UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2017 SEMESTER

COURSE CODE	: LGB40503
COURSE NAME	: INTRODUCTION TO MARINE MACHINERIES
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	: BACHELOR OF MARITIME OPERATIONS (HONS) BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN NAVAL ARCHITECTURE & SHIPBUILDING
DATE	: 11/07/2017 TUE
TIME	: 2.00 PM - 05.00 PM
DURATION	: 3 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, INCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

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

Question 1

(a) List two main features each of the following marine propulsion systems:

i) Diesel engine

ii) Steam turbine

iii) Gas turbine

iv) Hybrid diesel-electric

(8 marks)

(b) Sketch and label the diesel engine four stroke cycles of a marine diesel engine showing the movement of piston between the top dead center and bottom dead center and the closing and opening of the intake and exhaust valves.

(4 marks)

(c) Explain the processes of the four-stroke cycles of a marine diesel engine when in operation.

(8 marks)

Question 2

(a) Sketch and label a typical conventional (non-nuclear reactor type) steam plant used in a marine steam propulsion system.

(10 marks)

(b) Explain the working principles of a typical conventional (non-nuclear reactor type) steam plant used in a marine steam propulsion system which you sketched in (a) above.

(5 marks)

(c) Describe briefly the function of the following sub-components or equipment found in steam turbine propulsion system:

i) Main condenser

ii) Feed pump

iii) Feed water heater

iv) Maneuvering valve or steam throttle

v) Boiler

(5 marks)

SECTION B (Total: 60 marks)

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

Question 3

(a) Sketch and label a cross-sectional view of a gas turbine engine.

(5 marks)

(b) Sketch and label a closed cycle model of a Brayton gas turbine engine.

(5 marks)

(c) Explain briefly the processes across each section of a closed cycle model of a Brayton gas turbine engine in (b) above.

(4 marks)

(d) A transatlantic super container ship is propelled by a marine gas turbine propulsion system. The gas turbine engine takes in air at an ambient temperature of 25° C. If the thermal efficiency of the gas turbine engine is set to achieve 80%, deduce the temperature and the pressure of the hot compressed air entering the combustion, given that the specific heat ratio k = 1.5. Show the formulation used in your deduction.

(6 marks)

Question 4

(a) Sketch a sectional view and label tom show internal parts of a reduction gearbox and the associated gears and clutch units.

(8 marks)

(b) Sketch 4-bladed propellers and show clearly the root, tip, trailing edge, leading edge, pressure surface and the hub.

(6 marks)

(c) A 4-bladed B-series Wageningen propeller of pitch P = 6 m and rate of rotation per minute N = 600 has the following data lifted from the standard series propeller curves for J=1.2; K_T = 0.14, K_Q = 0.04 and P/D = 2. Assuming the propeller is being open water tested in fresh water, determine the torque, thrust and the open water efficiency.

(6 marks)

Question 5

(a) Name the two categories of pump use in many applications onboard ships.

(4 marks)

(b) Give two (2) examples of pumps for each category in (a) above.

(4 marks)

(c) State the function of the following auxiliary equipment:

i) Heat exchanger

ii) Fuel/Oil – water centrifuge

iii) Sewage treatment plant

iv) Steering gear

(8 marks)

(d) Draw a schematic diagram of a ship active fin stabilizer system and explain briefly the working principles.

(4 marks)

Question 6

(a) Sketch sectional view of a marine diesel engine and show five internal parts or components of the engine.

(8 marks)

(b) Sketch p - v and T – s of gas turbine process and explain the processes across the stages (stages 1 - 2, 2 - 3, 3 - 4 and 4 - 1).

(8 marks)

(c) List four advantages of a controllable pitch propeller over a fixed pitch propeller.

(4 marks)

END OF EXAMINATION PAPER