CONFIDENTIAL

UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION

JULY 2025 SEMESTER SESSION

SUBJECT CODE	:	**LMB32302**
SUBJECT TITLE	:	**SHIP CONSTRUCTION**
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	**BACHELOR OF MARINE ENGINEERING TECHNOLOGY WITH HONOURS**
TIME / DURATION	:	**9.00 AM – 12.00 PM (3 HOURS)**
DATE	:	**16 DECEMBER 2025**

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. Answer **FOUR (4)** questions **ONLY**.
4. Please write your answers on the answer booklet provided.
5. Answer all questions in English language ONLY.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FOUR (4) questions ONLY.

Question 1

With reference to ship dimension and form.

(a) The beam in Figure 1 (a) is to be used as a deck girder for box-shaped barge. Identify the beam true neutral axis (N.A) and the moment of Inertia about the N.A.

(10 marks)

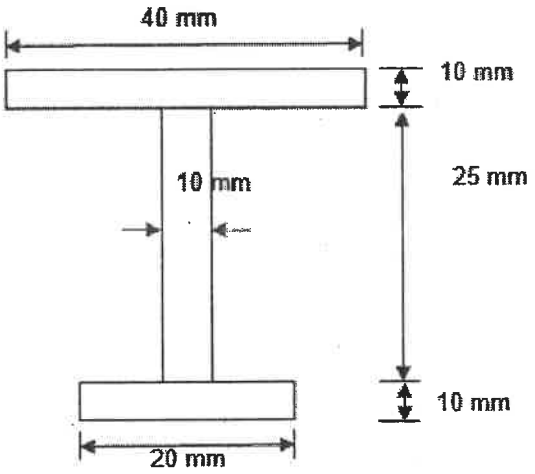

Figure 1(a)

(b) The midship section of a ship breadth given as 25 m and depth 20 m. All the materials are steel. Calculate the section modulus at keel for the barge cross section as shown in Figure 1(b).

(15 marks)

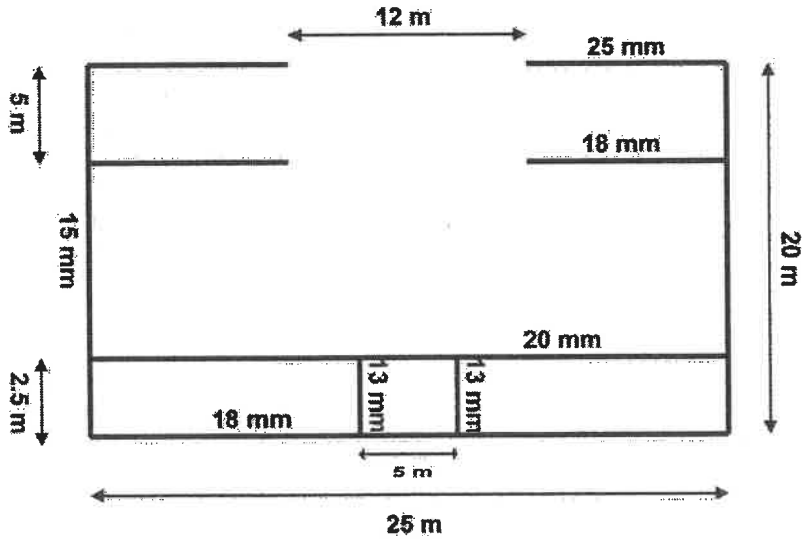

Figure 1(b)

Question 2

(a) Given in Table 2 (a) is the uncorrected bending moment (BM_{uc}) distribution along the length of a vessel. Estimate:

i) The correction to the BM for all stations by fixing end values to zero. (5 marks)

ii) The corrected BM for all stations. (5 marks)

Table 2(a)

Station	0	1	2	3	4	5	6	7	8	9	10
$BM_{uc}x10^9$(Nm)	0	10	20	30	35	40	30	25	15	10	5

(b) A superstructure is joined to the main hull at its lower boundary. As the ship sags or hogs the boundary becomes compressed and extended respectively. Thus, the superstructure tends to be arched in the opposite shear forces due to the stretch or compression and normal forces trying to keep the two in contact. The ability of the superstructure to accept these forces, and contribute to the section modulus for longitudinal bending, is regarded as an efficiency.

i) Express an efficiency formula for a superstructure. (5 marks)

ii) If the superstructure efficiency of a frigate is 85%, the upper deck stress for the ship without a superstructure (σ_o) is 200 N/mm^2 and stress when the superstructure is fully effective is 160 N/mm^2, estimate the stress subjected to the upper deck. (5 marks)

iii) If the superstructure efficiency dropped to 60% due to corrosion damage, calculate the new stress on the upper deck. (5 marks)

Question 3

(a) The beam is simply supported with a pinned support at point A and a roller support at point B, located 4 m from A. The beam extends a total of 6 m, leaving a 2 m overhang from B to the free end, point C. A uniformly distributed load (UDL) of 20 kN/m is applied along the 4 m span from A to B. Additionally, a point load of 30 kN is applied vertically downward at the free end C. Given weight A = 3262 Kg and g = 9.81ms^{-2}. Calculate the reactions at A and B. Hence draw the shear force and the bending moment diagrams for the beam and loading shown.

(20 marks)

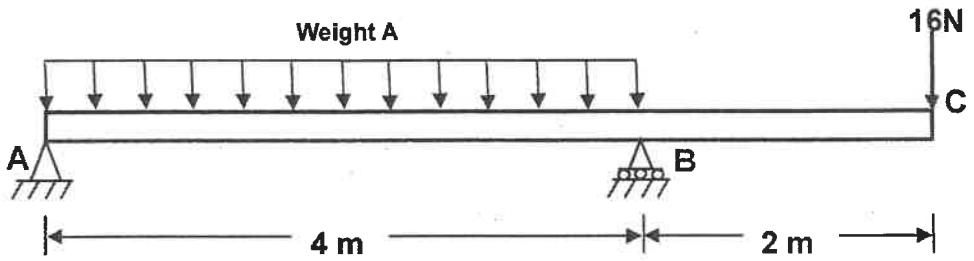

Figure 3(a)

(b) The ship has 200 m in length, its midships second moment of area is 1200 m^4, neutral axis position is 6.5 m from the keel and 7.0 m from the main deck. Calculate the keel and the deck stresses at midships position with the bending moment 37.5 MNm.

(5 marks)

Question 4

(a) The LBP of the ship is 180 m and the beam is 28 m and block coefficient is 0.74. The hull weight is 5000 tonnes having LCG 25.5 m from amidships. The mean LCB is 25 m from amidships. Values of the constant b are: hogging 9.647 and sagging 10.850. By using Murray's Method, calculate the longitudinal bending moments amidships for the ship on a standard wave with the crest amidships and the through amidships. The data for the ship are as given in Table 4(a).

(20 marks)

Table 4(a)

Item	Weight (tonnes)	LCG from amidships
Hold No. 1	1800	55.0 m aft
Hold No. 2	3200	25.5 m fwd
Hold No. 3	1200	5.5 m fwd
Hold No. 4	2200	24.0 m aft
Hold No. 5	1500	50.0 m aft
Machinery	1500	7.5 m aft
Fuel Oil	400	8.0 m aft
Fresh Water	150	10.0 m fwd

(b) Calculate the stress subjected to the ship at a coordinate position of 12 m from the ship's centerline and 10 m from the inclined neutral axis on the midships section as the ship rolls to 20 degrees, given that the second moment of areas about the neutral axis (I_{NA}) is 350m^4 and about the ship vertical centerline (I_{CL}) is 250 m^4 and the midships bending moment is 300 MNm.

(5 marks)

Question 5

(a) A box-shaped barge of uniform construction is 35 m long and barge weight is 385 tonnes, is divided by bulkheads into four (4) compartments. Initially, the cargo for each compartment is loaded as follows.

No. 1 hold 500 tonnes	No. 2 hold 490 tonnes
No. 3 hold 490 tonnes	No. 4 hold 500 tonnes

If cargo in No. 1 and No. 4 are removed, determine the bending moment at the bulkheads and at the position of maximum value.

(20 marks)

(b) The ship has second moment of area of the midship section 600 m^4, neutral axis 4.5 m from deck and 5.1m from keel, find the section modulus of the midship section and value of the maximum stress occurs, given bending moment at midship is 9820.58 tonnes meter.

(5 marks)

END OF EXAMINATION PAPER