UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
SEPTEMBER 2016 SEMESTER

COURSE CODE	:	LEB 10102
COURSE NAME	:	MARINE ELECTRO-TECHNOLOGY
PROGRAMME NAME	:	BET (HONS) IN NAVAL ARCHITECTURE AND SHIPBUILDING
DATE	:	13 JANUARY 2017
TIME	:	03.00 PM – 5.00 PM
DURATION	:	2 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. 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 only.

5. Please write your answers on the answer booklet provided.

6. Answer all questions in English / Bahasa Melayu language ONLY.

THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a)   Residual current circuit breaker is an electrical circuit device that offers safety to human and electrical properties. Explain the principle of operation of the device referring to Figure 1 below. **(CLO 1)**
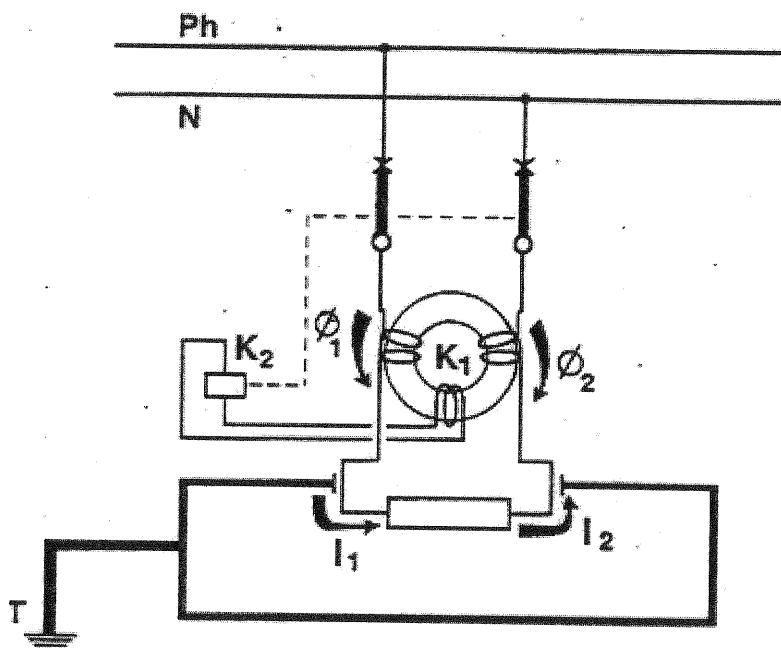

Figure 1: Residual current circuit breaker

(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. **(CLO 1)**

i.   Define the function of polarity test.

(2 Marks)

ii.   Explain the procedure of live-circuit polarity test.

(8 Marks)

iii. Illustrate a connection wires from the multimeter to one (1) of the testing point for live-circuit polarity test as Figure 2 below. (Draw back on your answer paper).
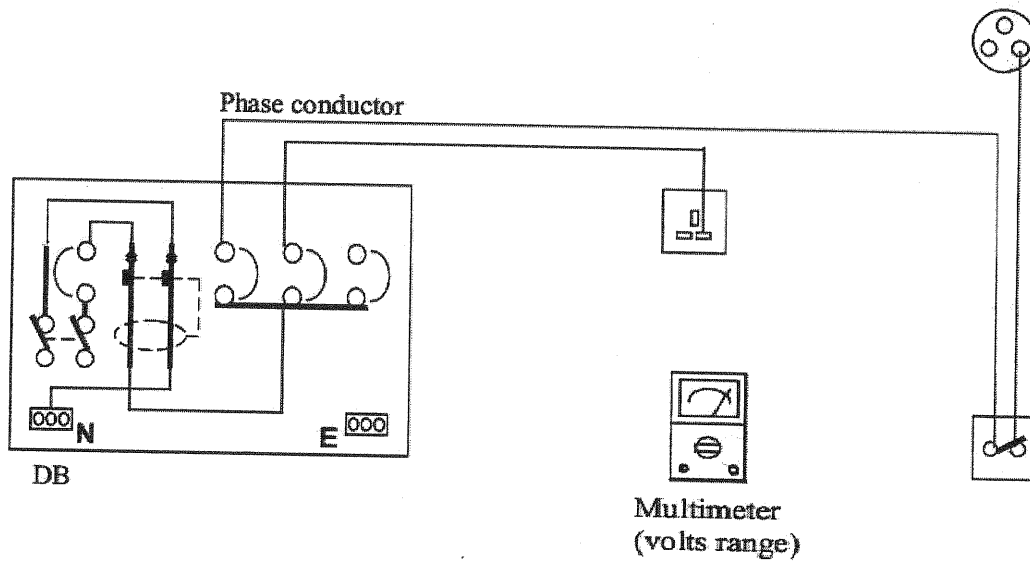

Figure 2: Connection wire from DB to socket outlet and switches

(2 Marks)

Question 2

(a)   In star-connected load as shown below, there are three line conductors connected to a load and the outlets from the loads are joined together at N (Neutral point), the loads can be in a balanced system. Explain the condition of connection in of balanced system. **(CLO 1)**
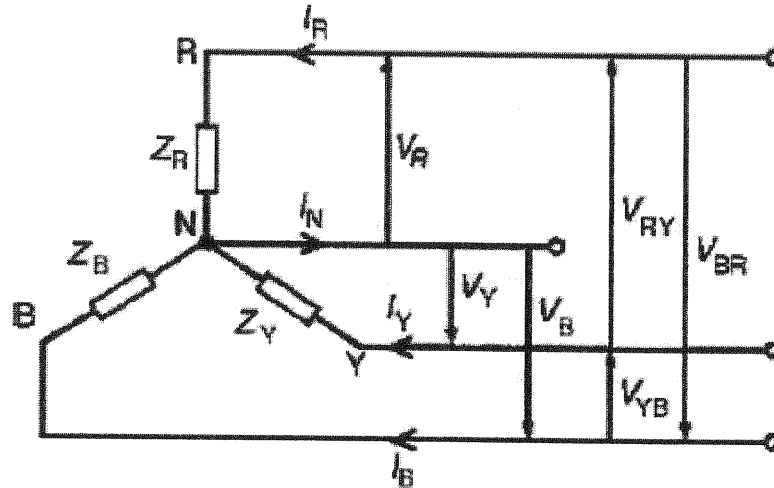

Figure 3: Star-connection load connection

(2 Marks)

(b)   A series RLC circuit having a resistance of 40Ω, an inductor of 10 mH and a capacitor of 250μF is connected with an AC supply voltage of 120 sin (314t + 60). Calculate: **(CLO 2)**

i   The impedance of the circuit.

(8 marks)

ii   The current.

(2 marks)

iii   Voltage across all loads

(6 marks)

iv   Power

(2 Marks)

Question 3

(a)   There are two sources of losses in transformers on load, these because of copper losses and iron losses. **(CLO 1)**

      i.   Define transformer efficiency

(2 Marks)

      ii.   Explain cause of copper losses and iron losses happened

(6 Marks)

(b)   A single phase transformer has 400 turns on primary and 1000 of secondary turns. If the primary winding is connected to a voltage supply of 50V, 50Hz. Calculate:
(CLO 2)

      i.   The voltage induced in the secondary winding.

(2 Marks)

      ii.   The current at secondary if the secondary winding connected to a 20Ω resistor, 50mH inductor and 100µF.

(10 Marks)

SECTION B (Total: 40 marks)

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

Question 4

A 400 kVA transformer has a primary winding resistance of 0.5Ω and a secondary winding resistance of 0.001Ω. The iron loss is 2.5kW and the primary and secondary voltages are 5 kV and 320V respectively. If the power factor of the load is 0.85. Determine the efficiency of the transformer. (CLO 2)

(a)   On full load

(13 Marks)

(b)   On half load

(7 Marks)

Question 5

Practically, the whole electrical energy we consume daily comes from mechanical energy conversion. This conversion is performed in power generating stations. Figure below shows a simplified schematic diagram one of a power generating stations.
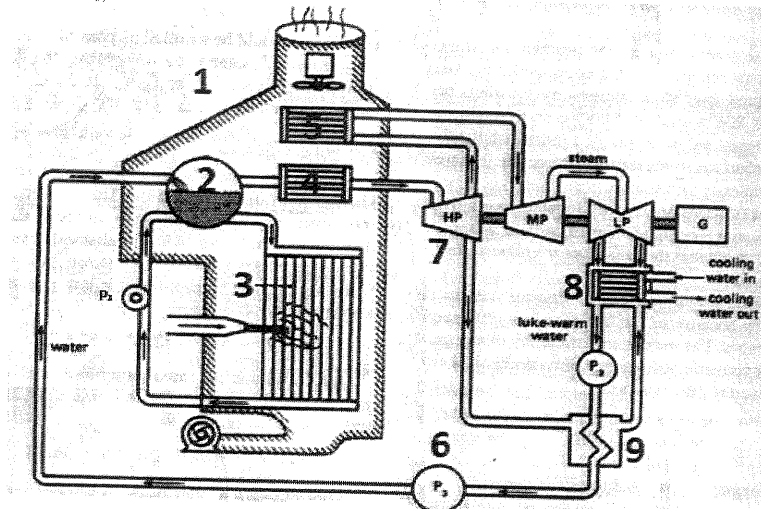

Figure 3: Thermal Generating Power Plant

(a)   Identify the type and one (1) of source of energy for power generating station in Figure 3. **(CLO 1)**

(2 Marks)

(b)   Analyzes the Figure 3 and describe the function of components that was marks. **(CLO 2)**

(18 Marks)

Question 6

(a)   There are several types of electrical machines widely used in any industries including motor and generator. State: **(CLO 1)**

   i.   State definition of motor

(1 Mark)

   ii.   State definition of generator

(1 Mark)

   iii.   List three (3) types of DC motor

(3 Marks)

   iv.   List two (2) types of AC motor

(2 Marks)

(b)   A 240V, DC shunt-wound motor has an armature resistance of 0.4 Ω and at a certain load has an armature current of 30A and runs at 1350 rev/min. If the load on the shaft of the motor is increased so that the armature current increases to 45A, determine the speed of the motor, assuming the flux remains constant.
(CLO 2)

(7 Marks)

(c)   A series motor has an armature resistance of 0.2Ω and a series field resistance of 0.3Ω. It is connected to a 240V supply and at a particular load runs at 24 rev/s when drawing 15A from the supply. **(CLO 2)**

   i.   Determine the generated e.m.f. at this load.

(2 Marks)

   ii.   Calculate the speed of the motor when the load is changed such that the current is increased to 30A. Assume that this causes a doubling of the flux.

(4 Marks)

END OF QUESTIONS