UNIVERSITI MALAYSIA TERENGGANU

FINAL EXAMINATION
PEPERIKSAAN AKHIR

SEMESTER I 2023/2024 SESSION (DEGREE PROGRAMME)
SEMESTER I SESI 2023/2024 (SARJANA MUDA)

COURSE ***KURSUS***	:	**NAVAL ARCHITECTURE AND SHIP CONSTRUCTION** ***SENIBINA DAN PEMBINAAN KAPAL***
COURSE CODE ***KOD KURSUS***	:	**MMT3154**
DURATION ***TEMPOH***	:	**2 HOURS** ***2 JAM***

MATRIC NO. ***NO. MATRIK***	:	_____
PROGRAMME ***NAMA PROGRAM***	:	_____
SEAT NO. ***NO. MEJA***	:	_____

INSTRUCTIONS TO CANDIDATES
ARAHAN KEPADA CALON

i. Answer all questions.
Sila jawab semua soalan.

ii. All answers must be written in answer booklet provided.
Semua jawapan hendaklah ditulis dalam buku jawapan yang disediakan.

DO NOT OPEN THE QUESTION PAPER UNTIL INSTRUCTED
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

THIS QUESTION PAPER CONSISTS OF FIVE (5) PRINTED PAGES
KERTAS SOALAN INI MENGANDUNGI LIMA (5) MUKA SURAT BERCETAK

Please answer all questions.
Sila jawab semua soalan.

Question 1 / *Soalan 1* (25 marks*/25 markah*)

a) A ship's displacement of 324,522 tonnes has the following characteristics:
Sesaran sebuah kapal sebanyak 324,522 tan mempunyai butiran berikut:

Length between perpendicular 130 m;
Panjang antara penegak 130 m
Moulded breadth 19.5 m;
Lebar teracu 19.5 m
Draught 8.15 m (SLWL);
Draf 8.15 m (SLWL)
Midship area 157.02 m^2;
Kawasan peminggang 157.02 m^2
Waterplane area 2003 m^2;
Kawasan satah air 2003 m^2

Calculate the following coefficients and terms: block coefficient (Cb), fineness coefficient (Cw), prismatic coefficient (Cp), midships coefficient (Cm), tonnage per centimeter (TPCsw) and fresh water allowance (FWA). (13 marks)
Hitung pekali-pekali yang berikut: pekali blok (Cb), pekali kehalusan (Cw), pekali prismatik (Cp), pekali peminggang kapal (Cm), tan per sentimeter (TPCsw) dan basi air tawar (FWA). (13 markah)

i. *Cb* (2 marks)
Cb (2 markah)
ii. Cw (2 marks)
Cw (2 markah)
iii. Cp (2 marks)
Cp (2 markah
iv. Cm (2 marks)
Cm (2 marks)
v. TPCsw (3 marks)
TPCsw (3 marks)
vi. FWA (2 marks)
FWA (2 marks)

b) A barge with identical transverse sections has a dimension of its length of 40 metres, a breadth of 10 metres, and a designed waterline (DWL) of 5 metres, as illustrated in Figure 1.
Tongkang dengan bahagian melintang yang sama mempunyai dimensi panjangnya 40 meter, lebar 10 meter, dan garisan air yang direkabentuk (DWL) 5 meter, seperti digambarkan dalam Rajah 1.

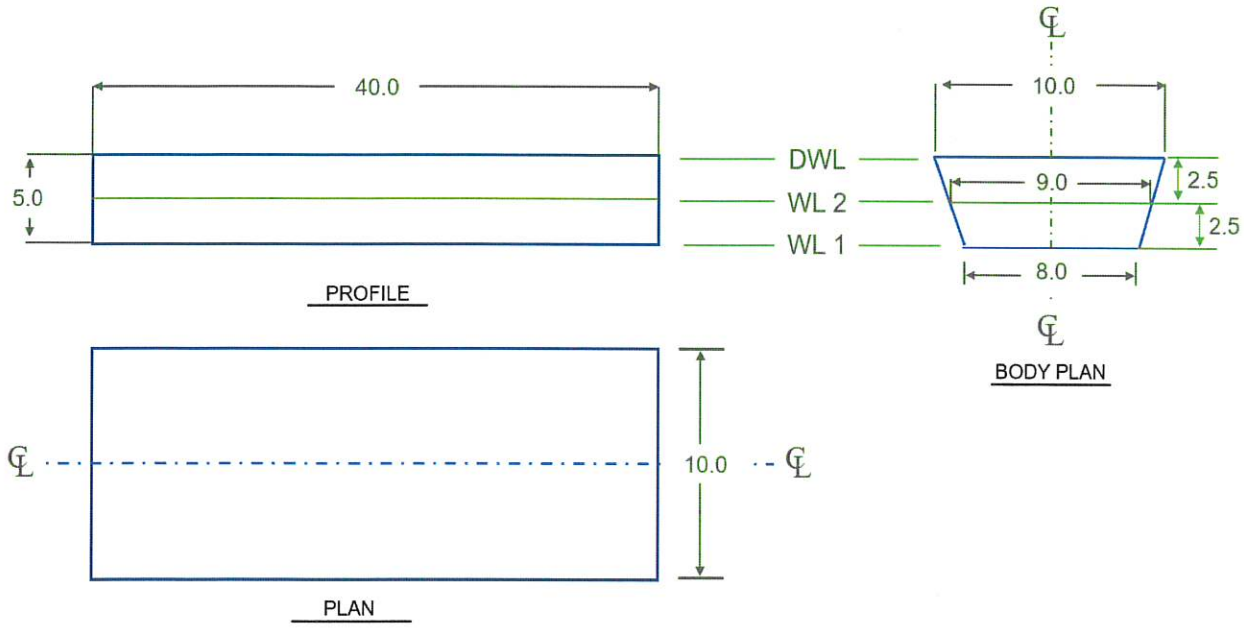

Figure 1: 2D Lines plan of 40 m barge
Rajah 1: Pelan 2D tongkang 40 m

Calculate the values for WL1 (baseline), WL 2, and DWL, then organise your findings according to the table in Table 1. Your answer must be accompanied by a working calculation. (12 marks)
Hitung nilai untuk WL1 (garis dasar), WL 2, dan DWL, kemudian susun jawapan anda mengikut jadual dalam Jadual 1. Jawapan anda mesti disertakan dengan jalan pengiraan. (12 markah)

Table 1 Geometries particular of 40 m barge
Jadual 1 Geometri khusus tongkang 40 m

Item Jenis	WL 1 (BL)	WL 2	DWL
Waterplane area (m^2)			
Volume of displacement (m^3)			1800
Block coefficient C_B)			
Midship coefficient (C_{AM})		0.9444	

Question 2 / *Soalan 2* (25 marks/*25 markah*)

The half-ordinates of a ship waterplane at equidistant intervals of 22.5 m are as follows:
Separuh ordinat satah air kapal pada jarak yang sama 22.5 m adalah seperti berikut:

Table 3 Half-ordinate of 180 m ship
Jadual 3 Luas kawasan satah air

Station	1 (AP)	1/2	2	3	4	5	6	7	8	8 1/2	9 (FP)
½ ord (m)	1.7	2.2	4.9	7.9	9.7	9.75	8.45	5.1	1.85	0.7	0

Calculate:
Hitung:

a) Waterplane area of a vessel (7 marks)
Luas kawasan satah air kapal (7 marks)
b) LCF from amidships (7 marks)
LCF from amidships (7 marks)
c) Second moment of waterplane area about amidships (I_Φ) (7 marks)
Momen kedua kawasan satah air kira-kira di tengah-tengah kapal (7 marks)
d) Second moment of waterplane area about a longitudinal centre of floatation (I_{LCF}) (2 marks)
Momen kedua kawasan satah air mengenai pusat terapung membujur (2 marks)
e) If the ship's displacement volume is 10,000 m^3, estimate the longitudinal BM_L (2 marks)
Jika isipadu sesaran kapal ialah 10,000 m^3, anggarkan BM_L membujur (2 marks)

Question 3 / *Soalan 3* (25 marks/*25 markah*)

A ship with an LBP of 100 m has the following half breadths. At this draught, the ship has a volume displacement of 10,000 m^3.
Sebuah kapal dengan LBP 100 m mempunyai separuh keluasan berikut. Pada draf ini, kapal mempunyai sesaran isipadu 10,000 m^3.

Table 1 Half-breadth of 100 m ship
Jadual 1 Separuh lebar kapal 100 m

Station	0 (AP)	1	2	3	4	5	6	7	8 (FP)
½ breadth (m)	1.8	5.1	8.3	9.9	9.85	8.25	5.35	1.75	0

Calculate:
Hitung:

a) The moment of inertia about the centreline (I_{LC}) for the waterplane. (22 marks)
Momen inersia mengenai garis tengah (I_{LC}) bagi satah air itu. (3 marks)
b) The height of the transverse metacenter above the center of buoyancy (BM_T)? (22 marks)
Ketinggian metacenter melintang di atas pusat keapungan (BM_T)? (3 marks)

Question 4 / *Soalan 4* (25 marks/*25 markah*)

a) A vessel of 13,000 tonnes, KM is 10.5 m (assumed constant) and KG is 9.5 m loads: for 400 tonnes, KG is 2.9 m; 900 tonnes, KG is 6.0 m; 1500 tonnes, KG is 10.6 m; 2000 tonnes, KG is 8.3 m. She discharges 700 tonnes, KG is 1.5 m; 300 tonnes, KG is 12.7 m.
Sebuah vesel 13,000 tan, KM ialah 10.5 m (diandaikan malar) dan KG ialah 9.5 m beban: untuk 400 tan, KG ialah 2.9 m; 900 tan, KG ialah 6.0 m; 1500 tan, KG ialah 10.6 m; 2000 tan, KG ialah 8.3 m. Dia melepaskan 700 tan, KG ialah 1.5 m; 300 tan, KG ialah 12.7 m.

Calculate the moment of statical stability if she is now heeled 8°. (8 marks)
Hitung momen kestabilan statik jika kapal kini di papak bawah 8°. (8 markah)

b) A vessel 150m in length, 18m in breadth, MCT 1 cm 150 tonnes-metres, TPC 25 is drawing 6.35m F 6.65m A and loads the following:
Sebuah kapal 150 m panjang, 18 m lebar, MCT 1 cm 150 tan-meter, TPC 25 sedang berada 6.35 m F, 6.65m A dan memuatkan yang berikut:

- 230 tonnes in No. 1 hold — 50 m forward of the centre of flotation
  230 tan di No. 1 dikedudukan 50 m ke hadapan dari pusat pengapungan
- 800 tonnes in No. 3 hold — 20 m forward of the centre of flotation
  800 tan di No. 3 dikedudukan 20 m ke hadapan dari pusat pengapungan
- 500 tonnes in No. 4 hold — 21 m aft of the centre of flotation
  500 tan di No. 4 dikedudukan 21 m di belakang pusat pengapungan
- She discharges 200 tonnes from No. 2 hold — 36 m forward of the centre of flotation
  Kapal memunggah 200 tan dari No. 2 dikedudukan 36 m ke hadapan dari pusat Pengapungan
- She discharges 105 tonnes from F tank — 60 m forward of the centre of flotation
  Kapal memunggah 105 tan dari tangki F dikedudukan 60 m ke hadapan dari pusat pengapungan

The centre of flotation is 5 m abaft amidships. Calculate the new end drafts. (17 marks)
Pusat pengapungan adalah 5m di belakang kapal. Hitung draf akhir baharu. (17 markah)

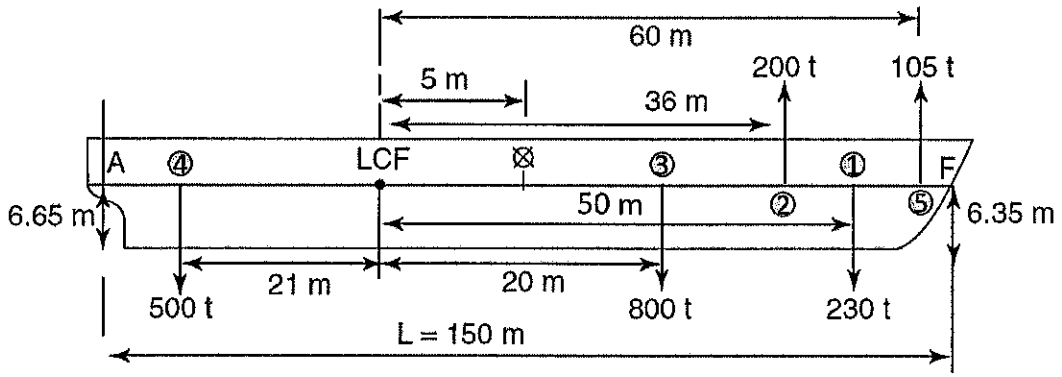

Figure 2: Loading-discharging cargo on the vessel
Rajah 2: Pembebanan-pemunggahan berat di atas kapal

End of Question Paper
Kertas Soalan Tamat