BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1   B. Sc. Engineering Examinations 2012-2013

Sub : NAME 351 (Ship Structure)

Full Marks : 210   Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

Assume reasonable values for missing data.

1. (a) What do you mean by the rationally based structural design of a ship? Write the steps of the ship structural design process and show in a flow diagram of rationally based structural design. **(20)**

    (b) Compare the traditional, rule based and engineering design of ship structural design. **(15)**

2. (a) Classify the loads on the ship structure based on the time frame. **(15)**

    (b) A dumb lighter is completely wall sided, 100 m long, 20 m maximum beam and it floats at a draught of 6 m in still water. The waterline is parabolic and symmetrical about amidships with zero ordinates at the ends. The weight is evenly distributed along its length. If the vessel is 15 m deep, has a sectional second moment of inertia = 30 m^4, and has a neutral axis 6 m above the keel, find maximum hogging stress when balanced on an L/20 wave. **(20)**

    The coordinate of a trochoid are:

x/20	0	1	2	3	4	5	6	7	8	9	10
z/20	0	0.018	0.073	0.161	0.28	0.423	0.579	0.734	0.872	0.964	1.0

3. (a) What is the basic principles of Murry's method? Discuss Murry's method of calculating the still water and wave bending moment of the ships. **(20)**

    (b) A vessel of constant rectangular cross-section is 90 m long and 10.5 m broad, floats at an even keel draught of 3.0 m in sea water. The weight of the vessel may be taken as being distributed uniformly over its entire length. Where should a weight 50 tonne be placed in order to give no bending moment at amidships? **(15)**

4. (a) Describe Fernandez and Miller method of calculating the radius of sub trochoid at any position along the length of ship considering the influence of smith correction. **(20)**

    (b) Using Taylor approximation method, find the shear deflection of a simply supported beam with uniformly distributed load "w" per unit length and assume the section of the beam is rectangular of breadth "b" and depth "d". **(15)**

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SECTION – B

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

The symbols have their usual meanings.

5. (a) What is equivalent steel area? Deduce the expression for area reduction in a mild steel midship section, if high tensile steel is added in the bottom and top deck. **(20)**

(b) A simply supported rectangular stiffened plate is 15 ft long, 20 ft broad and 0.5 inch thick with stiffeners spacing 30 inch apart. Find the critical buckling stresses when the stiffeners are spaced longitudinally and transversely. **(15)**

[E = 13500 tons/in^2, v = 0.30]

6. (a) With necessary assumptions derive the equilibrium equation for plates. **(20)**

(b) Discuss the importance of 'theory of plates' in relation to the ship's structure. **(15)**

7. (a) A structure consisting of a series of 'n' fixed-ended members. Obtain the expression of stiffness constant for 'p'th member. **(20)**

(b) Explain the procedure to obtain the bending moment of beams with brackets and with intermediate degrees of fixity at the ends. **(15)**

8. (a) With necessary assumptions, formulate the minimum critical buckling stress of a simply supported rectangular plate. Hence, discuss about longitudinal stiffening and transverse stiffening of plates in ship's structures. **(20)**

(b) A watertight bulkhead is 10 mm thick, 6 m deep from tank top to 2nd deck, and has to withstand a head of water 2.50 m above the 2nd deck. The stiffeners are spaced 750 mm in apart. Determine the maximum bending moments midspan: **(15)**

      (i) when ends are fixed, and

      (ii) when ends are free.

      [E$_{steel}$ = 207 GPa]

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Sc. Engineering Examinations 2012-2013

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

Full Marks : 210   Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

Symbols have their usual meanings.

1. (a) Define truss element.   (5)

    (b) Derive the expression of element stiffness matrix of a plain truss element.   (15)

    (c) For the truss shown in Figure for Q. No. 1(c), solve for the horizontal and vertical components of displacement at node 1. Also determine the stress in element 1. Let $A = 1 \text{ in}^2$, $E = 10 \times 10^6$ psi and $L = 100$ in.   (15)

2. (a) Calculate the equivalent set of concentrated forces acting at the nodes 10, 12 and 18 of Figure for Q. No. 2(a).   (15)

    (b) Derive the shape functions of a CST element by area coordinate.   (20)

3. (a) For the quadrilateral element shown in Figure for Q. No. 3(a), evaluate the stiffness matrix using four point Gaussian quadrature. Let $E = 30 \times 10^6$ psi and $v = 0.25$. The global coordinates (in inches) are shown in the figure.   (30)

    (b) Derive the shape functions of a four node isoparametric element.   (5)

4. (a) Determine the consistent nodal vector due to loads acting on the beam shown in Figure for Q. No. 4(a).   (11)

    (b) Derive the expression for consistent load, which varies linearly from p_1 at node 1 to p_2 at node 2 on a beam element of length L as shown in Figure for Q. No. 4(b).   (12)

    (c) Show how the element stiffness matrix of a plane frame element is developed combining the element stiffness matrices of other two elements.   (12)

SECTION – B

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

5. (a) Draw the flow chart of finite element analysis program for a single element.   (20)

    (b) What are the advantages of Finite element method?   (15)

6. (a) What is Von Mises stress? Formulate the expression of Von Mises stress. (15)

(b) In a solid body, the six components of stresses at a point are given by $\sigma_x = 40$ MPa, $\sigma_y = 25$ MPa, $\sigma_z = 30$ MPa, $\tau_{yz} = -30$ MPa, $\tau_{xz} = 20$ MPa and $\tau_{xy} = 10$ MPa. Determine the normal stresses at the point on a plane for which the normal is $(n_x, n_y, n_z) = \left(\dfrac{1}{2}, \dfrac{1}{2}, \dfrac{1}{\sqrt{3}}\right)$. (20)

7. (a) Describe the different steps of Penalty approach for treatment of boundary condition. (15)

(b) An axial force $P = 250 \times 10^3$ N is applied in a bar shown in Figure for Q. No, 7(b) below. Determine (20)

      (i) the nodal displacement

      (ii) the stresses in each member, and

      (iii) the reaction forces.
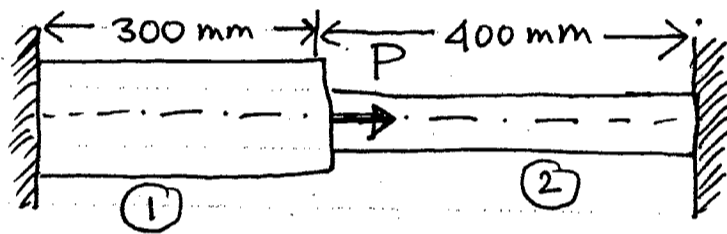
Aluminum

$A_1 = 2400$ mm^2

$E_1 = 70 \times 10^9$ N/m^2

Steel

$A_2 = 600$ mm^2

$E_2 = 210 \times 10^9$ N/m^2

Figure for Question No. 7(b)

8. (a) Formulate the three dimensional stress-strain relations for linear elastic materials. (10)

(b) Find the deflection at the free end under its own weight of a vertical bar shown in Figure for Q. No. 8(b), using two elements approach. (25)
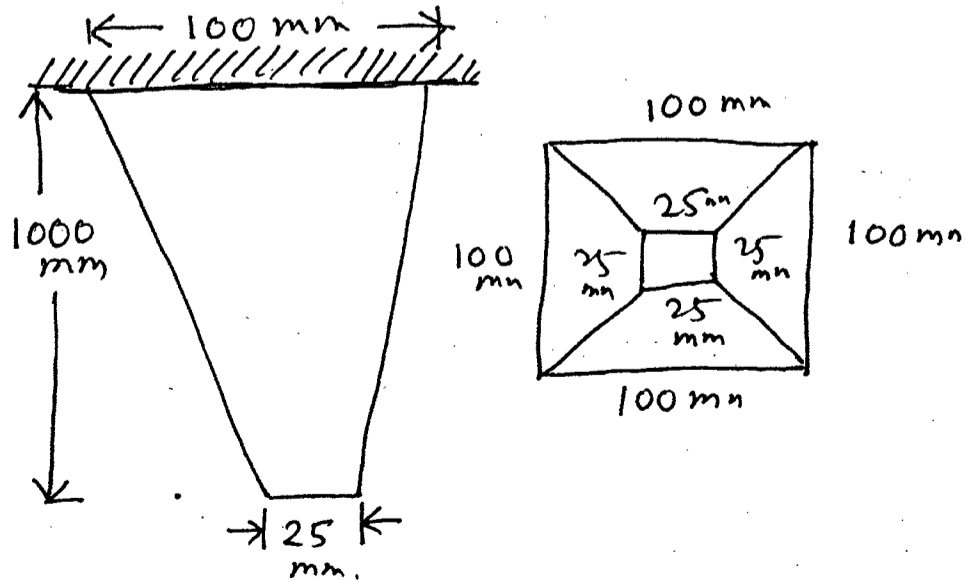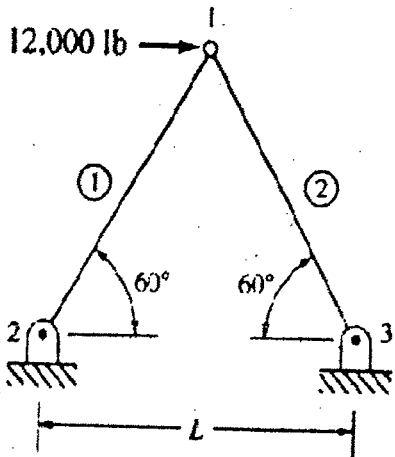

Figure for Question No. 8(b)
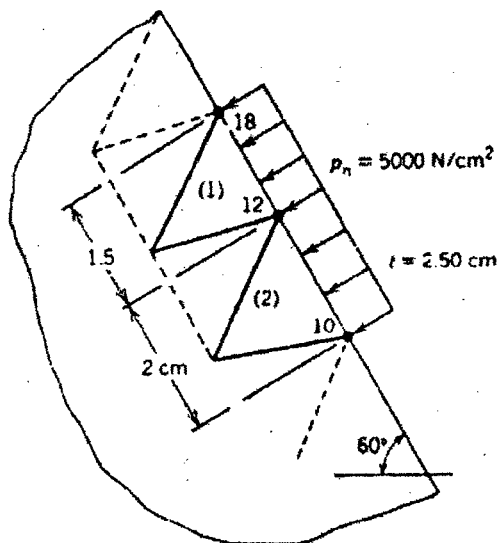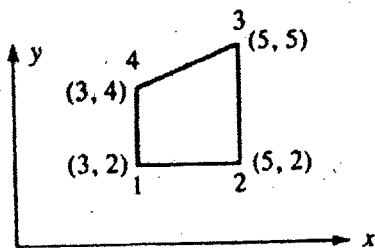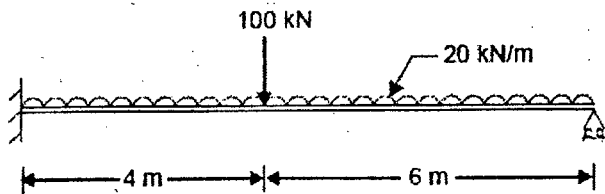
12,000 lb →

1

①   ②

60°   60°

2   3

L

Figure for Q. No. 1 (c)

18

$P_n = 5000$ N/cm²

(1)   12

$t = 2.50$ cm

1.5

(2)

10

2 cm

60°

Figure for Q. No. 2 (a)

y

3 (5, 5)

4
(3, 4)

(3, 2)   (5, 2)
1   2

x

Figure for Q. No. 3 (a)

100 kN

20 kN/m

←——4 m——→←——————6 m——————→

Figure for Q. No. 4 (a)

p_1 p_2

1   2

L

Figure for Q. No. 4 (b)

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1   B. Sc. Engineering Examinations 2012-2013

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

Full Marks : 210   Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) What is Arc Blow? Describe various types of Arc Blow.   **(14)**

   (b) Write short notes on: **(21)**
   (i) Fast-freeze electrodes
   (ii) Reverse polarity
   (iii) Axial spray transfer in MIG welding.

2. (a) Briefly describe the MIG welding process (with Figure).   **(20)**

   (b) Explain the following symbol of electrode specification according to ISO 2560 standard for SMAW process.   **(15)**

   E 514C 160 31 (H)

3. (a) What are the functions of flux covering ingredients of electrodes? Briefly describe the common welding defects occurring in Gas Shielded Arc Welding.   **(22)**

   (b) Compare the characteristics of various shielding gases used in πG welding.   **(13)**

4. (a) What are the factors affecting the selection of a particular welding process and the quality of weld.   **(12)**

   (b) Write down the names of various welding positions. Draw figures of each welding position for fillet weld.   **(11)**

   (c) Sketch how the welds would appear as specified by the symbols in Fig. for Q. 4(c). Use a cross-sectional view if needed.   **(12)**

SYMBOL
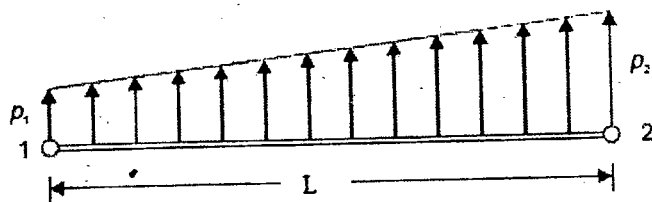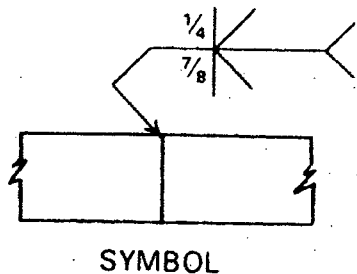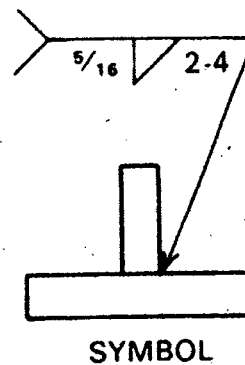
Fig. for Q. 4(c)(i)

SYMBOL

Fig. for Q. 4(c) (ii)

NAME 345

SECTION – B

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

5. (a) What are the basic differences between a welding torch and a cutting torch? **(10)**

   (b) Define the characteristics of three types of gas flames and their application. **(15)**

   (c) Draw a schematic diagram to show the components of an oxygen cutting outfit. **(10)**

6. (a) Write short notes on **(20)**

   (i) Brazing

   (ii) Spot Welding

   (iii) Cylinder Regulators

   (iv) Backfire and Flash back

   (b) Define backhand and forehand welding. **(15)**

7. (a) Mention the name of some common NDT methods. Discuss briefly magnetic particle testing. **(15)**

   (b) What are the limitations of VT method? **(8)**

   (c) What is dry under water welding? Describe the risks associated with under water welding. **(12)**

8. (a) Calculate the cost of welding 1,280 ft of a single bevel butt joint using the following data. **(20)**

   (i) Electrode – $\frac{1}{8}''$ diameter, 10″ long, E8018, operated at 25 Volt, 160 amps

   (ii) Stub loss – 2 inches

   (iii) Labour and overhead – $ 30.00/hr

   (iv) Electrode cost – $ 0.57/lb

   (v) Power cost – $ 0.45/kWh

   (vi) Operating factor – 30%

   (vii) Weight per foot of weld joint – 0.814 lb

   Deposition data chart is attached, [Fig. for Q. 6(a)].

   (b) Describe the advantage of wet abrasive blasting over blast cleaning. **(10)**

   (c) Mention the importance of surface preparation. **(5)**

E7016

ELECTRODE DIAMETER	AMPS	DEPOSITION RATE lbs/hr	EFFICIENCY %
1/8	100	1.7	63.9%
	130	2.3	65.8%
5/32	140	3.0	70.5%
	160	3.2	69.1%
	190	3.6	66.0%
3/16	175	3.8	71.0%
	200	4.2	71.0%
	225	4.4	70.0%
	250	4.8	65.8%
1/4	250	5.9	74.5%
	275	6.4	74.1%
	300	6.8	73.2%
	350	7.6	71.5%

E7024

ELECTRODE DIAMETER	AMPS	DEPOSITION RATE lbs/hr	EFFICIENCY %
1/8	140	4.2	71.8%
	180	5.1	70.7%
5/32	180	5.3	71.3%
	210	6.3	72.5%
	240	7.2	69.4%
3/16	245	7.5	69.2%
	270	8.3	70.5%
	290	9.1	68.0%
7/32	320	9.4	72.4%
	360	11.6	69.1%
1/4	400	12.6	71.7%

LOW ALLOY, IRON POWDER ELECTRODES
TYPES E7018, E8018, E9018, E10018, E11018, AND E12018

ELECTRODE DIAMETER	AMPS	DEPOSITION RATE lbs/hr	EFFICIENCY %
3/32	70	1.37	70.5%
	90	1.65	66.3%
	110	1.73	64.4%
1/8	120	2.58	71.6%
	140	2.74	70.9%
	160	2.99	68.1%
5/32	140	3.11	75.0%
	170	3.78	73.5%
	200	4.31	73.0%
3/16	200	4.85	76.4%
	250	5.36	74.6%
	300	5.61	70.3%
7/32	250	6.50	75.0%
	300	7.20	74.0%
	350	7.40	73.0%
1/4	300	7.72	78.0%
	350	8.67	77.0%
	400	9.04	74.0%

DEPOSITION DATA - SMAW - COATED ELECTRODES (Con't.)

FIGURE # FOR Q. NO 8(a)

NOTE: EFFICIENCY RATES DO NOT INCLUDE STUB LOSS

Fig. for - Q. 8(a)

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1   B. Sc. Engineering Examinations 2012-2013

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 any missing data.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) With neat sketches describe propeller geometry.   **(12)**

   (b) What do you mean by projected area, developed area and expanded area of a propeller?   **(8)**

   (c) In a four-bladed propeller of diameter 5.0 m, the expanded blade widths at the different radii are as follows: **(15)**

r/R	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
C (mm)	1454	1647	1794	1883	1914	1876	1724	1384	0

   The thickness of the blade tip is 15 mm and at r/R = 0.25, it is 191.25 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 15 degrees aft and the reference line intersects the axis at the mid-length of the boss. Determine the expanded blade area ratio and the blade thickness fraction if boss diameter is 834 mm at 15 degrees from the mid-length and the blade width at r/R = 0.1668 is 1390 mm.

2. (a) Write down the assumptions upon which the axial momentum theory is based.   **(5)**

   (b) Derive the expression of propeller efficiency using axial momentum theory.   **(15)**

   (c) How can you improve the above theory taking the influence of rotation of the flow into account?   **(15)**

3. (a) Describe the circulation theory of propeller action and hence derive the ideal efficiency of the blade section at radius r.   **(20)**

   (b) Derive the following relationship   **(15)**

   $$C_L \cdot c = \frac{4\pi D}{z} \cdot \frac{r}{R} \cdot \aleph \cdot \sin\beta_i \tan(\beta_i - \beta)$$

4. (a) What is cavitation? Write down the criterion for prevention of cavitation.   **(15)**

   (b) The ship trial data and model experimental results of a ship are provided below: **(20)**

NAME 323

Contd ... Q. No. 4(b)

Run No.	Ship trial		Model experiment	
	Mean speed V_ω Knot	Shaft power (kW)	Propulsive coefficient (QPC)	Residuary resistant coefficient, CR
1 – 3	21.52	13049	0.715	0.00142
4 – 6	22.78	17679	0.707	0.00189

Ship length, L = 159.54 m

Ship welted surface area, S = 4288.74 m^2

Density of sea water, ρ = 1026.5 kg/m^3

Kinematic viscosity, v = 1.2788 $\times$ 10^{-6} m^2/s

Calculate:

(i) model-ship correlation allowance, C_A

(ii) ship trial and service power at 21.5 Knot using the calculated C_A and service allowance, 1 + C_2 = 1.27.

SECTION – B

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

5. (a) With figure demonstrate various components of resistance of a ship. **(8)**

   (b) Define residual resistance of a ship. The particulars of a passenger Ferry are given below: **(27)**

   Length = 45 m

   Breadth = 8.5 m

   Draft = 1.4 m

   Block coefficient = 0.607

   Midship coefficient = 0.85

   Speed = 10 Knots

   Water density = 1000 kg/m^3

   Kinematic viscosity = 0.8 $\times$ 10^{-6} m^2/s

   Calculate the residual resistance, using Taylor Standard Table.

6. (a) Mention the components of the secondary wave system of a ship. What are the possible cases of interference between components of the secondary wave system? **(10)**

   (b) Derive the relation between wave-making resistance and ship speed as **(25)**

$$R_W = C \cdot V^6 \left\{ 1 + \sum C_{mm} \cos\left(\frac{2\pi\, Z_{mn}}{\lambda} \right) \right\}$$

where the symbols have their usual meaning.

NAME 323

7. (a) What are the causes of humps and hollows in wave resistance curve. How (P) Theory is used in determining the positions of humps and hollows. **(8)**

(b) Prove, $\text{(P)} = 0.4121 \cdot \dfrac{V}{\sqrt{C_p \cdot L}}$. **(7)**

where the symbols have their usual meaning.

(c) The following particulars of a passenger vessel is given: **(20)**

        Length = 75 m

        Breadth = 13.5 m

        Draft = 1.6 m

        Displacement = 1000 tonne (fresh water)

        Prismatic coefficient = 0.725

When the vessel attains speed of 14 Knots, will it be in hump or hollow region of speed-resistance curve?

If the vessel is operating in hump region what precautions should be taken?

8. (a) Discuss the effect of form on frictional resistance of a ship. **(8)**

(b) Calculate the economical speed of a ship of length 120 m and displacement 9000 tonne in salt water. **(7)**

(c) A passenger vessel has the following particulars: **(20)**

        Length = 50 m

        Frontal projected area (above water) 60 m^2

        Lateral projected area (above water) = 250 m^2

        Speed = 14 Knots

If the wind is blowing uniformly at a speed of 40 Knots at an angle 30° off the bow, calculate the magnitude and direction of resultant wind force.

Given:

    Wind resistance coefficient,

        $C_{RWD} = 1.142 - 0.142 \cos 2\theta - 0.367 \cos 4\theta - 0.133 \cos 6\theta$

    where, θ is the wind direction off the bow in degrees.

    Density of air = 1.2066 kg/m^3

------------- = 3 = -------------------

Table for Qu. no. 5(b)

Table - 1

Residual Resistance per unit displacement, values given for ($0.2283\, R_R /\Delta$)

Taylors Standard Series

C_p	$\dfrac{0.027894}{(L/100)^2}$	B/d = 2.25 0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	B/d = 3.75 0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10
	1.0724 V/√L →																						
0.50	50	0.41	0.50	0.69	0.85	1.10	1.20	1.40	1.65	2.00	3.15	5.25	0.46	0.52	0.67	0.88	1.20	1.55	1.90	2.40	3.00	4.10	5.80
	100	0.53	0.67	0.91	1.09	1.25	1.55	1.75	2.00	2.60	3.95	7.00	0.72	0.93	1.16	1.46	1.85	2.40	2.90	3.45	4.30	5.70	8.50
	150	0.62	0.78	0.99	1.20	1.40	1.80	2.20	2.55	3.30	4.90	8.40	0.80	1.02	1.32	1.73	2.20	2.90	3.50	4.20	5.20	7.20	11.30
	200	0.67	0.83	1.03	1.27	1.62	2.20	2.50	3.00	4.00	6.00	9.90	0.86	1.05	1.38	1.81	2.30	3.20	3.80	4.45	5.70	8.20	13.10
	250	0.71	0.86	1.07	1.29	1.96	2.30	2.90	3.60	4.90	7.50	13.00	0.89	1.08	1.43	1.90	2.47	3.40	4.02	4.65	6.50	8.70	14.30
0.60	50	0.49	0.62	0.83	1.22	1.61	2.05	2.70	3.80	5.40	6.20	6.80	0.55	0.72	0.91	1.28	1.70	2.20	2.80	4.00	5.35	6.60	8.10
	100	0.62	0.74	0.99	1.30	1.69	2.15	3.00	4.45	6.70	8.10	9.20	0.73	0.92	1.21	1.52	1.85	2.50	3.40	4.85	7.10	9.15	11.10
	150	0.68	0.83	1.05	1.34	1.71	2.20	3.20	4.85	7.60	9.00	10.60	0.83	1.05	1.37	1.69	2.15	2.70	3.60	5.30	7.80	10.30	12.70
	200	0.72	0.88	1.09	1.35	1.74	2.30	3.35	5.20	8.10	9.60	11.00	0.88	1.13	1.48	1.88	2.30	2.85	3.80	5.50	8.00	10.80	13.70
	250	0.74	0.92	1.12	1.36	1.79	2.48	3.60	5.60	8.50	10.00	11.50	0.93	1.20	1.51	1.93	2.45	3.00	4.00	5.60	8.40	11.30	14.20
0.70	50	0.80	1.02	1.32	1.83	2.34	3.35	4.70	7.30	11.50	14.30	15.00	0.89	1.16	1.66	2.34	3.20	4.40	6.00	8.80	12.20	15.60	17.30
	100	0.81	1.03	1.32	1.83	2.46	3.50	5.30	8.90	15.60	20.00	22.40	1.00	1.35	1.81	2.52	3.30	4.60	6.60	9.80	15.70	21.20	25.20
	150	0.81	1.03	1.33	1.83	2.46	3.50	5.45	9.75	17.80	24.00	28.20	1.03	1.39	1.87	2.55	3.35	4.70	6.80	10.60	17.40	24.30	29.20
	200	0.82	1.04	1.33	1.83	2.46	3.50	5.50	10.30	19.00	26.80	33.00	1.05	1.40	1.86	2.50	3.35	4.65	6.80	10.70	17.50		
	250	0.83	1.06	1.34	1.83	2.50	3.65	5.50	10.60	20.00	28.90	35.70	1.08	1.41	1.84	2.49	3.35	4.60	6.50	10.30	16.70		
0.80	50	1.00	1.27	2.00	3.52	6.70	9.30	10.30	13.20	19.30	25.50	28.00	1.63	2.42	3.80	5.60	7.80	10.50	13.50	17.00	22.90	28.20	32.00
	100	1.00	1.27	2.00	3.52	6.70	10.50	12.00	15.60	24.70	35.30	43.50	1.55	2.35	3.51	5.20	7.75	11.40	15.30	20.30	28.00	37.30	45.00
	150	1.00	1.27	2.00	3.52	6.70	10.90	12.50	16.80	26.70	40.20	52.50	1.31	1.92	2.77	4.20	6.30	9.70	12.90	17.00	26.00	36.30	
	200	1.00	1.27	2.00	3.52	6.70	11.10	12.80	17.35	27.70	42.00	57.50	1.27	1.77	2.52	3.60	5.50	8.40	11.00	14.80	23.70		
	250	1.00	1.27	2.00	3.52	6.70	11.30	13.20	17.60	28.30	41.50	58.50	1.32	1.94	2.50	3.65	6.20	8.20	11.00	14.90	23.70		

Note: R_R = Residual resistance, (N)   B = Breadth, (m)   V = Speed, (m/s) C_p = Prismatic (longitudinal

Δ = Displacement, (MT)   d = Draft, (m)   L = Length (m)   coefficient.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1   B. Sc. Engineering Examinations 2012-2013

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

Full Marks : 140   Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) Explain 'Monetary Unit assumption' and 'Economic entity assumption' with example.   (3⅓)

   (b) "Karim Advertising Agency" was opened on July 1, 2012. The following transactions occurred during July –   **(20)**

   July 1 :   Invested Tk. 900,000 cash in the business.

   July 2 :   Purchase supplies on account Tk. 15,000.

   July 4 :   Paid office rent in advance Tk. 8,000 cash for two months.

   July 6 :   Paid cash Tk. 6,000 for supplies.

   July 8 :   Received Tk. 50,000 cash for advertising provided this month.

   July 11 : Paid part time employee salaries Tk. 5,000.

   July 15 : Earned Tk. 40,000 for service rendered. Tk. 20,000 cash is received and the balance due for next month.

   July 17 : Received Tk. 25,000 from Eastern Bank borrowed on a notes payable.

   July 20 : Paid utility bill for Tk. 10,000 in cash.

   July 28 : Cash received Tk. 9000 for service rendered in July 15.

   Required: Show the effects of transactions on the accounting equation.

2. (a) Distinguish between Journal and Ledger.   (3⅓)

   (b) "Grider Company" started its operations from April 1, 2013. During April the following transactions occurred –   **(20)**

   April 1 :   Services performed but not yet received Tk. 20,000.

   April 5 :   Purchase office equipment Tk. 25,000 on account.

   April 6 :   Earned revenue of Tk. 100,000 of which Tk. 80,000 is collected in cash and the balance due for next month.

   April 16 : Withdrew Tk. 8,000 cash for personal use.

   April 28 : Received Tk. 10,000 cash from a bank by signing a notes payable

   Required:

   (i) Journalize each transaction.

   (ii) Post the Journal entries to the ledger accounts.

HUM 313

3. (a) "Adjusting entries are required by the cost principle of accounting". Do you agree? Explain. **(3 ⅓)**

(b) Kelvinator Company started their business on May 1, 2012. The trial balance at May 31 is as follows: **(20)**

Kelvinator Company
Trial Balance
May 31, 2012

Accounts Title	Debit (Tk.)	Credit (Tk.)
Cash	8,000	
Accounts Receivable	4,000	
Prepaid insurance	2,400	
Supplies	1,500	
Office Equipment	12,000	
Accounts payable		3,800
Unearned Service Revenue		3,000
Capital		20,000
Service Revenue		6,000
Salary expense	3,000	
Rent expense	1,900	
Total	32,800	32,800

Other data:

→ Unused supplies on hand at May 31, 2012 was Tk. 500.

→ Travel expense incurred but on paid on May 31, 2012 Tk. 350.

→ Insurance policy is for 2 years.

→ Tk. 1,000 of the balance in the unearned service revenue account remains unearned at the end of the month.

→ Rent is accrued but not paid for month Tk. 900.

Required:

(i) Prepare adjusting entries for the month of May.

(ii) Prepare an adjusted trial balance as of May 31, 2012.

4. (a) Trial Balance for Star company are as follows – **(17 ⅓)**

Star Company
Trial Balance
December 31, 2011

Accounts Title	Debit (Tk.)	Credit (Tk.)
Cash	20,000	
Accounts Receivable	11,000	
Supplies	1,500	
Prepaid Insurance	2,000	
Office Equipment	24,000	

HUM 313

Contd ... Q. No. 4(a)

Accounts Title	Debit (Tk.)	Credit (Tk.)
Accumulated depreciation of office equipment		5,600
Notes payable		26,900
Accounts payable		6,100
Salaries payable		2,400
Interest payable		600
Capital		16,000
Drawings	7,000	
Service Revenue		61,000
Advertising expense	8,400	
Supplies expense	4,000	
Depreciation expense	5,600	
Insurance expense	3,500	
Salaries expense	31,000	
Interest expense	600	
Total	118,600	118,600

Other data:

→ Salaries are accrued and unpaid Tk. 500.

Requirement:

    (i) Prepare an income statement.

    (ii) Prepare an owners equity statement.

    (iii) Prepare a classified Balance Sheet as on December 31, 2011 assuming that Tk. 10,000 of the notes payable become due in 2012.

(b) Determine –   **(6)**

        (i) Profit margin Ratio.

        (ii) Return on total asset.

        (iii) Return on equity.

SECTION – B

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

Symbols indicate their usual meaning.

5. (a) Given below is the Cost Data of MM company for the year 2012. All the figures are in Taka.   **(20)**

Material Purchase	3,80,000
Return and Allowances of material	4,000
Direct Labor Cost	85,000
Factory machine insurance	20,000
Office design expense	50,000
Factory rent	25,000

HUM 313

Contd ... Q. No. 5(a)

Sales Revenue	13,00,000
Advertisement expense	40,000
Factory superintendent's salary	20,000
Office maintenance	13,000
Officers' salary	50,000

Inventory in amounts	Beginning of the year	Ending of the year
Raw Materials	59,000	60,500
Work in process	34000	28000
Finished Goods	68000	55000

Requirement:

(i) Prepare a Cost Statement for the year 2012.

(ii) Calculate the net income for 2012.

(b) Write short notes on: **(3⅓)**

(i) Opportunity Cost

(ii) Sunk Cost

(iii) Differential Cost

6. (a) Define variable cost, fixed cost, contribution margin, degree of operating leverage and beak-even point with example. **(3⅓)**

(b) Following data relates to a manufacturing company: **(20)**

Number of units produced and sold each year is 6,000 and selling price per unit $ 20.

Direct materials	Tk. 20
Direct Labor	Tk. 40
Variable Manufacturing Overhead	Tk. 10
Variable selling and Administrative expenses	Tk. 30
Fixed manufacturing overhead	Tk. 30,000
Fixed selling and administrative expenses	Tk. 10,000

Requirement:

(i) Compute BEP in units and in value. (BEP = Break-Even-Point).

(ii) Compute Degree of Operating Leverage (DOL) and prove it by assuming 20% increase in sales.

(iii) Prepare income statement if the selling price increases by $ 2.00 per units, fixed cost increases by $ 15,000 and the sales volume decreases by 10%.

(iv) Compute the BEP in units if selling price increases by 10% and variable cost increases by 15%.

(v) Calculate Margin of Safety in value and in units.

7. Dremmon corporation uses a standard cost accounting system. Data for the last fiscal year are as follows. **(23⅓)**

	Units
Beginning inventory of finished goods	100
Production during the year	750
Sales	700
Ending inventory of finished goods	150

Per Unit cost

Product selling price	Tk. 200
Variable manufacturing cost:	
Direct material	Tk. 40
Direct Labor	Tk. 30
Variable manufacturing overhead	Tk. 25
Variable selling and administrative	Tk. 10
Fixed manufacturing cost	Tk. 20*
Selling and administrative costs (all fixed)	Tk. 45,000

* Denominator level of activity is 750 units for the year.

There was no price, efficiency, or spending variances for the year, and actual selling and administrative expense equal the budget amount. Any volume variance is written off to cost of goods sold in the year incurred.

Required:

(i) Calculate Product cost per unit using Variable and Absorption method.

(ii) Calculate operating income using variable costing and absorption costing method in the last fiscal year.

(iii) Explain the difference in operating income for using two methods and reconcile the amount.

(iv) How will you differentiate the variable and absorption costing method?

8. (a) Robin Partners provides management consulting services to government and corporate clients. It has two support departments – Finance (Fin) and Information technology (IT) – and two operating departments – Government Consulting (GOVT) and Corporate Consulting (CORP). For the year 2012, its cost records indicate the following: **(21)**

	Support		Operating	
	FIN	IT	GOVT	CORP
Overhead cost before allocation (Tk)	60,000	24,000	80,000	1,20,000
Support work by FIN (%)	---	25%	40%	35%
Support work by IT (%)	10%	---	30%	60%

HUM 313

Contd ... Q. No. 8(a)

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

(i) Direct method

(ii) Step Down method

(iii) Reciprocal method (Linear Equation)

(b) Which method of cost allocation is the best method?   (2⅓)

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1   B. Sc. Engineering Examinations 2012-2013

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

Full Marks : 210   Time : 3 Hours

The figures in the margin indicate full marks.

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 container terminal is to be designed for the following size of the vessel (maximum)   **(35)**

   Length : 90 m,   Breadth : 14.5 m

   Depth: 6.5 m,   Draft : 3.8 m

   The port is to be handled 120,000 TEU per year. Determine the number of berths and quay length considering following factors:

   Gross Production per crane : 25 moves/hr

   Number of crane per berth : 02 (Two)

   Operational hour/year : 5280

   Berth Occupancy : 0.56

2. (a) What are the functions of a dock fender? List the requirements for selection of a fender system.   **(10)**

   (b) The engineering team is designing a port for the following vessel: **(25)**

   Length : 180 m,   Breadth : 30 m

   Depth : 12 m,   Draft : 9 m

   Block co-efficient : 0.78,   DWT : 25000

   For a suitable fender system, calculate the berthing energy and fender spacing (Use Kinetic Energy method). Considering the berth is open type and quarter point berthing. Also consider average wind and current.

3. (a) A small terminal is to be designed for a capacity of 116,000 TEU/yr of which   **(25)**

   60,000 import (of which 15000 via CFS)

   40,000 export

   16,000 empties

   Calculate the area for each of the types of containers and also draw a possible layout of the container terminal. Assume average dwel time for import, export and empty containers are 10, 7 and 20 days respectively. Consider stacking height three containers (i.e.) required area per TEU 13 m^2, occupancy rate 0.7 for all containers.

   (b) Write short notes on: **(10)**

   (i) Dolphin

   (ii) Types of Terminals

NAME 335

4. (a) Define approach channel. Discuss the various design parameters and requirements for alignment of approach channel. **(15)**

   (b) Calculate the width of a two way approach channel for a artificial harbor which is to be designed for in following target vessel: **(20)**

   Length : 160 m,   Breadth : 30 m

   Draft : 8.5 m,   Depth : 12 m

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

   Cross wind : 20 Knots,   Long current : 5 Knots

   Sea bed : 50 ft   Vessel speed : 8 Knots

   Wave height : 2 m

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

For Q. No. 4 (b)

SECTION – B

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

5. (a) List the major difference between port and harbor. What are the characteristics of harbors? Write a short description of each type of harbors. **(17)**

   (b) What are the determining factors for planning a port? Discuss in brief of each of the factors for planning a port. **(18)**

NAME 335

6. (a) Why the entrance of the harbor should not be wider than necessary? The wave height inside the harbor has the great influence in cargo loading and unloading operations of the ships. Near the entrance of the harbor, the wave height is 2.0 m, the breadth of the entrance is 50 m while the breadth of the harbor is 400 m. Determine the wave height near the berth if the distance from entrance to the berth is 500 m. **(10)**

(b) Draw a typical layout of a very large artificial harbor with single opening/channel for entrance and leaving the vessel. **(10)**

(c) A port to be designed for the following target vessel. **(15)**

    Length, L = 185.0 m

    Breadth, B = 32.0 m

    Draft, T = 8.5 m

    Block co-efficient, C_B = 0.75

Tidal elevation above reference level below which no entrance is allowed is 3.0 m. Determine the channel depth assuming blockage factor of the channel is 0.6 and sandy bottom. Speed of the vessel is 4.0 Knots.

7. (a) Define breakwater. List the major types and functions of breakwater. **(15)**

(b) For designing a Rock-Mound breakwater, the designer initially assumed the breakwater slope of $1 : 1\frac{1}{4}$ for a wave height 6 m. Do you think that the designer assumption is correct? Determine the slope of the breakwater if the weight of cap rock is 22 tonnes. Use the Ireburren equation and take specific weight of cap rock 2.73. **(20)**

8. Write short notes on the following. **(35)**

    (i) Site investigation for a port.

    (ii) Advantages and disadvantages of vertical type breakwater.

    (iii) Cellular sheet pile breakwater.

    (iv) Floating breakwater.