L-3/T-1/NAME **Date: 01/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Sc. Engineering Examinations 2017-2018

Sub: **NAME 351** (Ship Structure)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

Assume reasonable values for missing data. Symbols have their usual meanings.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Classify the weight items of ships. **(5)**

   (b) Describe the Biles and Cole method for calculating the steel weight of ships. **(15)**

   (c) A ship whose length is 72 m has the following mean values for weight and buoyancy, as measured at centers between each of 6 displacement stations. Find the shear force and bending moments at amidships. **(15)**

Station	Weight (tonnes/m)	Buoyancy (tonnes/m)
½	3.98	1.65
1½	7.84	6.37
2½	4.39	7.87
3½	3.78	6.77
4½	3.17	4.30
5½	4.77	0.98

2. (a) Describe the Murray's method for calculation of Still Water Bending Moment (SWBM) and Wave Bending Moments (WBM). **(15)**

   (b) The following data refer to a general cargo ship: **(20)**

   Length = 448 ft; Block coefficient = 0.75; Beam = 62 ft.

Item	Weight (tons)	L C G from amidships (ft)
Machinery	1050	21A
No. 1 Hold	1510	155F
No. 2 Hold	3305	77F
No. 3 Hold	1941	80A
No. 4 Hold	1210	150A
Oil Fuel	120	25A
Fresh Water	105	18F
Fresh Water	60	27A

The mean LCG from amidships of the hull and outfit weight of the fore and aft bodies may be assumed at 100 ft. The total hull and outfit weight = 3974 tons. The LCB of the fore and aft bodies is L (0.174 × Cb + 0.057) from amidships. Values of b' are: hogging 51.0, sagging 57.4 in the relationship $W B M = b' \times L^{2.5} B \times 10^{-3}$.

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3. (a) Explain with flow diagram the rationally-based structural design procedure of ship structure. **(15)**

(b) The sectional area curve of a box-shaped barge [Fig. for Question No. 3(b)] of length 60 m and breadth 12 m shows that the area of cross section over 30 m at mid-length is constant and then diminishes uniformly to zero at each end. The barge carries a uniformly distributed weight (including its own) of 7 t/m over its entire length. The barge may carry a uniform load of 16 t/m over the middle half of the vessel's length. Find the magnitude of bending moment amidships. **(20)**

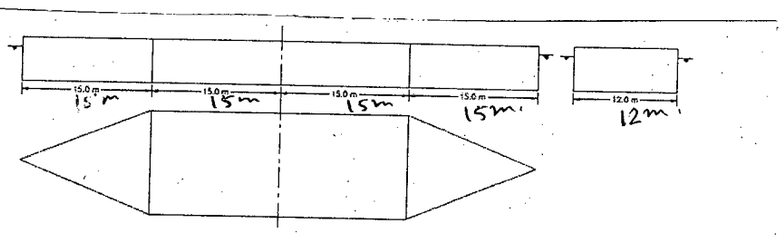

Fig. for Questions No. 3 (b)

4. (a) Write General conclusions from static tests regarding the experiments of longitudinal strength of ships. **(15)**

(b) Calculate the deck and keel moduli of the structural section shown in Fig. for Question No. 4(b). The center of area of each girder and longitudinal may be assumed to lie in the plating to which it is attached, Second moments of girders about their own C.Gs are negligible. **(20)**

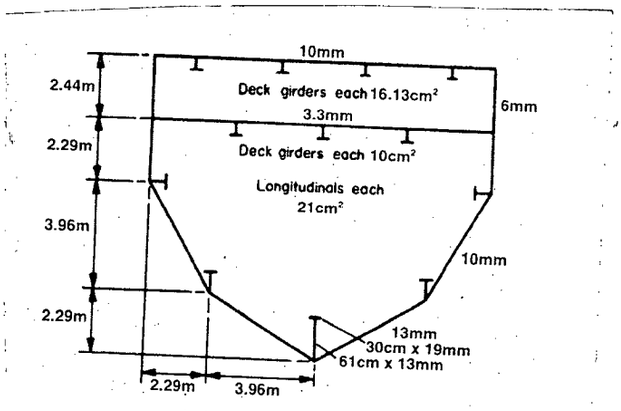

Fig. for Questions No. 4 (b)

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SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Define simple grillage. Why grillage problem is complicated in ship structure? Derive the mathematical expression of reaction at the intersection of a simple grillage. **(20)**

(b) A beam shown in Figure for Q. No. 5(b) is fixed on both ends with a roller support 5 ft from the left end. There is also a distributed load of 10 kips/ft over the first 5 ft and a point load of 20 kips at 4 ft to the right of the roller. Find the moments at the supports A, B and C using moment distribution method. **(15)**

6. (a) A tubular derrick post is 60 cm outside diameter and 1.25 cm thick. It is 5.40 m high and is rigidly attached at its lower end to a deck. The post is to be stayed, the stay being inclined at 30° to the horizontal and being attached to the top of the post. The lower end of the stay is attached to the deck on which the derrick post stands. A horizontal load of 15 tonne is applied to the top of the post in the plane of the stay. Calculate the cross-sectional area of the stay if the stress in it is not to exceed 1 tonne per sq. cm and determine the greatest stress in the post. The modulus of elasticity of the material of the stay is one-half that of the material of the post. **(18)**

(b) Define watertight bulkhead. Develop the expressions of shear force, bending moment, slope and deflection of a fixed ended watertight bulkhead. **(17)**

7. (a) In converting a steel survey ship, it is proposed to extend the short forecastle for the whole length of the ship and to arrange the structure so that it contributes 100 percent to the hull girder. The new structure is wholly of light alloy. Estimate the new nominal stresses due to the change in section modulus, assuming that the bending moment remains unchanged. **(20)**

Before conversion:

BM = 7750 tonnef/m, I = 23970 cm^2m^2,

A = 4520 cm^2, y deck = 2.9 m, y keel = 3.05 m.

Added structure (shown in Figure for Q. No. 7(a)):

Side plating 2.3 m × 10 mm stiffened by one 26 cm^2 girder at mid height.

Deck plating 11 m × 10 mm stiffened by five 26 cm^2 girders with centre of area 8 cm below the deck. E, alloy = 69 GPa; E, steel = 207 GPa.

(b) Explain stress concentration with figure. Explain the following discontinuities of ship structures: **(15)**

(i) Deck openings and

(ii) End of girders and other structural members.

8. (a) Derive the expression of minimum critical buckling stresses of a simply supported rectangular plate. **(20)**

(b) Find the amplitude, deflection and edge moments of a simply supported rectangular plate subjected to the loading **(15)**

$$P = P_0 \sin\frac{\pi x}{a}\sin\frac{\pi y}{b}$$

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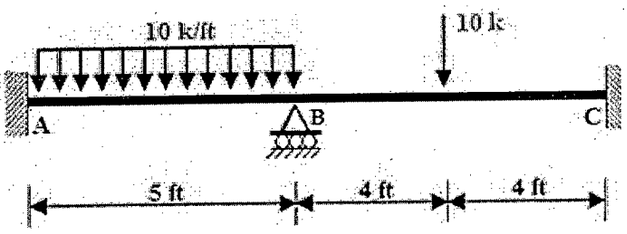

Figure for Question No. 5(b)

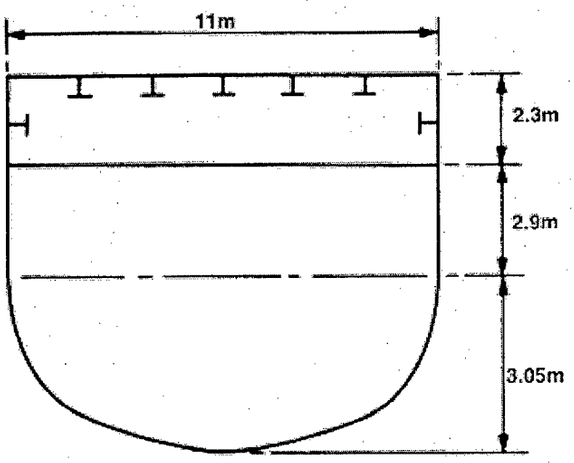

Figure for Question No. 7(a)

L-3/T-1/NAME **Date: 11/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Sc. Engineering Examinations 2017-2018

Sub: **NAME 323** (Resistance and Propulsion of Ships)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

Symbols have their usual meaning. Assume reasonable value for missing data, if any.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) With a neat sketch describe a marine propeller. **(12)**

   (b) In a four-bladed propeller of 5.5 m diameter, the expanded blade widths at the different radii are as follows: **(20)**

r/R	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
C (mm)	1456	1645	1795	1884	1916	1878	1726	1386	0

   The thickness of the blade at the tip is 15.2 mm and at r/R = 0.25, it is 191.7 mm. The propeller boss is shaped like the frustum of a cone with a length of 900 mm and has forward and aft diameters of 890 mm and 800 mm. The propeller has a rake of 16 degrees aft and the reference line intersects the axis at the mid-length of the boss. Determine the expanded blade area ratio, the blade thickness fraction and the boss diameter ratio. Assume boss diameter at root section as 832 mm and the blade width at the root section as 1390 mm.

   (c) Why does the detailed design of a propeller essentially consist in designing the expanded sections? **(3)**

2. (a) Describe impulse theory of propeller action and hence deduce the expression of the efficiency. **(20)**

   (b) Establish the relation between the axial and rotational induced velocities in a propeller neglecting the friction. **(15)**

3. (a) Derive the expressions of bending moments due to thrust and torque of a screw propeller and hence prove that $M_T = 0.2376\frac{TD}{Z}$ and $M_Q = 0.6691\frac{Q}{Z}$. **(18)**

   (b) A propeller of 3.0 m diameter and constant face pitch ratio 1.0 runs at 180 rpm. The bending moments due to thrust and torque are respectively 66 kNm and 60 kNm. The mass of each blade is 570 kg, the centroid being at a radius of 0.755 m. The centroid of

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Contd... Q. No. 3(b)

the root section at 0.2 R is 0.150 m forward of the centroid of the blade and 0.035 m towards the leading edge from it. The root section has a chord of 0.8 m, a thickness of 0.16 m and an area of 0.09 m^2. The position of maximum thickness is 0.27 m from the leading edge. The centroid of the section is 0.065 m from the face and 0.29 m from the leading edge. The leading and trailing edges at the root sections have offsets of 0.02 m and 0.01 m from the face chord. The moments of inertia of the section about axes through its centroid and parallel and perpendicular to the face chord are respectively 1.5×10^{-4} m^4 and 3.2×10^{-3} m^4. Determine the stress at the leading edge. **(17)**

4. (a) A ship is to have a design speed of 12 Knots at which its effective power is 3000 kW. The maximum propeller that can be fitted is 4.5 m. The propulsion factors based on thrust identity are: w = 0.2, t = 0.15, η_R = 1.05. The shafting efficiency may be taken as 0.97. The minimum blade area ratio required to keep cavitation within acceptable limits is estimated to be 0.55. Determine the propeller rpm and the corresponding brake power taking pitch ratio 0.8. (Use Table 1 for Regression equations for Thrust and Torque coefficients of 4-bladed propellers) **(20)**

(b) Write short note on:

(i) Contra-rotating propeller **(3)**

(ii) Podded propeller **(4)**

(iii) Cavitation criteria of Marine Propellers. **(5)**

(iv) Rake and skew of propeller. **(3)**

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) What considerations are to be made in diminishing the wind resistance of a ship. **(7)**

(b) A double-decker passenger vessel has the following particulars: **(28)**

Length = 33.54 m

Breadth = 7.01 m

Depth = 2.143 m

Draft = 1.524 m

Speed = 11 Knots

Engine power = 335.82 kW

Contd P/3

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Contd... Q. No. 5(b)

Superstructure Dimensions:

1st Deck (L × B × H) = 31.1 × 7.01 × 1.98 [m]

2nd Deck same as 1st Deck

Wheel House (L × B × H) = 4.57 × 4.27 × 1.88 [m]

Funnel – Base diameter × Height above 2nd Deck = 2.13 × 2.44 [m]

For the above vessel, two types of superstructure construction is tried. One is constructed with a flat and practically not rounded front and the other with completely streamlined form.

The total propulsive efficiency is 0.8.

The resistance coefficient with zero angle of attack amounts to approximately as follows:

(i) For flat and practically not rounded front = 0.86

(ii) For completely streamlined form = 0.20

Calculate percentage saving in total power by adopting the second form of superstructure construction in the following wind conditions.

(i) In calm weather

(ii) Head wind of 8.5 m/s (fresh breeze-Beaufort 5)

(iii) Head wind of 17 m/s (fresh gale-Beaufort 8)

(iv) Head wind of 28.32 m/s (storm-Beaufort 10)

6. (a) Describe the effect of form on frictional resistance of a ship. **(5)**

(b) The principal particulars and model experimental results of a ship model is given below: **(20)**

Principal particulars:

Length between perpendiculars = 6.1 m

Wetted Surface Area = 4.312 m^2

Model Experimental Results:

Model speed = 4.115 m/s

Model resistance = 218.574 N

Tank water density = 997.52 kg/m^3

Tank water kinematic viscosity = 1.0111×10^{-6} m^2/s

Perform the necessary calculations for the prediction of model's frictional and residuary resistance using ATTC (Schoenherr) and ITTC formula.

(c) What is Bulbous bow? Describe the effect of bulbous bow using the concept of destructive interference of waves. **(10)**

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7. (a) What is ship squat? What are the factors governing ship squat? **(5)**

(b) Give two reasons why ship squat is more important today than say 40 years ago. **(5)**

(c) What are the advantages to ship operators of knowing how to predict ship squat in open waters and in confined channels? **(10)**

(d) In shallow water for a fully loaded condition, a vessel has a C_B of 0.75. She was on even keel when static. If the vessel moves with a forward speed of 10 Knots, calculate the maximum squat at the bow for the following conditions. **(15)**

(i) In open water

(ii) In a confined channel and

(iii) In a river giving a blockage factor of 0.175.

8. (a) With a neat sketches describe the different components of ship resistance. **(10)**

(b) Describe Froude's contribution for determination of frictional resistance. **(10)**

(c) A vessel has the following dimensions: **(15)**

Length, L = 70.00 m; Breadth, B = 12.50 m; Draft, d = 1.8 m; Displacement, Δ = 855 tonne at fresh water; Wetted girth of hull = 15.5 m; Midship section coefficient, C_M = 0.855.

The vessel is moving in a channel having the section shown in the Fig. for Q. No. 8(c). If the channel is filled with water of density 995.81 kg/m^3 and kinematic viscosity 0.8043×10^{-6} m^2/s and the ship speed is 12 Knots, calculate the speed-resistance-power relationship in the channel.

Q.N. 4(a)

Table 1: Regression Equations for Thrust and Torque Coefficients of 4-Bladed Propellers

$$K_T = 0.0446 - 0.3130\,J + 0.3447\,\frac{P}{D} - 0.0315\,J\,\frac{P}{D} + 0.0495\left(\frac{P}{D}\right)^2$$
$$- 0.0100\,J\left(\frac{P}{D}\right)^2 - 0.3844\,\frac{A_E}{A_O} + 0.2823\,J\,\frac{A_E}{A_O} + 0.8590\,\frac{P}{D}\,\frac{A_E}{A_O}$$
$$- 0.9800\,J\,\frac{P}{D}\,\frac{A_E}{A_O} - 0.3533\left(\frac{P}{D}\right)^2\frac{A_E}{A_O} + 0.5000\,J\left(\frac{P}{D}\right)^2\frac{A_E}{A_O}$$

$$10K_Q = 0.0391 + 0.1664\,J - 0.0881\,\frac{P}{D} - 0.6128\,J\,\frac{P}{D} + 0.6817\left(\frac{P}{D}\right)^2$$
$$+ 0.0050\,J\left(\frac{P}{D}\right)^2 - 0.1092\,\frac{A_E}{A_O} + 0.1533\,J\,\frac{A_E}{A_O} + 0.1352\,\frac{P}{D}\,\frac{A_E}{A_O}$$
$$- 0.6667\,J\,\frac{P}{D}\,\frac{A_E}{A_O} + 0.2183\left(\frac{P}{D}\right)^2\frac{A_E}{A_O} + 0.1333\,J\left(\frac{P}{D}\right)^2\frac{A_E}{A_O}$$

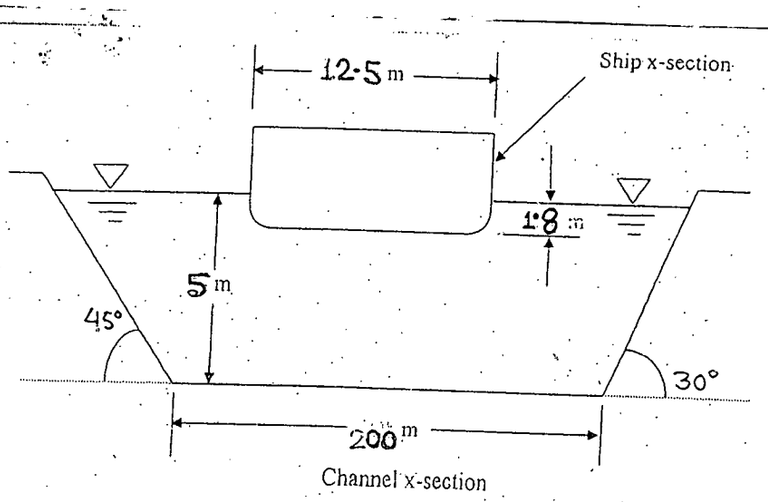

Figure for Question No. 8(c)

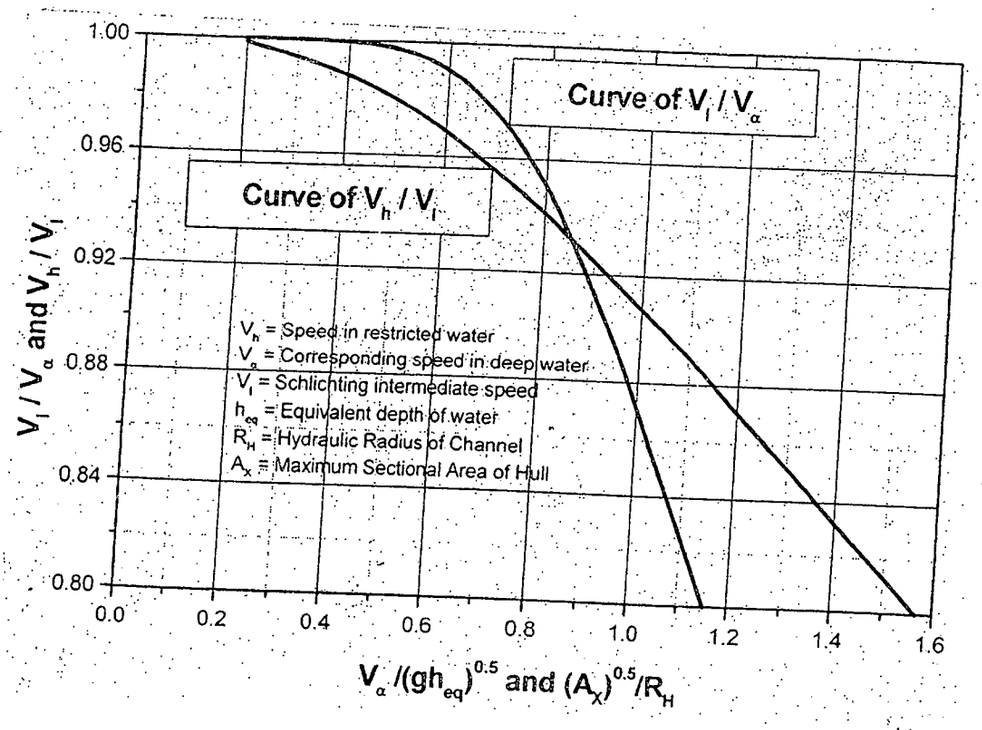

Figure: Curves of velocity ratios for calculating resistance in restricted channel (Landweber) for Question No. 8(c)

L-3/T-1/NAME **Date: 17/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Sc. Engineering Examinations 2017-2018

Sub: **NAME 371** (Finite Element Method for Ship Structure)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

The symbols have their usual meanings. Assume reasonable value in case of missing data.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Derive the expression of [B] for a CST element. **(15)**

   (b) Construct the element stiffness matrix of the element shown in Figure for Q. No. 1(b). Let $E = 30 \times 10^6$ psi, $\nu = 0.25$ and $t = 1$ inch. Consider plane stress condition. **(20)**

2. (a) Evaluate the force matrix for the plate shown in Figure for Q. No. 2(a). Assume the weight density to be 77.1 kN/m^3. Assume plate thickness 5 mm. **(17)**

   (b) For the four-node linear plane element shown in Figure for Q. No. 2(b), with the inform surface traction along side 2-3, evaluate the expression for equivalent nodal loads from the expression of work potential and hence construct the load matrix. Let the thickness of the element be 1 inch. **(18)**

3. (a) Prove that $dA = \det[J]\, d\xi d\eta$. **(15)**

   (b) For a tetrahedral element **(20)**

   (i) Write the shape functions

   (ii) Prove that $V_e = |\det[J]|/6$.

   (iii) Derive the expression of strain-displacement matrix and comment on it.

   (iv) Derive the expression of body force vector.

4. (a) Derive the expression of stiffness matrix of a beam element using Hermite shape functions. What are the limitations of this element? **(15)**

   (b) For the fixed-fixed beam subjected to the linear varying distributed loading acting over the whole beam shown in Figure for Q. No. 4(b), **(20)**

   (i) Construct element and global stiffness matrices.

   (ii) Construct load vector.

   (iii) Explain boundary conditions.

   (iv) Evaluate the displacement and rotation at the center.

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SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Write down the general expression of the potential energy for a linear elastic material. Also, determine the expression for the element stiffness matrix 'k' of a bar element using the relevant term(s) of the potential energy expression. Mention necessary equations and assume a linear shape function. **(15)**

(b) During finite element analysis, how will you treat the element stiffness matrix for a truss with skewed or inclined support? **(5)**

(c) Each joint of the structural system shown in Fig. for Q. No. 5(c) is a pinned support **(15)**

(i) Determine the nodal displacement of node 2

(ii) Recover the stresses in each element

(iii) Calculate the reaction forces.

6. (a) With example, explain two-dimensional stress-strain relationships. **(10)**

(b) Explain Von Mises Stress. For the State of Plane Stress and Plane Strain, write the expression of Von Mises Stress. **(5)**

(c) Find the deflection at the free end of a vertical bar, shown in Fig. for Q. No. 6(c) under its own weight using two elements approach. **(20)**

7. (a) A displacement field, **(12)**

$$u = 1 + 3x + 4x^3 + 6xy^2$$

$$v = xy - 7x^2$$

is imposed on the square element shown in Fig. for Q. No. 7(a).

(i) Write down the expression for ϵ_x, ϵ_y and γ_{xy}.

(ii) Find where ϵ_x is maximum within the square and determine the maximum value.

(iii) Assuming Plain Strain determine the stresses at point A.

(b) For the five-bar truss shown in Fig. for Q. No. 7(b), using symmetry condition **(23)**

(i) Determine the nodal displacements

(ii) Recover stresses in each element.

8. (a) Consider the structure shown in Fig. for Q. No. 8(a). A rigid bar of negligible mass pinned at one end, is supported by a steel rod and an aluminum rod. A load $P = 30 \times 10^3$ N is supplied as shown **(17)**

(i) Model the structure using two finite elements. What are the boundary condition for your model?

(ii) Develop the modified stiffness matrix and modified load vector.

(b) Neglecting the body force, write the potential energy equation for the linear elastic one-dimensional rod shown in Fig. for Q. No. 8(b). Using Rayleigh-Ritz method, find the displacement at the midpoint of the rod and the equation for stress. **(18)**

Use $u(x) = a_1 + a_2 x + a_3 x^2 + a_4 x^3$ as polynomial for displacement field.

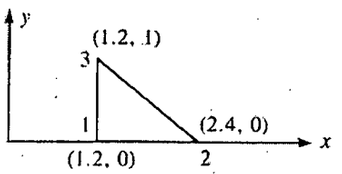


Figure for Q. No. 1(b)

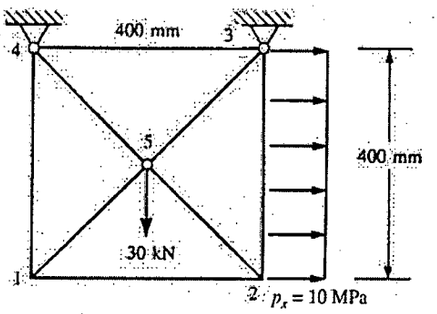


Figure for Q. No. 2(a)

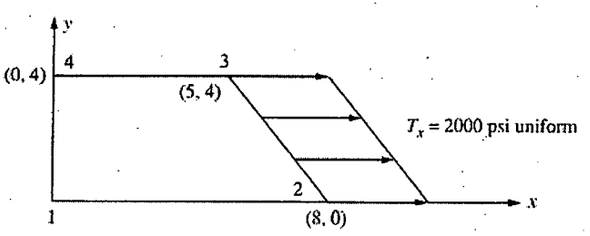


Figure for Q. No. 2(b)

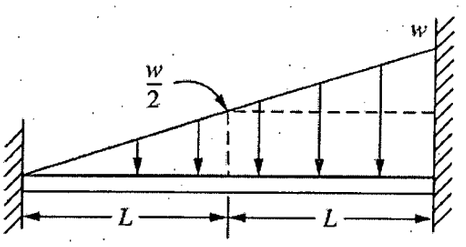
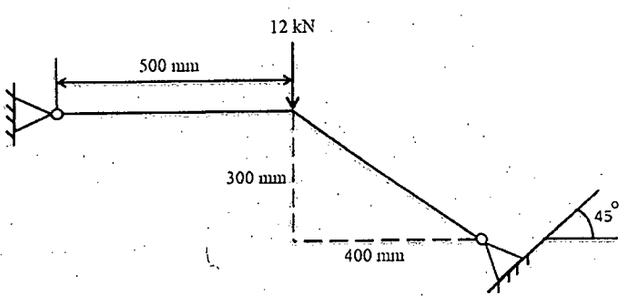


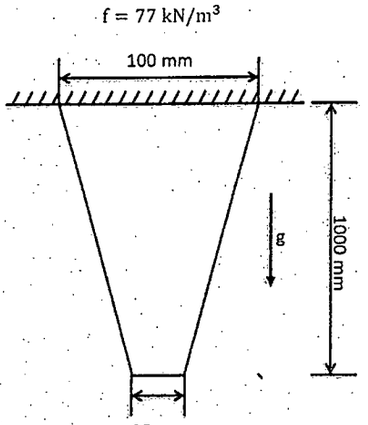
Figure for Q. No. 4(b)



E= 70GPa
A= 200 sqmm
} for both members

Fig. for Q. No. 5(c)

E = 200GPa
f = 77 kN/m^3



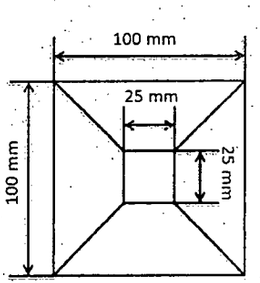
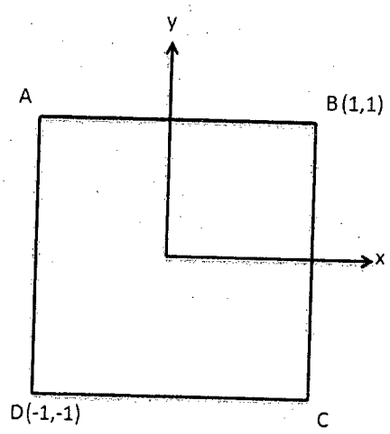


Fig. for Q. No. 6(c)



$E = 30 \times 10^3 psi$

$\nu = 0.3$

Fig. for Q. No. 7(a)

All elements have $E = 30 \times 10^6$ *and* $A = 10in^2$

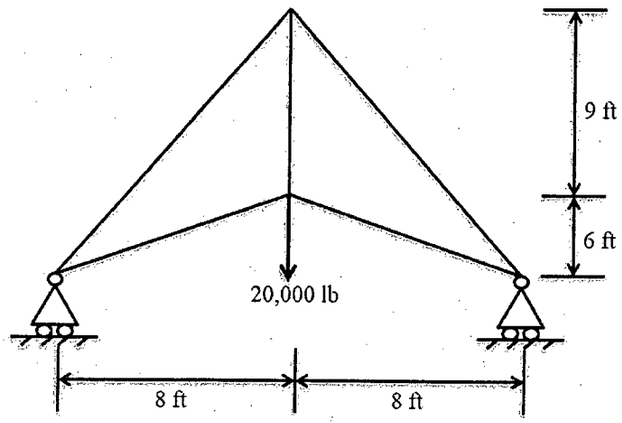


Fig. for Q. No. 7(b)

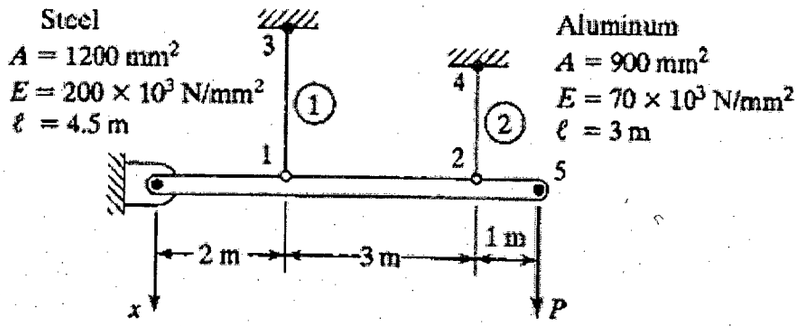


Fig. for Q. No. 8(a)

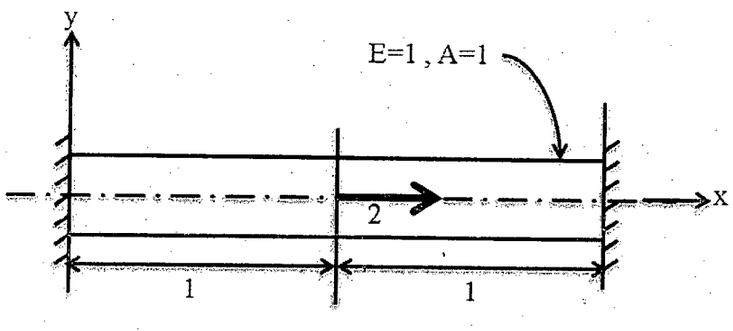


Fig. for Q. No. 8(b)

L-3/T-1/NAME **Date : 17/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B.Sc. Engineering Examinations 2017-2018

Sub : **NAME 335** (Port and Harbor Engineering)

Full Marks: 210 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

Assume reasonable values in case of missing data.

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Define harbor. Mention the factors which govern the choice of site for a harbor. **(8)**

   (b) Distinguish between natural and artificial harbor. Explain how an artificial harbor could be made to provide safe anchorage. **(10)**

   (c) Enumerate the important forces generated by a storm-wave breaking on a sea structure and list the phenomena which these forces give rise to. **(10)**

   (d) Why is site investigation necessary? List the items of work which are required for a through site investigation. **(7)**

2. (a) Derive Morrison's equation for determining the wave force on vertical circular cylinder, and simplify the equation for shallow water wave and deep water wave. **(20)**

   (b) 'In practice the combination of floating equipment and break-water based equipment will be the most economical and efficient way to construct a rubble mound break-water,' explain the statement by describing the construction procedure of a rubble mound breakwater. **(15)**

3. (a) Determine the criterion for a stability of a sliding armour unit and from it derive Hudson Formula. **(12)**

   (b) Explain why Hudson Formula cannot represent the stability of concrete armour unit layer as it can for rock armour unit layer. **(6)**

   (c) Show that, wave run-up is proportional to the wave height. **(5)**

   (d) A rubble mound breakwater with slope of 30° is to be designed in a place where the wave period is 8 sec. The super structure crest level is at 6 m above water level. It is found that the significant wave height is 4 m. **(12)**

   Determine:

   (i) Weight of the individual rock arnour unit.

   (ii) Number armour units per unit area

   (iii) Layer thickness

   (iv) Rock volume per unit area.

   Take stability coefficient 3, packing density 1.26, porosity 0.37, layer thickness coefficient 1 and density as 2.65 ton/m3.

Contd P/2

NAME 335

4. (a) Determine the pressure distribution and horizontal forces on the vertical breakwater for both cases shown in Fig. for Q. No 4(a) applying Goda's formulae. **(20)**

(b) A general cargo vessel has the following particulars: **(15)**

L = 180 m, B = 30m, D = 16m, T = 10m

DWT = 32000 tonnes, CB = 0.78

Assuming a third point berthing mathematically determine the eccentricity coefficient. If the above mentioned ship is the shortest ship that docks in the port, compressed fender height is 1m and clearance to wharf is 0.5m, determine the distance between fenders.

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) List the main types of port terminals. **(6)**

(b) "The services provided by a port terminal normally comprise the unloading from ship to shore, or the reciprocal process, the temporary storage, sometimes a limited processing of the cargo, and the loading or unloading into or from the through-transport means." – explain. **(10)**

(c) Describe the components of a terminal. **(9)**

(d) What is maximum instantaneous capacity and maximum annual capacity of a port? Also explain the optimum annual capacity of a port. **(10)**

6. (a) Explain the master plan process of port planning with sketches. **(12)**

(b) What are the steps for cargo forecasting? List some of the frequent obstacles faced during port planning. **(15)**

(c) Does the transport function of a port deserve to be expanded in a competitive situation? Explain in brief. **(8)**

7. (a) Write short notes on the following: **(15)**

(i) Types of ports

(ii) Privatization of ports

Contd P/3

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Contd... Q. No. 7

(b) An inland container terminal is to be designed for the following vessel: **(20)**

L: 100 m (maximum)

B: 15 m (maximum)

D: 7 m

T: 4 m (maximum)

The port is to handle with 120,000 TEU per year. Port workers work 340 days/ year. There are two shifts (8 hours/shift) in a day. Determine the number of berths and quay length considering the following factor:

Gross production/crane	: 20 moves/hr
Number of crane/berth	: 2
TEU factor	: 1.5
Berth Occupancy	: 0.55

8. (a) A small terminal is to be designed for a capacity of 80,000 TEU/year for which import 40,000 TEU (of which 15,000 TEU via CFS), 30,000 export and 10,000 empties. Find the area needed for the export, import, empties and CFS. Also sketch the possible layout of terminal. Assume average dwell time for import, export and empty containers are 10, 7 and 20 days respectively. Consider stacking height three containers, required area per TEU 13m2, occupancy rate 0.7 for all containers. **(20)**

(b) Calculate the width of a two way approach channel for an artificial harbor which is to be designed for the following target vessel: **(15)**

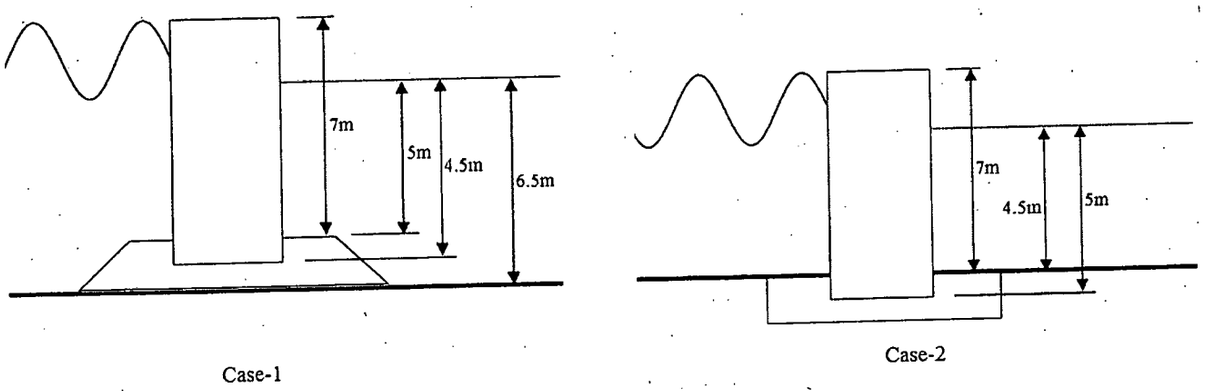
L: 160 m B: 30m T: 8.5m D: 12m

The port will have the vessel traffic system as aids for navigation. The following information is also available:

Cross wind: 20 knots Long Current : 5 knots Sea bed: soft

Vessel speed: 8 knots Wave height: 2 m

$H_{\frac{1}{3}} = 1.5$ m ; $T_{\frac{1}{3}} = 5.0$ sec



Case-1 Case-2

Fig. for Q. No. 4(a)

Width component	Condition	Width (m)
Basic width (W_{BM})	1.25 D < d < 1.5 D	1.6 B
	d < 1.25 D	1.7 B
Additional width (W_i)		
• prevailing cross-winds	15 - 33 kn	0.4 B
	33 - 48 kn	0.8 B
• prevailing cross-current	0.2 - 0.5 kn	0.2 B
	0.5 - 1.5 kn	0.7 B
	1.5 - 2.0 kn	1.0 B
• prevailing long current	1.5 - 3 kn	0.1 B
	> 3 kn	0.2 B
• prevailing wave height	1 - 3 m	1.0 B
	> 3 m	2.2 B
• aids to navigation	VTS	0
	good	0.1 B
• seabed characteristics	soft	0.1 B
	hard	0.2 B
• cargo hazard	medium	0.5 B
	high	1.0 B
• separation distance (W_P)	8 - 12 kn	1.6 B
	5 - 8 kn	1.2 B
• bank clearance (W_B)	sloping edge	0.5 B
	steep, hard embankment	1.0 B

Fig. for. Q. No. 8(b)

L-3/T-1/NAME **Date: 23/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Sc. Engineering Examinations 2017-2018

Sub: **NAME 345** (Welding Technology)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

Symbols have their usual meaning. Assume reasonable value for any missing data.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Suppose you are performing oxyacetylene gas welding. How many types of torch are used in this welding method? Explain briefly with figure. **(20)**

   (b)Which welding technique will you use between oxyfuel backhand welding and oxyfuel forehand welding for material upto 1/8 inch thick? Give a detailed description about the technique with necessary figure. **(15)**

2. (a) The bilge plate of a ship has been damaged during a voyage in deep sea and an underwater welding must be performed as soon as possible. **(20)**

   (i) What do you mean by underwater welding?

   (ii) Which type of underwater welding will you perform and why? Give a detailed description about the welding technique.

   (iii) What are the precautions you have to keep in mind while performing the welding?

   (b) Which resistance welding technique will be the best to perform continuous weld on two sheet metals and why? Write down the principle operation of the welding technique. **(15)**

3. (a) What is the reason for using magnetic particle testing in NDT method? How will you perform magnetic particle testing to detect defects in materials? **(15)**

   (b) Write short notes on the following defects found in GTAW. **(10)**

   (i) Underflush

   (ii) Lack of fusion

   Mention the causes and remedies of these defects.

   (c) Draw the schematic diagram of MIG welding. **(10)**

4. (a) What do you mean by surface preparation? What are the methods used in surface preparation? Give a brief description on "pickling". **(15)**

   (b) If you are told to perform MIG welding, which mode of metal transfer will you use to avoid spatter and why? Explain the procedure of the metal transfer with figure. **(20)**

Contd P/2

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SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Briefly discuss the principles of arc welding process. **(10)**

   (b) With the aid of suitable figures distinguish between electrode positive and electrode negative arc welding. **(10)**

   (c) Explain the importance of arc shielding. **(8)**

   (d) Mention some characteristics of good fluxes. **(7)**

6. (a) Write a short note on submerged arc welding. **(10)**

   (b) Distinguish between the followings: **(15)**

   (i) SMAW and GSAW

   (ii) GTAW and GMAW

   (c) List the factors causing arc blow. What are the ways to minimize arc blow? **(10)**

7. (a) What is welding distortion? What measures can be adopted to control welding distortion? **(15)**

   (b) Briefly discuss various types of welding cracks. **(10)**

   (c) What are the advantages of TIG welding? Compare the characteristics of various shielding gases used in TIG welding. **(10)**

8. (a) Sketch how the welds would appear as specified by the symbols as shown in Figures for Question No. 8(a) **(15)**

   (b) Write short notes on the followings (any five): **(20)**

   (i) Lack of fusion

   (ii) Undercutting

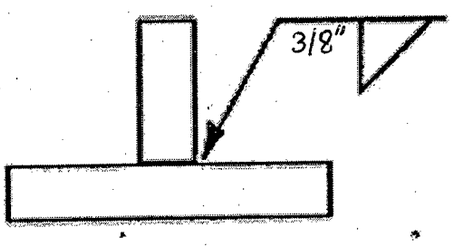
   (iii) Fast fill electrode

   (iv) Porosity

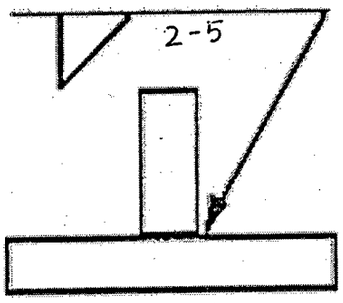
   (v) Electrode coating

   (vi) Weld ability of metals.

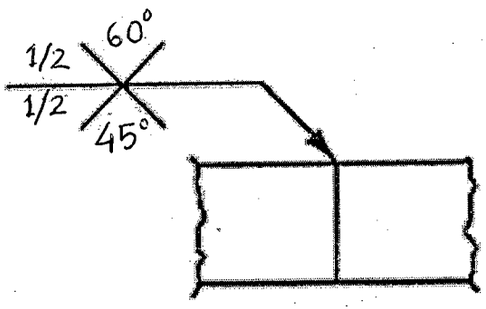
NAME 345



(i)



(ii)



(iii)

Figures for Question No. 8(a)

L-3/T-1/NAME **Date : 29/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B.Sc. Engineering Examinations 2017-2018

Sub : **HUM 313** (Principle of Accounting)

Full Marks: 140 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Define the following terms with examples- **(6 1/3)**

Revenue, Expense, Monetary Unit Assumption.

(b) Mr. David started his manufacturing business on June 1, 2018. The following transactions took place during the month of operation: **(17)**

June 1: Invested Tk. 400,000 cash in the business.

June 5: Purchased office equipment cash in TK. 110,000.

June 11: Hired a managing director to manage the business efficiently. He will be paid Tk. 40,000 per month.

June 12: Incurred utility expenses on account Tk. 10,000.

June 16: Incurred office rent in advance Tk. 15,000.

June 17: Earned Tk. 70,000 for selling product; Tk. 45,000 is received in cash and remaining on account.

June 19: Withdrawn by Mr. David for his personal use Tk. 8,000 in cash from the business.

June 20: Paid the amount due related to utility expenses.

June 23: Received cash from previous customer related to transaction July 17.

June 26: Employees salaries expense was due for TK. 6,000

Required:

(i) Prepare a tabular summary from the above transactions.

(ii) Prepare an income statement.

2. (a) What is ledger? What is its significance in recoding process? **(5 1/3)**

(b) On December 1, 2016 Mr. "Q" stated his business. He completed the following transactions during December- **(18)**

December 1: Stated his IT firm by investing Tk. 350,000 cash.

December 2: Paid interest expense for the month in cash Tk. 5,000.

December 4: Purchase an insurance policy for one year by using cash Tk. 10,000.

December 5: Purchased supplies Tk. 10,000 in cash.

Contd P/2

HUM 313/NAME

Contd... Q. No. 2(b)

December 6: Completed work for a client and immediately received Tk. 50,000 in cash.
December 18: For business purpose took loan from a bank in cash Tk. 60,000.
December 21: Completed work for "ABC Co." on credit Tk. 40,000.
December 24: Received payment in half from "ABC Co" for the work completed.
December 28: Provide services to the clients and immediately collected cash Tk. 12,000.

Required:

Give journal entry from the above transactions in general form.

3. The following information is available for "Assurance Construction" Company for the month of December- **(23 1/3)**

"Assurance Construction" Balance Sheet December 31,2017		
Accounts Name	**Debit (Tk.)**	**Credit (Tk.)**
Cash	12,000	
Accounts Receivable	6,000	
Supplies	5,000	
Prepaid Insurance	3,600	
Office Furniture	20,000	
Accounts Payable		3,500
Unearned Service Revenue		2,000
Capital		25,000
Service Revenue		3,500
Salary Expense	3,400	
Drawings	3,000	
Loan		19,000
Total	**53,000**	**53,000**

Additional Information:

- Tk. 1,000 of supplies has been used during the period.
- Tk.500 balances in the unearned revenue was earned at the end of the period.
- Insurance policy is for two years.
- Travel expense incurred but not paid on December 31, 2017 Tk. 1,200.
- Utility bill was not paid for the month Tk. 2,000.
- Annual depreciation on office furniture was 10%.
- Invoices showed that Tk. 2,000 of service performed during the month have not been recorded as of December 31, 2017.

Required:

(i) Prepare necessary adjusting entries.
(ii) Prepare an adjusted trial balance as at May 31, 2017.

Contd P/3

HUM 313/NAME

4. (a) What is current asset? Give some examples of current asset. **(5 1/3)**

(b) The following amounts are taken from the ledger balances of "K K Enterprise" Company on 31st December, 2016- **(18)**

K K Enterprise		
Trial Balance		
31st December, 2016		
Account Title	**Debit (Tk.)**	**Credit (Tk.)**
Account receivable	12,000	
Accounts payable	-	6,000
Cash	30,500	
K K Capital		50,900
Supplies	9,000	
Salaries expense	7,000	
Selling expense	3,000	
Cleaning expense	4,000	-
Rent expense	13,000	
Notes payable		5,000
Bonds payable		30,000
Store equipment	25,000	
Machinery	2,500	
Unearned Revenue		11,100
Sales Revenue		47,000
Maintenance expense	30,000	
Prepaid Insurance	4,000	
Goodwill	10,000	
Total	**150,000**	**150,000**

Required:

(i) Prepare a single step income statement for the year ended December, 2016.

(ii) Prepare an owner's equity statement and classified balance sheet at 31st December, 2016.

Contd P/4

HUM 313/NAME

SECTION-B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. The following information has been taken from the accounting records of Alinson Corporation for last year, 2017. **(23 1/3)**

Particulars	Amount (Tk.)
Selling expenses	Tk. 140,000
Beginning raw material inventory	90,000
Ending raw material inventory	60,000
Utilities, factory	36,000
Direct labor cost	150,000
Depreciation, factory	162,000
Purchase of raw material	750,000
Sales	2500,000
Insurance, factory	40,000
Supplies, factory	15,000
Administrative expenses	270,000
Indirect labor	300,000
Maintenance, factory	87,000
Work-in-process Inventory Beginning	180,000
Work-in-process Inventory, Ending	100,000
Finished goods Inventory, Beginning	260,000
Finished goods Inventory, Ending	210,000

Required:

(i) Prepare a cost of goods Sold Statement and an Income Statement.

6. (a) The admitting department's costs and the number of patients admitted for Nelson Hospital during the immediately preceding eight months are given in the following table. **(10)**

Month	Number of patients admitted	Admitting Department Cost
May	1800	Tk. 14700
June	1900	15200
July	1700	13700
August	1600	1400
September	1500	14300
October	1300	13100
November	1100	12800
December	1500	14600

Contd P/5

HUM 313/NAME

Contd... Q. No. 6(a)

Required:

(i) Use the high low method to establish the fixed and variable components of admitting cost.

(ii) Express the fixed and variable components of admitting cost as a formula in the form Y = a + bX.

(b) The following cost data relate to the manufacturing activities of Chang Company during the year 2017. **(13 1/3)**

Total actual manufacturing cost incurred	Tk. 473,000
Purchase of raw material	400,000
Direct labor cost	60,000
Inventories:	
Raw material, Beginning	20,000
Raw material, Ending	30,000
Work-in-process, Beginning	40,000
Work-in-process, Ending	70,000

The predetermined overhead rate was Tk. 25 per machine hour. A total of 19,400 machine-hours was recorded for the year.

Required:

(i) Compute the amount of under or over applied overhead cost for the year.

(ii) Prepare a schedule of cost of goods manufactured for the year.

7. (a) What are the assumptions of cost-volume-profit (CVP) analysis? **(3 1/3)**

(b) Tentex Company manufactures and sells a single product. The company's sale and expenses for last quarter are as follows: **(20)**

	Total (Tk.)	Per Unit(Tk.)
Sales	Tk.4,50,000	Tk.30
Less: Variable expenses	1,80,000	12
Contribution margin	2,70,000	18
Less: Fixed expense	2,16,000	
Net Income	54,000	

Required:

(i) What is the quarterly break-even-point in units sold and in sales amount?

(ii) What is the total CM (Contribution Margin) at the break-even-point?

(iii) How many units would have to be sold each quarter to earn a target profit of Tk. 90,000.? Use CM method.

(iv) Compute the company's margin of safety both in taka and percentage terms.

(v) What is the CM ratio? If sales increase by Tk.50,000 per quarter and there is no change in the fixed expenses, by how much would you expect net income to increase?

(vi) What is the operating leverage for the company? If sales increase 10% how much the net income will increase using operating leverage?

Contd P/6

HUM 313/NAME

8. (a) What are the differences between process costing and job-order costing? **(5 1/3)**

(b) Herrington Computer company has two support departments and two operating departments. Relevant information is given below: **(18)**

	Support Department		Operating department		Total
	Legal Department	Personnel Department	Laptop Division	Work Station Division	
Budgeted manufacturing Overhead cost	500,000	100,000	300,000	200,000	1100,000
By legal Department					
Budgeted legal hours	—	1200 14%	3200 38%	4000 48%	8400
By personnel Department					
Budgeted personnel hours	400 21%	—	1200 63%	300 16%	1900

Required: Allocate support departmental cost to operating departments by using:

(i) Direct Method

(ii) Step-down Method.

(iii) Reciprocal method.
