UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2017 SEMESTER

COURSE CODE : LMB20603
COURSE NAME : MARINE DIESEL ENGINE 1
PROGRAMME NAME
(FOR MPU: PROGRAMME LEVEL) : BACHELOR OF ENGINEERING TECHNOLOGY (HONS)
                               IN MARINE ENGINEERING
DATE : 04/07/2017 TUE
TIME : 02.00 PM - 04.30 PM
DURATION : 2 HOURS 30 MINUTES

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 FIVE (5) questions. Answer FOUR (4) questions only.
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 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.
INSTRUCTOR: Answer FOUR (4) questions ONLY. (Total: 100 marks) 
Please use the answer booklet provided.

Question 1

With reference to engine performance:

(a) Sketch a typical P-V diagram for a large two-stroke diesel engine and explain what is meant by mean effective pressure in relation to the diagram. (7 marks)

(b) A two-stroke crosshead diesel engine has the following specifications:
   
   No. of cylinders = 8
   Cylinder bore, D = 700 mm
   Piston stroke, S = 2360 mm

   A diagram taken at 108 rpm using an engine indicator having a spring scale of 1 bar = 0.3 mm, had an area of 399 mm² and a diagram length of 70 mm. Calculate:

   i. The mean effective pressure in bar and MPa (1 bar = 0.1 MPa). (8 marks)

   ii. The indicated power (IP) of the engine assuming that the mean effective pressure of all cylinders is identical. (10 marks)

Question 2

With reference to engine lubrication:

(a) Sketch and discuss how lubricating oil is conveyed to top end, bottom end and main bearings of a large two-stroke slow speed engine. (18 marks)

(b) Discuss the means of recognizing and the signs of deterioration of the lubricating oil. (7 marks)
Question 3

With reference to diesel engine heat balance:

(a) Sketch a typical Sankey diagram showing the heat balance of a large two-stroke diesel engine and indicate all the losses in the system in terms of percentage.  

(10 marks)

(b) Discuss the means used onboard the ship to recover some of the heat losses in your diagram in (a).  

(5 marks)

(c) Analyze the indicator diagram shown in Figure 1 and explain the possible reasons of the fault.  

(10 marks)

![Figure 1](image-url)  

both $p_{\text{comp}}$ and $p_{\text{max}}$ are low.

Figure 1. (Source of Image: Diesel I, by K. Kuiken)

Question 4

With reference to combustion and fuel oil system onboard ships:

(a) Sketch and show the components of a typical main engine fuel system for a large two-stroke diesel engine.  

(15 marks)

(b) Discuss the procedure for changing over from heavy fuel oil to diesel oil prior to arrival in port making mention of the necessary precautions to ensure safe operation.  

(10 marks)
Question 5

With reference to lubrication oil testing:

(a) Discuss how a representative sample of used lubricating oil is obtained from the main engine system for analysis. (7 marks)

(b) Discuss THREE (3) onboard tests that can be carried out for used lubricating oil. (9 marks)

(c) Suggest possible means on how the condition of lubricating oil could be assessed if no testing equipment is available onboard. (9 marks)

END OF EXAMINATION PAPER