight bulkheads must be _____.	installed with watertight stuffing tubes	grounded on both sides of the bulkhead	fitted with unions on each side of the bulkhead	welded on both sides of the bulkhead	
12	3231	A	Which of the following statements concerning electrical cables is correct?	Where they pass through watertight bulkheads, they should be fitted with watertight stuffing boxes.	Electric cable coverings should never be grounded.	Electrical cables must be rigidly held in place by welding of armored cable, or glued in place where nonmetallic insulation is used.	All of the above.	
12	3251	B	From the standpoint of safety, you should never allow salt water to enter a lead-acid storage battery or come in contact with sulfuric acid because _____.	the resulting gas is extremely flammable	the resulting gas is a respiratory irritant that can be fatal	the primary constituent, sodium, reacts lethally with lead peroxide	combining salt water with lead-acid creates an invisible gas resulting in severe corrosion	
12	3261	C	Which of the following precautions should be taken when a blown fuse, rated at 10 amperes, is replaced?	Short out the fuse before removing it from the circuit.	Use needle-nose pliers to remove fuse from the circuit.	Replace blown fuse with one of equal voltage and ampere capacity.	Fuses of 10 ampere rating and less are virtually harmless when energized and may be handled freely.	

12	3271	C	Before any work on electrical or electronic equipment is performed, which of the following precautions should be carried out?	De-energize the applicable switchboard bus.	Bypass the interlocks.	Secure and tag the supply circuit breaker in the open position.	Station a man at the circuit supply switch.	
12	3281	D	When maintenance personnel are working on electrical equipment, all supply switches should be secured in the open position and tagged specifically by the _____.	watch engineer	chief engineer or first assistant	chief electrician	person performing the repair	
12	3291	B	When changing fuses, you should always _____.	wear rubber boots	use a fuse puller	stand on a rubber mat	wear safety glasses	
12	3301	A	If overloading a DC machine becomes necessary in an emergency, you should _____.	cool the machine with portable blowers and fans	hold thermal overload relays open with blocks of wood	inject small amounts of CO2 into the windings for cooling	increase the residual magnetism value of windings to reduce eddy currents	
12	3311	C	Which of the following statements of Coast Guard Regulations (46 CFR) concerning battery installations is correct?	Sign, permanently secured to the battery trays, indicating that "naked lights or smoking is prohibited in the vicinity" is not necessary to be posted if trickle charging is used.	When power ventilation is required, blower blades must be nonsparking and the system must be interlocked with the battery charger to prevent simultaneous operation.	Trays should be chocked with wood strips or equivalent to prevent movement and each tray should be fitted with nonabsorbent insulating supports on the bottom.	Power and lighting batteries must be of the lead-acid type only.	
12	3321	D	Receptacle outlets aboard ship should be designed so those mounted according to 46 CFR 111 have _____.	there must be a sufficient number of receptacle outlets in the crew accommodations for an adequate level of habitability	each receptacle outelt must be compatible with the voltage and current of the circuit in which it is installed	a receptacle outlet must not have any exposed parts with the plug opening uncovered	all of the above	
12	3331	C	Coast Guard Regulations (46 CFR) state that the minimum conductor size allowed for use in flexible electrical cords is _____.	10 AWG	14 AWG	18 AWG	20 AWG	
12	3341	B	Coast Guard Regulations (46 CFR), require that an indicating light at the propulsion control station will operate if overloading or overheating occurs in a _____.	forced draft blower motor	steering gear motor	fuel pump motor	condensate pump motor	
12	3351	B	Wire in general, when used aboard vessels must meet minimum requirements. Which of the following statements is/are correct?	Each wire must be 14 AWG or larger, regardless of locations and use.	Wire must be copper stranded.	The only wire that does not have to be in a suitable enclosure or cover is the ground wire used with portable tools and lights.	All of the above.	
12	3361	C	In accordance with Coast Guard Regulations (46 CFR), each battery operated relay-controlled lantern must _____.	be readily portable	contain a dry cell battery having a minimum capacity of 10 amp hours	have an automatic battery charger to maintain the battery in a fully charged state	all of the above	
12	3371	C	Coast Guard Regulations (46 CFR) require that fire door holding and release systems are to comply with subpart _____.	111.15	111.54	111.99	111.112	
12	3381	D	Coast Guard Regulations (46 CFR) require that the emergency diesel generator engine shut down when _____.	lubricating oil pressure is lost	the engine overspeeds dangerously	fixed CO2 is released into the emergency diesel generator space	all of the above	

12	3391	D	Which of the following is/are true concerning electric power operated watertight door systems?	Each motor driven door must use the main bus as its source of power.	Each distribution panel for the system must be on the lowest level where berthing quarters are located.	Distribution panels must not be provided with a means of locking in order to permit quick activation of the system.	Each system must have a separate branch circuit.	
12	3401	B	Unless it can be shown that a 45°C ambient temperature will not be exceeded, motors within a machinery space must be designed for an ambient temperature of _____.	45°C	50°C	55°C	60°C	
12	3411	D	When portable cords are connected to devices such as portable tools, you must eliminate direct tension on the joints or terminal screws. Coast Guard Regulations (46 CFR), allow this to be done by _____.	knotting the cords together at the plugs	taping the plugs together	installing a special fitting to eliminate plug separation	all of the above	
12	3421	D	Coast Guard Regulations (46 CFR) require each switchboard to have _____.	non-conductive deck covering at the frount	non-conductive deck coverings at the rear	a name plate for each circuit breaker	all the above	
12	3431	C	According to Coast Guard Regulations (46 CFR), which of the following is an acceptable lining for battery trays containing alkaline batteries?	Brass	Lead	Steel	Zinc	
12	3461	C	Where automatic restart does not present a hazard after a power failure, Coast Guard Regulations (46 CFR) require motor controllers for auxiliaries vital to the propelling equipment to be provided with _____.	overload protection	low voltage protection	low voltage release	reverse current protection	
12	3471	C	According to U. S. Coast Guard Regulations (46 CFR), the motor controller for a submersible electric motor driven bilge pump should be installed _____.	in the shaft alley	at the submersible bilge pump	above the uppermost continuous deck	at the engine room emergency control panel	
12	3481	C	Which of the following statements is a requirement of Coast Guard Regulations (46 CFR) concerning emergency diesel generator engines?	The fuel must have a flash point not less than 75,F.	They must be capable of operating under full load not less than 30 seconds after cranking.	They must lubricate and operate when inclined to specified angles and must be arranged so that it does not spill oil under a vessel roll of 30°, to each side of the vertical.	The starting battery must produce 12 consecutive cranking cycles.	
12	3491	C	In accordance with Coast Guard Regulations (46 CFR), a circuit breaker located in the machinery space and installed in a 440V AC system must _____.	be dependent upon mechanical cooling to operate within its rating	have a long-time delay trip element set above the continuous current rating of the trip element or the circuit breaker frame	have an interrupting rating sufficient to interrupt the maximum asymmetrical short-circuit current available at the point of application	all of the above	
12	3501	A	Which of the following statements is/are true regarding requirements for receptacle outlets aboard vessels?	Each receptacle outlet operating at 100 volts or more must have a grounding pole.	Outlets connecting a lifeboat and the vessel's electrical system must have threaded plugs.	Machinery spaces must contain sufficient outlets for lighting all machinery with a portable light having a 50 foot flexible cord.	All of the above.	
12	3521	C	According to Coast Guard Regulations (46 CFR), a battery installation must be in a room that is only for batteries or a box on deck. This would be termed a _____.	small installation	moderate installation	large installation	high amp/hour capacity installation	
12	3541	B	Coast Guard Regulations (46 CFR) require instrument and control wiring in a switchboard to be of what minimum size?	12 AWG	14 AWG	16 AWG	18 AWG	

12	3551	C	Coast Guard Regulations (46 CFR 199) require that each lifesaving appliance, including lifeboat equipment, must be inspected at least once every _____.	week	2 weeks	month	3 months	
12	3561	C	An emergency generator, driven by an internal combustion engine, shall be tested under load for a minimum of 2 hours at least once every _____.	week	2 weeks	month	3 months	
12	3571	D	Coast Guard Regulations (46 CFR) require that each alternating current generator arranged for parallel operation shall be provided with _____.	more than one means of excitation	individual circuit fuses	a high back-pressure trip	a reverse-power trip	
12	3601	C	According to Coast Guard Regulation (46 CFR) for emergency power and lighting systems, which of the listed items is the only permissible starting aid for the emergency diesel generator engine?	Ether	Lube oil heater	Jacket water heater	Fuel oil heater	
12	3611	C	When supplying emergency lighting loads, the storage battery initial voltage must not exceed the standard system voltage by more than _____.	2%	3%	5%	10%	
12	3621	B	In accordance with Coast Guard Regulations (46 CFR), a steering gear feeder circuit from the emergency switchboard or alternate power supply must have the capacity for continuous operation of the rudder 15° side to side in not more than 60 seconds for a period of _____.	1/4 hour	1/2 hour	1 hour	2 hours	
12	3631	C	In accordance with Coast Guard Regulations (46 CFR), the capacity of each branch circuit providing power to a fire detection or alarm system must not be less than what percent of the maximum load?	50%	100%	125%	150%	
12	3641	B	Coast Guard Regulations (46 CFR) require storage batteries to be tested for a specified period of time to demonstrate their ability to properly supply the required emergency loads every _____.	3 months	6 months	year	inspection for certification	
12	3651	D	Which of the following methods of finish applications is/are considered to be satisfactory for resisting corrosion?	Electroplating with cadmium	Sherardizing	Galvanizing	All of the above	
12	3681	D	When working on a high voltage circuit, you should always have another person present with you. This person should have a good working knowledge of _____.	the circuit being worked on and the location of all switches and circuit breakers controlling it	first-aid techniques for treating electrical shock	cardiopulmonary resuscitation (CPR)	all of the above	
12	3691	A	When there is a fire in a large electric motor, normally the very FIRST step is to _____.	secure the electric supply	ventilate area to remove smoke	start the fire pump and lead out hose	apply foam	
12	3711	C	According to Coast Guard Regulations (46 CFR), which of the following statements is the ONLY method allowed to ease the starting of emergency diesel generator engines?	Bayonet-type electrical oil heaters	Steam or hot water lube oil heaters	Thermostatically controlled electric jacket water heaters	Electric resistance heaters in the air intake manifold	
12	3751	D	Coast Guard Regulations (46 CFR) require the temporary emergency electrical power source onboard a tank vessel, over 1600 gross tons, and on a coastwise voyage to be able to supply power to each _____.	electrically controlled or powered ships whistle	emergency loudspeaker system	smoke detector system	all of the above	
12	3771	C	According to Coast Guard Regulations (46 CFR) the capacity of a general emergency alarm system feeder fuse must be at least _____.	50 percent of the power source fuse capacity	150 percent of the system's rated current	200 percent of the load supplied	twice the capacity of the largest branch circuit fuse	
12	3821	D	"Corrosion-resistant material" and "noncorrodible material" will include which of the following _____.	brass	copper-nickel	plastics	all of the above	

12	3841	B	Coast Guard Regulations (46 CFR) require the minimum number of ships service generators for ocean vessels to be _____.	1	2	3	4	
12	3861	C	Coast Guard Regulations (46 CFR) permit which of the listed types of fuses to be used in an interior lighting circuit?	Phillips-base plug type	Renewable link cartridge type	Non-renewable link cartridge type	All of the above	
12	3891	A	Coast Guard Regulations (46 CFR) require overcurrent protection for steering gear feeder circuits and shall be protected by _____.	circuit breaker with an instantaneous trip only	motor-running overcurrent protection only	nonrenewable link cartridge fuse only	renewable link cartridge fuse only	
12	3901	D	Coast Guard Regulations (46 CFR) require which of the listed features to open the power circuit to a motor due to low voltage and re-close when the voltage is restored to normal?	Low voltage protection	6 volt non-renewable link fuse	12 volt renewable link fuse	Low voltage release	
12	3911	B	In accordance with Coast Guard Regulations (46 CFR), "corrosive location" means a/an _____.	location exposed to the weather on a vessel operating only in fresh water	location exposed to the weather on a vessel operating in salt water	area in the vicinity of cargo vents used for the carriage of corrosive material	location within the machinery space subjected to heavy condensation	
12	3921	B	In accordance with Coast Guard Regulations (46 CFR), each diesel engine driven generator prime mover must have an overspeed device, independent of the normal operating governor, and adjusted so that the speed cannot exceed the maximum rated speed by more than _____.	10%	15%	20%	25%	
12	3931	C	Which of the following devices for a lifeboat winch electrical circuit automatically prevents the davit arms of a gravity-type unit from over traveling their tracks when raising the lifeboat?	Master cutout switch	Emergency disconnect switch	Limit switch	Clutch interlock switch	
12	3961	C	Coast Guard Regulations (46 CFR) require that automatic transfer to the emergency diesel generator(s) assume loads as soon as _____.	it is started	the electric potential of the ship's service generators drops 15 to 40 percent below normal value	the potential from the emergency generator reaches 85 to 95 percent of its normal value	the electric potential of the ship's service generators drops to 85 to 95 percent of the normal value	
12	3981	C	Which of the following statements, regarding Coast Guard Regulations (46 CFR), is correct concerning electric engine order telegraphs?	A twin screw vessel need only have one engine order telegraph in the machinery space if installed on the operating level.	The receiver dials must be illuminated.	A audible signal at both transmitter and indicator shall ring continuously at all times when the transmitter and indicator do not point to the same order.	The transmitters and indicators shall be mechanically connected to each other.	
12	4001	A	When power ventilation is required in a battery compartment, Coast Guard Regulations (46 CFR) require _____.	the power ventilation system to be separate from ventilation systems for other spaces	electric ventilation motors to be inside the vent duct	electric ventilation motors to be inside the compartment	all of the above	
12	4041	C	Which of the listed features does the Coast Guard Regulations (46 CFR) require of a motor controller which must be manually re-started following a power failure?	Overload protection	Low voltage release	Low voltage protection	Reverse current protection	
12	4081	A	Coast Guard Regulations (46 CFR), require each motor controller to have a wiring diagram located _____.	on the inside of the controller door	in the engineering department office	in the spare parts locker	all of the above	

12	4101	A	In accordance with Coast Guard Regulations (46 CFR), the emergency generator set aboard an 1800 GT tank ship in ocean service, must be capable of supplying an emergency source of power for a minimum period of _____.	18 hours	18 hours or twice the time of the vessel's run, whichever is the least	36 hours	36 hours or twice the time of the vessel's run, whichever is the least	
12	4111	D	Coast Guard Regulations (46 CFR) state that transformer windings must be resistant to _____.	moisture	sea atmosphere	oil vapor	all of the above	
12	4151	B	If a steering motor becomes overloaded, the _____.	overload condition of 5% will trip the motor off the line immediately	overload condition will be indicated visually in the machinery space	motor running indicator will begin to flash "on" and "off" in response to the sustained overload condition	standby steering pump will start automatically and come on the line	
12	4161	A	Which of the following safeguards can be built into the control circuit of a remotely operated fire pump to ensure that the pump is not started with the suction valve closed?	The fire pump starting circuit is completed by a limit switch when the suction valve opens.	A normally closed contact opens in the suction valve starter circuit, and the pump starts immediately upon the pushing of the pump start button.	A normally open contact closes in the fire pump suction valve starter circuit, and the pump starts immediately upon the pushing of the pump start button.	A time delay relay is de-energized when the "ON" button is pushed, and the pump starts after a predetermined time delay.	
12	4171	B	Coast Guard Regulations (46 CFR) require that the construction and operation of ship's service generators adhere to the codes of the _____.	Underwriter's Laboratories, Inc.	American Bureau of Shipping	manufacturer	ASME	
12	4181	D	To comply with Coast Guard Regulations (46 CFR), a permanently grounded conductor must not have an overcurrent device unless the overcurrent device simulaneously opens each ungrounded conductor of the _____.	switch	fuse	neutral breaker	none of the above	
12	4191	D	Coast Guard Regulations (46 CFR) prohibit the use of portable electric cord or fixture wire aboard ship if that wire or cord is smaller than _____.	12 AWG	14 AWG	16 AWG	18 AWG	
12	4221	A	Coast Guard Regulations (46 CFR) requires that each electrical receptacle is to have a grounding pole, but only if it _____.	operates at 100 volts or more	is in a location exposed to the weather	is in a location accessible to other than qualified personnel	is connected to a DC source	
12	4231	D	According to Coast Guard Regulations (46 CFR), which of the following is true concerning flexible electric cord and cable used aboard ship?	Solderless crimp-on splices with outside insulators are permitted.	Soldered Western Union splices with latex tape are permitted.	Splices or taps are not permitted in cable runs longer than 30 feet.	No. 12 AWG cable or cord may be spliced for repairs if made in compliance with Regulations.	
12	4241	D	In accordance with Coast Guard Regulations (46 CFR), receptacles for refrigerated containers must _____.	have a switch near the receptacles that disconnects all power to those receptacles	have a sign stating that the switch should be opened before cables are disconnected from the receptacles	be designed for circuit breaking service	all of the above	
12	4271	B	Coast Guard Regulations (46 CFR) require that the emergency lighting and power system _____.	emergency generator must be tested under load before sailing	must be tested and inspected weekly and the date recorded	batteries must be tested annually and the date recorded	must be capable of sustaining the emergency load for 48 hours	

12	4281	D	Coast Guard Regulations (46 CFR) state that a normal source for emergency loads and power on a cargo vessel must be supplied from _____.	emergency generator supply to the emergency switchboard	emergency generator supply to the main switchboard	battery supply to the main switchboard	ship's service generator via the emergency switchboard	
12	4291	A	A storage battery for an emergency lighting and power system must have the capacity to _____.	close all watertight doors twice	open all watertight doors four times	open and close all watertight doors in six consecutive cycles within a 20 second period	none of the above	
12	4301	D	Coast Guard Regulations (46 CFR) require a continuous trickle charge to be supplied from the ship's service power system for batteries supplying power to the _____.	emergency power system for the radar	portable radios for the lifeboats	radios installed in the lifeboats	emergency power and lighting system	
12	4311	A	Coast Guard Regulations (46 CFR), require storage batteries for emergency lighting and power systems be tested at least once each _____.	six month period that the vessel is navigated, and noted in the official log book	biweekly period to verify the battery condition, and noted in the rough log book	quarterly period that the vessel is navigated, and noted in the rough log book	week to verify the battery condition, and noted in the official log book	
12	4331	B	Coast Guard Regulations (46 CFR), require automatic shutdown of an emergency diesel generator if the _____.	cooling water temperature is excessively high	engine dangerously overspeeds	oil pressure is excessive	exhaust temperature is high	
12	4341	D	Coast Guard Regulations (46 CFR), require that the emergency generator fuel tank on an ocean going cargo vessel of 1600 GT or more must be capable of supplying fuel to a fully loaded engine for a time period of at least _____.	2 hours	4 hours	6 hours	18 hours	
12	4351	B	Coast Guard Regulations (46 CFR) require emergency diesel engine starting systems to have sufficient capacity to provide power for at least _____.	three continuous starting sequences	six consecutive cranking cycles	nine repeated starts under load	twelve cranking periods of 5 seconds	
12	4361	C	In accordance with Coast Guard Regulations (46 CFR), the minimum number of consecutive cranking cycles an emergency diesel generator starting system must be capable of providing is _____.	two cycles	three cycles	six cycles	eight cycles	
12	4381	D	Which of the following statements is a Coast Guard Regulation (46 CFR) concerning emergency generator diesel engines?	The fuel must have a flash point not less than 75°F.	Emergency diesel engines must be capable of operating under full load in not less than 30 seconds after cranking.	The starting battery must produce 12 consecutive cranking cycles.	Emergency diesel engines must operate satisfactorily up to a 22.5° list.	
12	4401	D	Coast Guard Regulations (46 CFR) require the emergency diesel generator on a cargo vessel of over 1600 gross tons sailing international voyages to be able to supply power to the _____.	smoke detector system	emergency loudspeaker system	daylight signaling light system	all of the above	
12	5014	A	If an AC motor is started and produces 25 horsepower, the kW meter reading will increase by _____.	18.65 kW	25.65 kW	30.65 kW	37.65 kW	
12	24033	A	While on watch in the engine room at sea with only one ship's service turbine alternator on line, the entire plant suddenly blacks out without warning. After restoring power, the cause for this casualty was attributed to which of the following faults?	The micro switch at the generator throttle trip vibrated open, allowing the main breaker to open via the under voltage trip.	Someone pushed the trip button to the "shore power" breaker.	The main air compressor suddenly stopped.	The standby generator started automatically and became motorized.	