UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2017 SEMESTER

COURSE CODE   : LEB10102

COURSE NAME   : MARINE ELECTRO-TECHNOLOGY

PROGRAMME NAME   : BACHELOR OF ENGINEERING TECHNOLOGY (HONS)
(FOR MPU: PROGRAMME LEVEL)   IN NAVAL ARCHITECTURE & SHIPBUILDING

DATE   : 03/07/2017 MON

TIME   : 2.00 PM - 04.00 PM

DURATION   : 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read CAREFULLY the instructions given in the question paper.

2. This question paper has information printed on both sides.

3. This question paper consists of TWO (2) sections; Section A and Section B. Answer ALL questions in Section A and THREE (3) questions from Section B.

4. Please write yours answers on the answer booklet provided.

5. Write your answers only in BLACK or BLUE ink.

6. Answer all questions in English.

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

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

Question 1 (CLO1)

(a)   Electrical shock can be occurred to people when working with electrical because of; defect in the electrical systems and people applying an unsafe working method. Explain four (4) causes of electric shocks.

(8 marks)

(b)   The wiring and installation of electrical system is needed to run up electrical equipment and facilities. In order to complete a wiring and installation of electrical system, a number of tests need to be conducted before it can be confirmed that the system is in a good function and safe.

i.   Define the function of polarity test

(2 marks)

ii.   Explain the procedure of off-circuit polarity test

(8 marks)

iii.   Off-circuit polarity test need to use ohmmeter or multimeter (set to ohm) to identify the connection of the wiring. Explain the ohm-meter working principle.

(2 marks)

Question 2 (CLO 2)

(a)   There are five ways to express and measure the value of a sine wave in terms of its voltage or current magnitude. State the definition of below terms:

   i.   Instantaneous value

                                                                        (2 marks)

   ii.   Peak value

                                                                        (2 marks)

   iii.   Peak-to-peak value

                                                                        (2 marks)

   iv.   RMS value

                                                                        (2 marks)

   v.   Average value

                                                                        (2 marks)

(b)   In many practical circuit, the voltage and current can be in superimposed value.

   i.   State the definition of superimposed voltage (or current)

                                                                        (2 marks)

   ii.   Illustrate a superimposed circuit diagram with a load, R=10Ω

                                                                        (2 marks)

   iii.   Illustrate a sinewave of superimposed V_{AC} = 5V and V_{DC} = 7V

                                                                        (2 marks)

   iv.   Illustrate a sinewave of superimposed V_{AC} = 7V and V_{DC} = 5V

                                                                        (2 marks)

   v.   Illustrate a sinewave of a superimposed V_{AC} = 4V and V_{DC} = -2V

                                                                        (2 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer only THREE questions.
Please use the answer booklet provided.

Question 3 (CLO 2)

(a)   An alternating voltage of 240V, 50Hz is connected across a load of an impedance
       (60-j100) Ω. Determine:

       i   The resistance

                                                                      (2 marks)

       ii   The capacitance

                                                                      (2 marks)

       iii   The magnitude of impedance and its phase angle

                                                                      (4 marks)

(b)   A coil having a resistance of 12Ω, and an inductance of 0.1H is connected across a
       100V 50 Hz supply. Calculate:

       i.   The reactance of the coil.

                                                                      (4 marks)

       ii.   The impedance.

                                                                      (2 marks)

       iii.   Illustrate and label the impedance phasor diagram.

                                                                      (2 marks)

       iv.   The current.

                                                                      (2 marks)

       v.   Illustrate and label the phase difference between the current and the applied
              voltage.

                                                                      (2 marks)

Question 4 (CLO 2)

(a)   Transformer is a device which uses the phenomenon of mutual induction to change the value of alternating voltages and currents. Illustrate and label an equivalent circuit of a transformer.

(2 marks)

(b)   A transformer has 1200 primary turns and 200 secondary turns. The primary and secondary resistance's are 0.2Ω and 0.02Ω respectively and the corresponding leakage reactance's are 1.2Ω and 0.05Ω respectively. By referring to the primary winding, calculate:

    i.   The equivalent resistance.

(2 Marks)

    ii.   The equivalent reactance.

(2 Marks)

    iii.   The equivalent Impedance.

(2 Marks)

(c)   A 100kVA, 4000V/200V, 50Hz single phase transformer has 100 secondary turns. Determine:

    i.   The voltage ratio of the transformer.

(2 Marks)

    ii.   The primary and secondary current.

(4 marks)

    iii.   The number of primary turns

(2 marks)

    iv.   The maximum value of the flux in primary of transformer

(2 marks)

    v.   The maximum value of flux in secondary of transformer

(2 Marks)

Question 5 (CLO 2)

(a)   Hydroelectric is the term of electricity generated by hydropower. The convention of hydro power plant uses hydroelectric Dams as a place where the process of conversion of power. Explain with the aid of sketches the principle operation of hydropower generation.

(11 marks)

(b)   Differentiate three (3) types of turbines suitable for hydroelectric power plants in terms of water height (H) and water flow (Q)

(9 marks)

Question 6

(a)   Direct current (DC) motor is a machine that operated by supplying DC voltage and it producing a magnetic field. The basic operations of DC motor can be picturizing as Figure 1 below. Explain the operation of DC motor by referring to these figures. (CLO1)
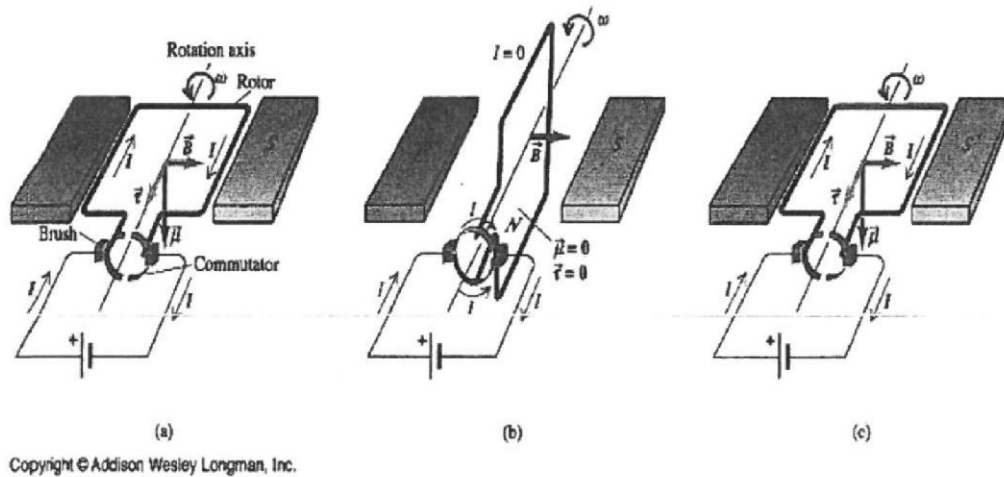
(8 Marks)

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Figure 1: Basic DC motor operations

(b)   A terminal voltage of a 60kW shunt generator is 600V at rated load. The resistance of the shunt field is 120Ω and the armature resistance is 0.2Ω. The rotational losses at full load is 2500W. (CLO2)

i.   Calculate the generated EMF of the generator.

(8 Marks)

ii.   Determine the efficiency of the shunt generator.

(4 Marks)

END OF QUESTIONS