



ETO
Sr. No. MODEL

EXAMINATION OF ELECTRO TECHNICAL OFFICER
Function: Electrical, Electronic & Control Engineering

MARINE ELECTROTECHNOLOGY & SSEP

(Time allowed - 3hours)

India (2015)

Total Marks 100

- NB : (1) Answer any SIX Questions. Not more than TWO from Each Section**
(2) Neatness in handwriting and clarity in expression carries weightage
(3) Illustration of an Answer with clear sketches / diagrams carries weightage.

SECTION - I

- I. Answer the following: (16)
- i. The freezing point of the electrolyte in a fully charged lead-acid battery will be _____
- (a) higher than in a discharged battery
 - (b) lower than in a discharged battery
 - (c) the same as in a discharged battery
 - (d) higher than in a discharged battery, but the specific gravity will be less
- ii. 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?
- (a) 1.1 amps
 - (b) 4.5 amps
 - (c) 18.1 amps
 - (d) 27.7 amps
- iii. The (NMEA) is short form of :
- (a) National Marine Electrical administration
 - (b) National Marine Electronics administration
 - (c) National Marine Electronics association
 - (d) National Marine Electrical association
- iv. Radar determines range by.
- (a) $D = 2 \times cT$
 - (b) $D = 1/2 \times cT$
 - (c) $D = 1/2 \times c/T$
 - (d) $D = 1/2 \times T/c$

- v. Which of the following statements is correct?
- a) Ladder logic is a PLC graphical programming technique introduced in the last 10 years.
 - b) A ladder logic program is hard to analyze because it is totally different when compared with the equivalent relay logic solution.
 - c) The number of ladder logic virtual relays and input and output instructions is limited only by memory size.
 - d) The number of contacts for a mechanical relay is limited to number of
- vi. Which of the following statements about RLL is NOT true?
- a) NO contact symbol has two parallel lines to indicate an open contact.
 - b) RLL stands for Relay Ladder Logic.
 - c) NC contact symbol has the same two parallel lines with a line across them to indicate closed contacts.
 - d) The right power rail is positive or the high side of the source, and the left power rail is the power return or ground.
- vii. In a current sinking DC input module _____.
- a) The current flows out of the input field device
 - b) Requires that a AC sources be used with mechanical switches
 - c) The current flows out of the input module
 - d) Currents can flow in either direction at the input module
- viii. For open control system which of the following statements is incorrect ?
- (a) Less expensive
 - (b) Recalibration is not required for maintaining the required quality of the output.
 - (c) Construction is simple and maintenance easy
 - (d) Errors are caused by disturbances
- ix. In open loop system
- (a) the control action depends on the size of the system
 - (b) the control action depends on system variables
 - (c) the control action depends on the input signal
 - (d) the control action is independent of the output
- x. Pressure error can be measured by which of the following ?
- (a) Differential bellows and strain gauge
 - (b) Selsyn
 - (c) Strain gauge
 - (d) Strain gauge and potentiometer
- xi) Which of the following statements about a single pole double throw relay is NOT true?
- a) It is called an SPDT type of relay.
 - b) It has one common contact.
 - c) It has two positions (NC and NO).
 - d) It has a center off position.

xii) Which of the following statements about a single pole double throw relay is true?

- a) Insulators are used in the armature to isolate the electrical switching contacts from the rest of the relay components.
- b) The NC contact and the pole are in contact when the relay is off.
- c) It has just one coil.
- d) All of the above.

xiii) Which of the following statements about RLL is NOT true?

- a) NO contact symbol has two parallel lines to indicate an open contact.
- b) RLL stands for Relay Ladder Logic.
- c) NC contact symbol has the same two parallel lines with a line across them to indicate closed contacts.
- d) The right power rail is positive or the high side of the source, and the left power rail is the power return or ground.

xiv) The _____ is moved toward the relay electromagnet when the relay is on.

- a) Armature
- b) Coil
- c) NO contact
- d) NC contact

xv) When a relay is NOT energized:

- a) There is an electrical path through the NO contacts
- b) There is an electrical path through the NC contacts
- c) Neither the NO or the NC contacts have an electrical path
- d) Both the NO and the NC contacts have an electrical path

xvi) Which of the following RLL applications is not normally performed in early automation systems?

- a) On/off control of field devices
- b) Logical control of discrete devices
- c) On/off control of motor starters
- d) Proportional control of field devices

2. A 220-V shunt motor takes 5 A on no-load. The armature resistance is 0.25Ω and field resistance 200Ω . Calculate the efficiency when taking full load current of 50 A and the percentage changes in speed between no-load and full-load. (16)

3. Explain the meaning of the following terms with reference to automatic control system :-

- (a) Control loop (4)
- (b) Transmitter (4)
- (c) Controller (4)
- (d) Desired value. (4)

SECTION - II

- 4. With reference to an emergency source of electrical power in cargo ships:- (16)
 - (a) Describe a typical power source.
 - (b) Give a typical list of essential services, which must be supplied simultaneously.
 - (c) Explain how the emergency installation can be periodically tested.

- 5. With reference to oil monitoring of bilge and tanker ballast discharges: (16)
 - (a) Describe with the aid of a sketch, the general arrangement of an electronic oil monitoring system;
 - (b) State the inputs that are recorded;

- 6.
 - a) Draw the circuit diagrams of PNP and NPN transistors by identifying all junction voltages of currents. (6)
 - b) Sketch the potential variation through the transistor if PNP transistor biased in active region. (6)
 - c) Explain about current components of a transistor with neat sketches. (4)

SECTION - III

- 7. Mechanical foam used for firefighting, is produced by _____.
 - (a) mechanically mixing and agitating foam chemical, water, and air
 - (b) a chemical reaction of foam components and air
 - (c) gas bubbles liberated when the foam chemical contacts fire
 - (d) chemical reaction of foam components and waterBriefly Justify your answer

- 8. The necessity for administering artificial respiration may be recognized by the victim's _____.
 - (a) vomiting
 - (b) blue color and lack of breathing
 - (c) irregular breathing
 - (d) unconscious conditionBriefly justify your answer

- 9.
 - (a) List the items which are contained in the training manual pertaining to life saving appliances (4)
 - (b) Describe the frequency of abandon ship drills and fire drills and how they should be conducted. (4)
 - (c) State the regulation regarding the maintenance of life boat falls (4)
 - (d) List the LSA to be carried by all ships (4)

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