UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE	: LMD22103
COURSE NAME	: MARINE ELECTRO-TECHNIQUE 2
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	: DIPLOMA OF TECHNOLOGY IN MARINE ENGINEERING
DATE	: 31 MAY 2016
TIME	: 09.00 AM – 11.30 AM
DURATION	: 2 HOURS 30 MINUTES

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. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer TWO (2) questions.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language ONLY.

SECTION A: (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) Name TWO (2) types of DC Generator.

(2 marks)

(b) State THREE (3) differences between AC Generator and DC Generator

(6 marks)

(c) Define

i. Line voltage

ii. Neutral line

(4 marks)

(d) A 3 phase system with a 415V, 60 Hz ac supply, Z_{PH} = 20 Ω at power factor. = 0.8 lagging (balanced load). Calculate the phase current, line current and supply power when connected as *delta* (Figure 1)

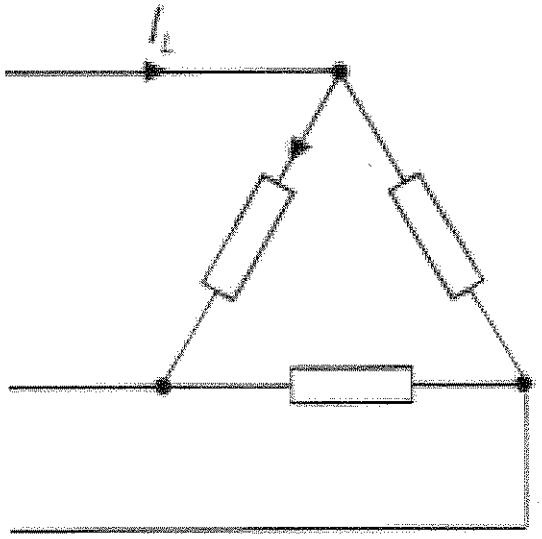

Figure 1

(8 marks)

Question 2

A coil having a resistance of 6 Ω and an inductance of 0.03 H is connected across a 50 V, 60 Hz supply. Calculate:

(a) Current
(b) The phase angle between the current and the supply voltage
(c) Power factor
(d) Apparent power
(e) True power
(f) Reactive power

(20 marks)

Question 3

(a) The electrical power demand onboard ship will vary according to the types of ship and its day-to-day operational needs. How are you going to determine the power demand for a ship?

(3 marks)

(b) Explain briefly ONE (1) of the types of generator excitation circuit below.
   i. Brushless excitation circuit
   ii. Compound excitation circuit

(4 marks)

(c) Switchboard is one of the main parts in power distribution onboard ship.
   i. State the function of the switchboard.
   ii. Specify three (3) components that can be classified as switchboard.

(5 marks)

(d) State TWO (2) *earthing* location for shipboard and shore systems.

(2 marks)

(e) Refer to Figure 2 below. Determine the types of fault at point A, B and C and specify its implication (effect) to the circuit.

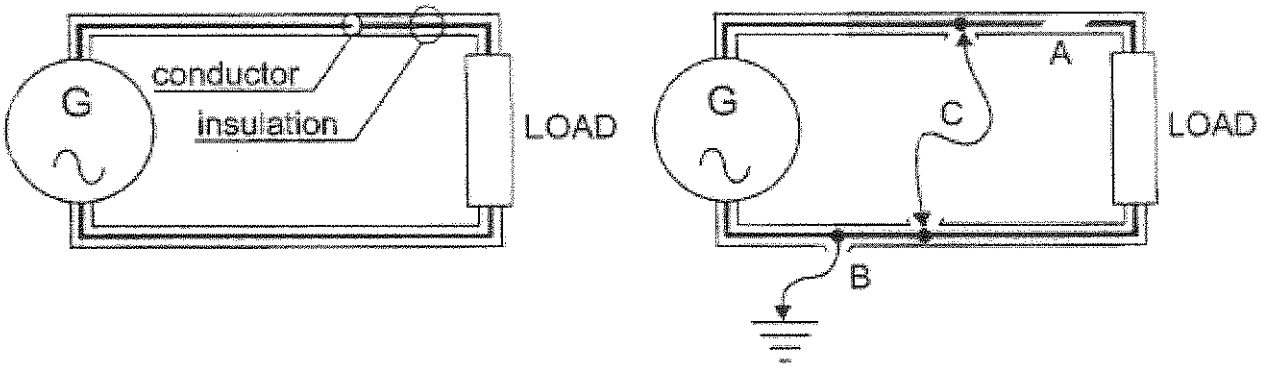

Figure 2

(6 marks)

SECTION B: (Total: 40 marks)

INSTRUCTION: Answer ONLY TWO (2) questions.
Please use the answer booklet provided.

Question 4

(a) The ship generators deliver 8000 MVA at a power factor of 0.75 lagging. Calculate the true power output, reactive power supplied to the system and the phase angle. Sketch and label the power triangle and show all the values of the parameters.

(12 marks)

(b) Sketch and label the standby UPS system during emergency.

(6 marks)

(c) AC Generator produces voltage and frequency. State TWO (2) effect if the generator facing higher voltage.

(2 marks)

Question 5

Figure 3 below is a circuit diagram of a ship electrical system.

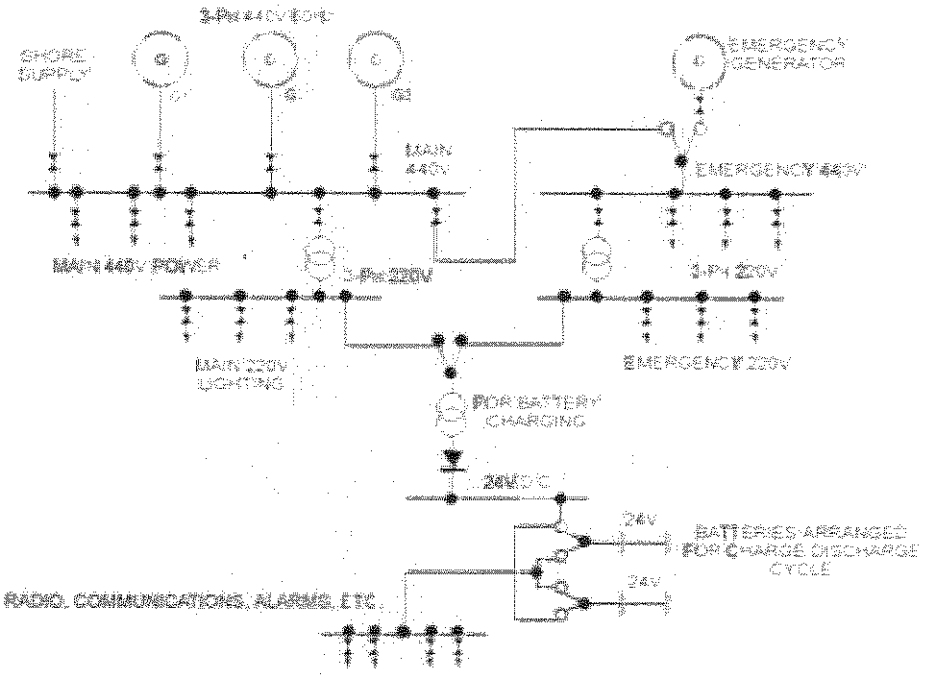

Figure 3

(a) State the occasion when the ship use the shore supply.

(3 marks)

(b) Explain any THREE (3) procedures to carry out the connection of shore supply to the ship.

(6 marks)

(c) Determine the source of emergency power supply

(2 marks)

(d) Explain the main requirement of installing an emergency generator on board ship.

(2 marks)

(e) State four (4) services provided by the emergency generator

(4 marks)

(f) i. Name ONE (1) type of battery installed on board ship.

ii. Determine the function of this battery.

(3 marks)

Question 6

(a) State the importance of paralleling the generators on board ship.

(2 marks)

(b) Identify TWO (2) main parameters that involve in paralleling the generators.

(2 marks)

(c) Procedures are to be followed closely when paralleling the generators. Explain THREE (3) of these procedures.

(6 marks)

(d) Figure 4 below is the block diagram of AVR. Answer the following questions.

i. State the meaning of AVR

ii. Describe briefly the function of the following components.

(1) Voltage Sensing

(2) Manual Trimmer Regulator

(3) Thyristor

(10 marks)

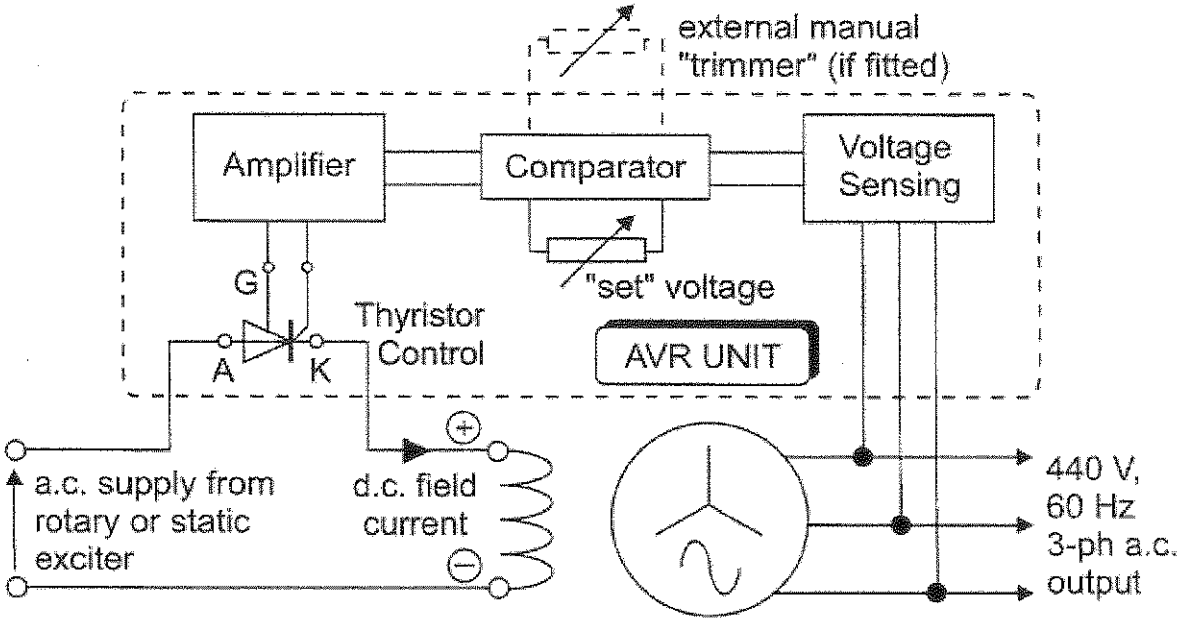

Figure 4

END OF QUESTION PAPER

FORMULAE

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

$$\cos\phi = \frac{P}{Q}$$

$$S = I^2 z$$

$$P = I^2 R$$

$$Q = I^2 X$$

$$P = IV$$

$$V^2 = V_R^2 + V_c^2$$

$$X_c = \frac{1}{2\pi fC}$$

$$z^2 = R^2 + X_L^2$$

$$X_L = 2\pi fL$$

Star

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

$$I_L = I_{PH}$$

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

Delta

$$V_{PH} = V_L$$

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

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

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