

UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE : LED 20503

COURSE NAME : SHIPBOARD ELECTRICAL INSTALLATION &
AUXILIARY EQUIPMENT

PROGRAMME NAME : DIPLOMA

DATE : 03 JANUARI 2016

TIME : 09.00 AM – 12.00 AM

DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of TWO (2) sections; Section 'A' and Section 'B'. Answer ALL questions in Section A and TWO(2) questions only for Section B.
6. Answer all questions in English language ONLY.

THERE ARE 9 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer all (THREE) questions.

Please use the answer booklet provided.

Question 1

- (a) i. Name three (3) types of ship services system fitted onboard ship (3 marks)
- ii. Name two (2) types of ship systems available onboard ship. (2 marks)
- (b) Figure 1 below shows series-parallel resistor circuit. Determine:
- i. Total Resistance (3 marks)
- ii. Total power absorbed in R1 (3 marks)

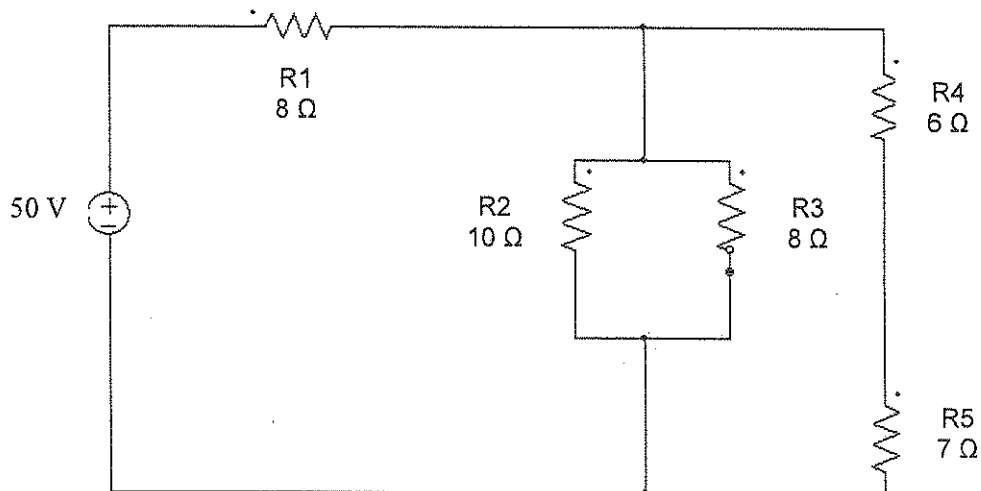


Figure 1

- (c) i. Define the auxiliary equipment and give four (4) examples. (6 marks)
- ii. Describe two (3) from four (4) characteristics of a system to minimize the safety risk to personnel and equipment. (3 marks)

Question 2

(a) The block diagram in Figure 2 is a conversion of AC to DC voltage system.

- i. Name the correspond devices to A, B, C and D. (6 marks)
- ii. State the function of devices A, B, C and D. (6 marks)
- iii. Draw the waveforms 1 until 4 for each block output to convert voltage from AC to DC. (8 marks)

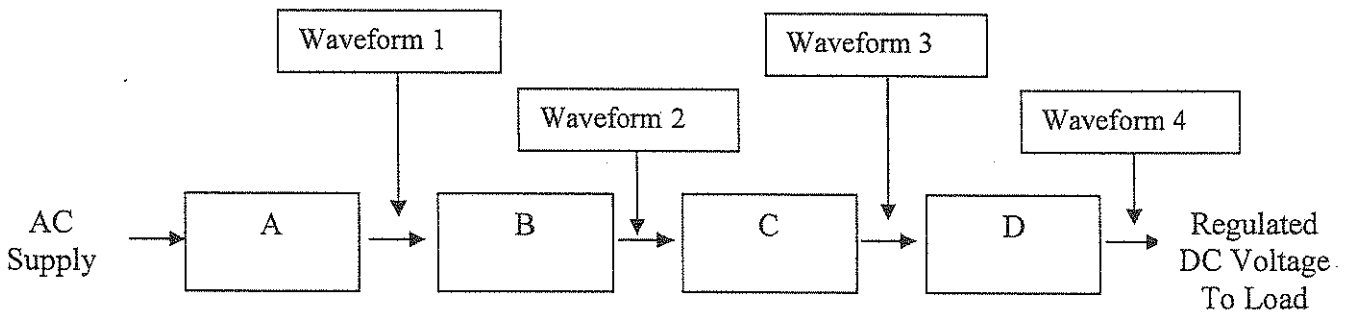


Figure 2

Question 3

(a) Figure 3 shows the delta to star connection for three phases AC. The source is 400V and the load is 10kW.

(i) Calculate the phase current (I_{ph}) for both source and load.

(8 marks)

(ii) Calculate line current (I_{Line}).

(4 marks)

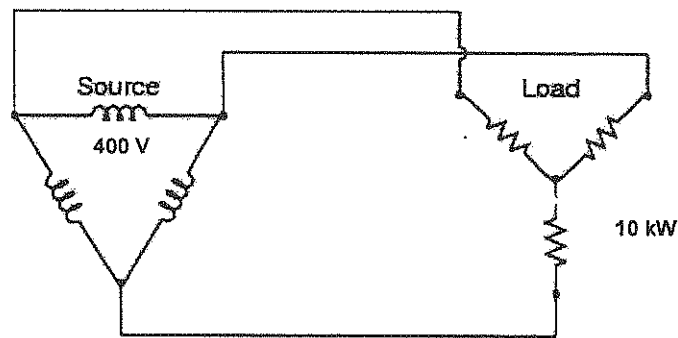


Figure 3

(b) Figure 4 shows the series RLC circuit. Given $2\pi f = 120$. Calculate:

i. The frequency of the circuit.

(2 marks)

ii. The value of inductor L.

(3 marks)

iii. The value of capacitor C.

(3 marks)

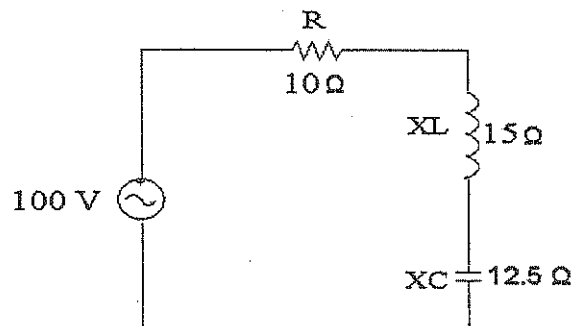


Figure 4

SECTION B (Total: 40 marks)

INSTRUCTION: Answer ONLY TWO (2) questions.

Please use the answer booklet provided.

Question 4

- (a) Switchboard is one of the main parts in power distribution onboard ship.
- i. State the function of the switchboard. (2 marks)
 - ii. Give three (3) components that can be classified as switchboard. (3 marks)
- (b) In electrical system, there are three (3) types basic circuit fault. By referring Figure 5, describe each type of fault and specify its implication (effect) to the circuits. (9 marks)

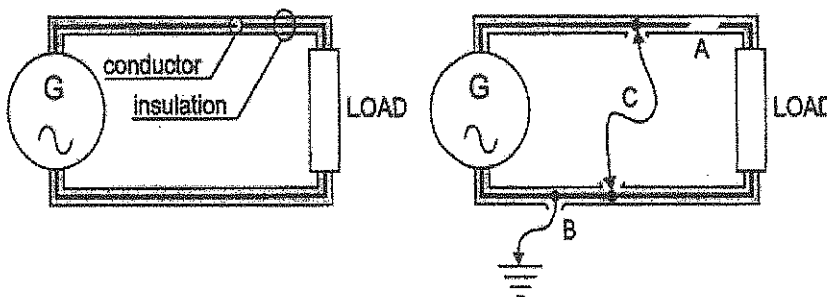


Figure 5

- (c) AC generator produces voltage and frequency.
- i. State two (2) effect if the generator facing higher voltage. (3 marks)
 - ii. State two (2) effect if the generator facing higher frequency. (3 marks)

Question 5

- (a) State the reasons why it necessary to parallel (synchronizing) the generators onboard ship.

(2 marks)

- (b) Two generators are load sharing in parallel where Generator 1 delivers 500kW at 0.8 power factor lag and Generator 2 delivers 400 kW and 350kVar lag. Determine:

i. The KVar loading of Generator 1.

(3 marks)

ii. The power factor of Generator 2.

(3 marks)

iii. The total busbar loading in kW, kVar and power factor.

(3 marks)

- (c) Analyze four (4) general techniques (Planning, Background knowledge, Diagnostic performance and Search strategy) used to solve the fault finding.

(9 marks)

Question 6

Figure 6 is a circuit diagram of the ship power system including the emergency and shore supply. Answer the following question:

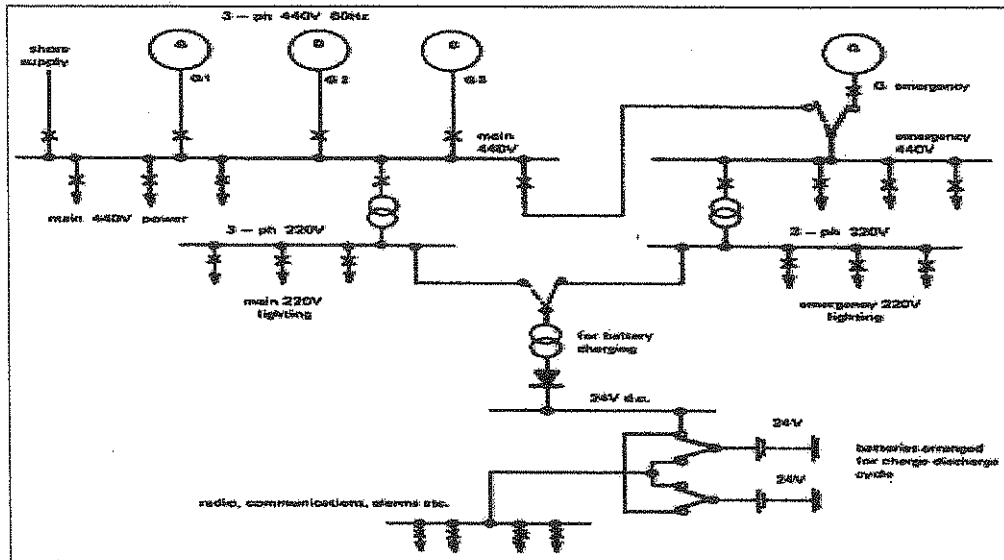


Figure 6

- (a) Describe a situation when the shore supply will be utilized by the ship. (3 marks)
- (b) There were five (5) procedures to carry out the connection of shore supply cable to the ship. Give any three (3) of the procedures (6 marks)
- (c) What is the source of emergency power supply? (1 marks)
- (d) By referring on answer 6(c), state the reasons this source is installed onboard ship. (3 marks)
- (e) State four (4) services provided by the emergency generator. (4 marks)
- (f) In phase transformer, normally it composed of 3 separate single phase units interconnected to form 3-phase arrangement. Explain about delta-delta transformer connection. (3 marks)

FORMULAE

$$S^2 = P^2 + Q^2$$

$$pf = \cos \theta$$

$$P = IV$$

$$P = IV \cos \theta$$

$$X_C = \frac{1}{2\pi f c}$$

$$Z^2 = R^2 + X^2$$

$$X_L = 2\pi f l$$

$$V_c = V_s(1 - e^{-t/RC})$$

$$I_c = \frac{V}{R} e^{-t/RC}$$

Star

$$V_L = \sqrt{3} \times V_{PH}$$

$$I_L = I_{PH}$$

$$P = \sqrt{3} V_L I_L \cos \theta$$

Delta

$$V_L = V_{PH}$$

$$I_L = \sqrt{3} \times I_{PH}$$

$$I_{PH} = \frac{V_{PH}}{Z_{PH}}$$

$$P = \sqrt{3} V_L I_L \cos \theta$$