UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION
SEPTEMBER 2016 SESSION

SUBJECT CODE : LMB 10103
SUBJECT TITLE : INTRODUCTION TO MARINE ENGINEERING
LEVEL : BACHELOR
TIME / DURATION : 21/2 HOURS
DATE : SEPTEMBER 2016

INSTRUCTIONS TO CANDIDATES

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

2. This question paper is 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 B. Answer all questions in Section A. For Section B, answer TWO (2) questions only.

6. Answer all questions in English Language.

THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

LMD 20903 Shipboard Marine Engineering Operation
SECTION A (Total: 60 marks)

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

Question 1

With reference to marine propulsion diesel engine.

a. There are 3 main propulsion systems commonly used for seagoing ships that are slow speed diesel engine, medium speed diesel engine and steam turbine propulsion systems. Briefly compare these three types of propulsion systems. (6 marks)

b. With reference to two stroke diesel engine.
   i. Sketch and label the timing diagram (6 marks)
   ii. Explain two stroke cycle operation (8 marks)

Question 2

Refering to marine cooling system

Slow speed diesel engines are usually designed to operate continuously on heavy fuel and keep a constant supply of diesel oil available for manoeuvring operations.

a) Make a detail sketch of a typical fresh water cooling system for the slow speed diesel engine operates on both fuel and diesel oils. (10 marks)

b) Briefly explain about the above (i) fresh water cooling system (10 marks)
SECTION B (Total: 60 marks)

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

Question 3
Reference to marine boiler

(a) Boiler is used to heat water to produce steam, which is then used for other purposes on board ship. There are two basic types of boiler: water tube and fire tube. Briefly compare the two types of boiler in terms of their basic construction, performances and applications. (10 marks)

(b) On the basis of their working principles, steam turbines can be classified as impulse turbine and reaction turbine. Compare the two types of turbine in terms of their basic construction and working principles. (10 marks)

Question 4
Referring to engine cycle.

(a) A slow speed main propulsion engine usually would be a two-stroke while a four-stroke would be used for medium speed main engines and auxiliary engines, eg alternators. Sketch figures and label the main components as well all the events illustrating the working principle of the two-stroke engine. (10 marks)

(b) Briefly describe the working principle of the two-stroke cycle diesel engine that you have drawn above (a). (10 marks)
Question 5

With reference to marine transmission system.

(a) The thrust from the propeller is transferred to the ship through the transmission system. The different items in the system include the thrust shaft, one or more intermediate shafts and the tailshaft. These shafts are supported by the thrust block, intermediate bearings and the sterntube bearing. Produce a sketch of a typical arrangement of the transmission system and label the main components.

(10 marks)

(b) Propeller is a device for producing motion that has blades mounted on a power-driven shaft. A propeller changes an engine's power into forward thrust. Briefly describe the following items related to the propeller and its characteristics:
   i. Propeller Pitch
   (2 marks)
   ii. Fixed-pitch Propeller
   (4 marks)
   iii. Controllable-pitch Propeller
   (4 marks)

Question 6

Reference to marine steering gear.

(a) The steering gear provides a movement of the rudder in response to a signal from the bridge. The total system may be considered made up of three basics sub-systems. Make a sketch showing the operating flow of the sub-systems.

(6 marks)

(b) Briefly describe the operating principle of the steering gear system as per sketched above.

(8 marks)

(c) A steering gear system of a small ship, usually is of a hydraulic power unit operates two rams acting on each side of the rudder crosshead. Draw a sketch of this hydraulic power unit with two-ram steering gear arrangement.

(6 marks)

END OF QUESTIONS