L-4/T-2/WRE Date : 14/01/2017

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2014-2015

Sub : **WRE 437** (Coastal Engineering)

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) How will you define coastal engineering with respect to ocean engineering? **(5)**

   (b) Secondary coasts shaped primary by marine agents or by marine organisms. It may or may not have primary coasts before being shaped by the sea - explain. **(8)**

   (c) Draw a schematic diagram of a wave profile and identify all the salient features. **(7)**

   (d) Define: (i) wave period, (ii) wave celerity, (iii) group velocity, and (iv) wave steepness. **(10)**

   (e) Draw a neat sketch of tidal datum and show: MHHS, MHW, MTL, MLW, MLLW. **(5)**

2. (a) Draw a neat sketch of the typical beach profile and identify all the salient features. Define foreshore and berm-crests in a beach? **(5+3)**

   (b) Draw the schematic diagram for water particle displacements from mean position for shallow water and deep water waves. **(6)**

   (c) A wave with a period of 6 seconds is propagated shoreward over a uniformly sloping shelf from a depth of 350.0 m to a depth of 3.5 m. Find the wave celerity and wave length at depths of (i) 350.0 m, and (ii) 3.5 m. **(6)**

   (d) What do you understand by the terms "small amplitude" and "surface wave" in small amplitude surface wave theory? What are the assumptions to derive this theory? **(3+4)**

   (e) What is the difference between deep water and shallow water waves? What is dispersion equation? Write down the significance of dispersion equation? **(3+3+2)**

3. (a) List up the factors effecting 'sea level rise' and 'seiches in a harbour. **(6)**

   (b) Write down the phenomenon happens after a wave breaks specially (i) wave steup, (ii) wave set down and (iii) wave run up. **(10)**

   (c) Write short notes on the following terms: **(9)**

   (i) Wave diffraction

   (ii) Wave reflection

   (iii) Wave breaking

   (d) Given a wave with a period T = 5 sec in water depth d = 18 m and wave height 1.50 m. Find the local horizontal and vertical velocities at a depth of 6 m below SWL when $\theta = 2\pi x/L - 2\pi t/T = \pi/8$. **(10)**

Contd P/2

WRE 437

4. (a) What are the underlying assumptions to derive energy conservation theory? **(6)**

(b) Derive the equation for wave forces in an inclined wall (inclination with horizontal θ), when the waves approaches with an angle (α) with the shore line. **(5)**

(c) What is estuary? Define: tide dominated estuary, macro tidal estuary, hyposynchronous estuary and tectonic estuary. **(9)**

(d) Write down the equation for absolute pressure including wave actions? **(3)**

(e) Find the non breaking wave force and moments against a completely reflecting vertical wall ($\chi = 1.0$) resulting from the wave condition given below: **(12)**

(i) wave height at the structure if the structure were not there, $H_i = 1.85$ m.

(ii) depth at structure, $d = 3.60$ m.

(iii) the wave period considered in the design is, $T = 5.0$ sec.

Figure 1, Figure 2 and Figure 3 is attached for relevant uses.

SECTION – B

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

5. (a) Define Highest astronomical tide, Tidal bore, Harbour of refuge, Marine terminal and Macro-tidal zone. **(7)**

(b) Explain (i) Newton's theory of tide generation, (ii) Tidal level and changes in sounding datum. **(7+7)**

(c) Describe the consideration for designing the layout of a harbour. With neat sketch show a typical layout of a harbour. **(7+7)**

6. (a) Write down the physical characteristics of tsunami. **(7)**

(b) Explain how the wind stress that causes storm surge in a coast is calculated. Describe the procedure of estimating the storm surge height in a water body trapezoidal shapes in plan and uniform slopping bottom. **(4+10)**

(c) Explain (i) DART system of tsunami warning, (ii) Indian Ocean Tsunami Warning System. **(7+7)**

7. (a) Explain the considerations while designing groins as a coastal structure. **(7)**

(b) Write down the names of different types of coastal structures and state one objective of each of the structures. **(14)**

(c) Explain and show with neat sketches the different types of caisson breakwater. **(14)**

Contd P/3

WRE 437

8. (a) Based on stability considerations, explain the criteria for designing (i) filter layer, (ii) toe protection and (iii) height of protection works of a coastal revetment. **(15)**

(b) You have been assigned to design a shore protection revetment at a site. The site and wave conditions along that coast line are given below: **(20)**

RL of road level = + 18.5 ft MLLW

Storm surge height = 4.0 ft

50 year high water level = + 7.75 ft MLLW

MHHW = + 6.4 ft MLLW

Bed level at the end of the bank slope = + 3.5 ft MLLW

Bottom slope of sea bed = 1 : 15

Design wave height = 3.0 ft

Design Wave period = 3.5 sec

Check which type(s) of armor unit among riprap, quarry stone and concrete block is (are) suitable. Design the quarry stone armor layer, crest level of the revetment, filter layer and toe protection. Sketch the design section. (Use the attached Table and Figure. Assume the reasonable value of any data, if not given).

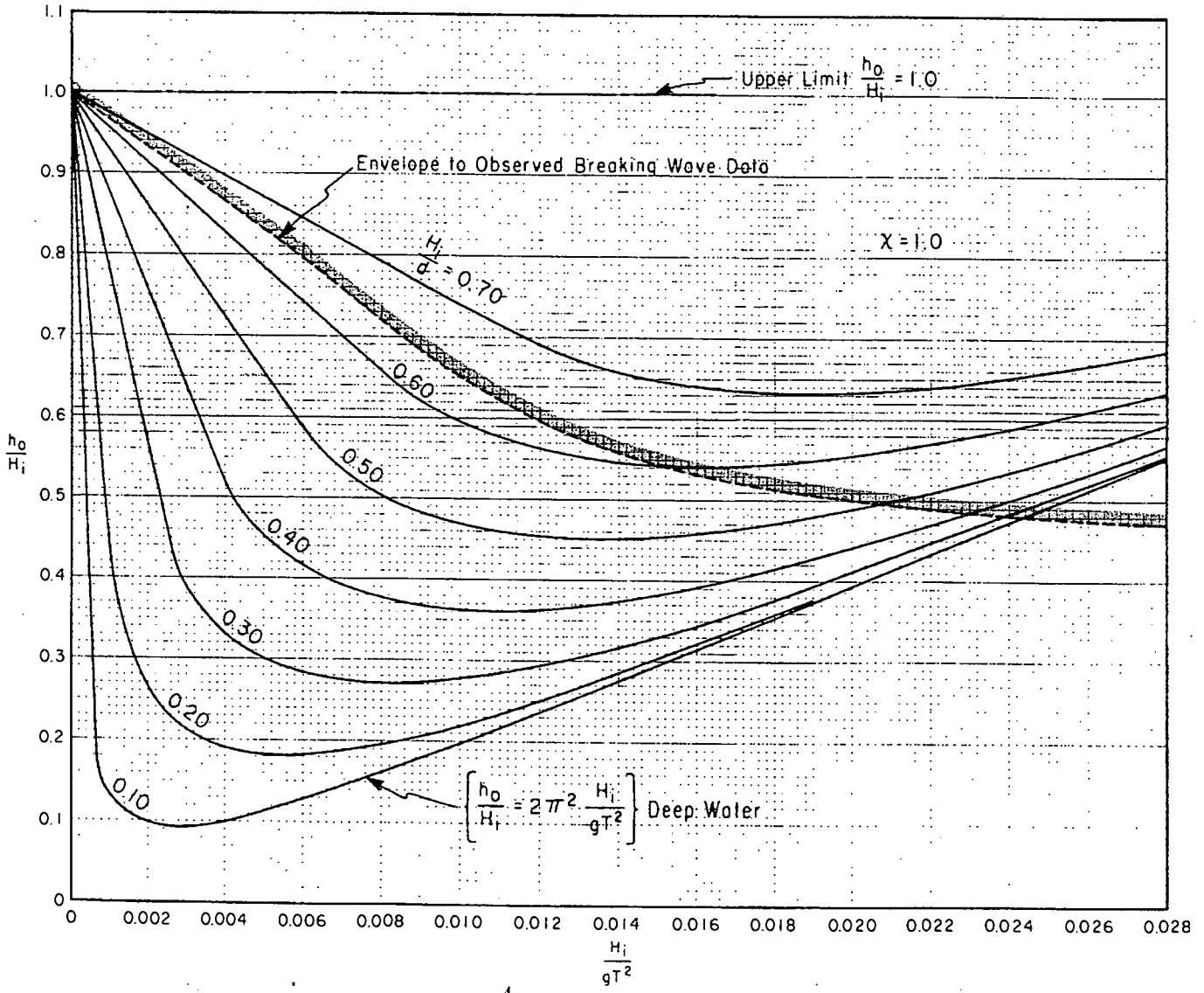

Figure 1 Nonbreaking waves; $\chi = 1.0$.

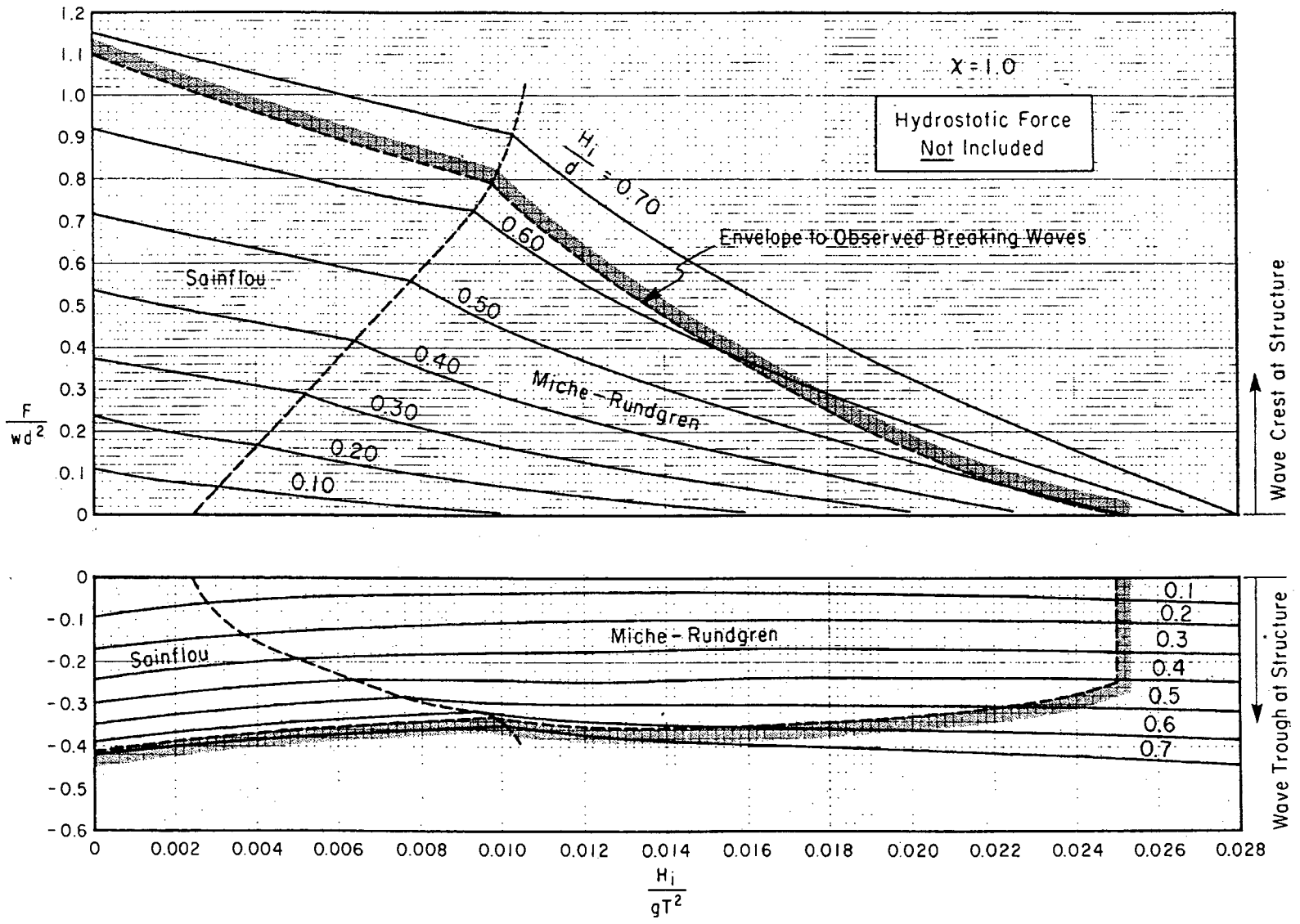

Figure 2 Nonbreaking wave forces; $\chi = 1.0$.

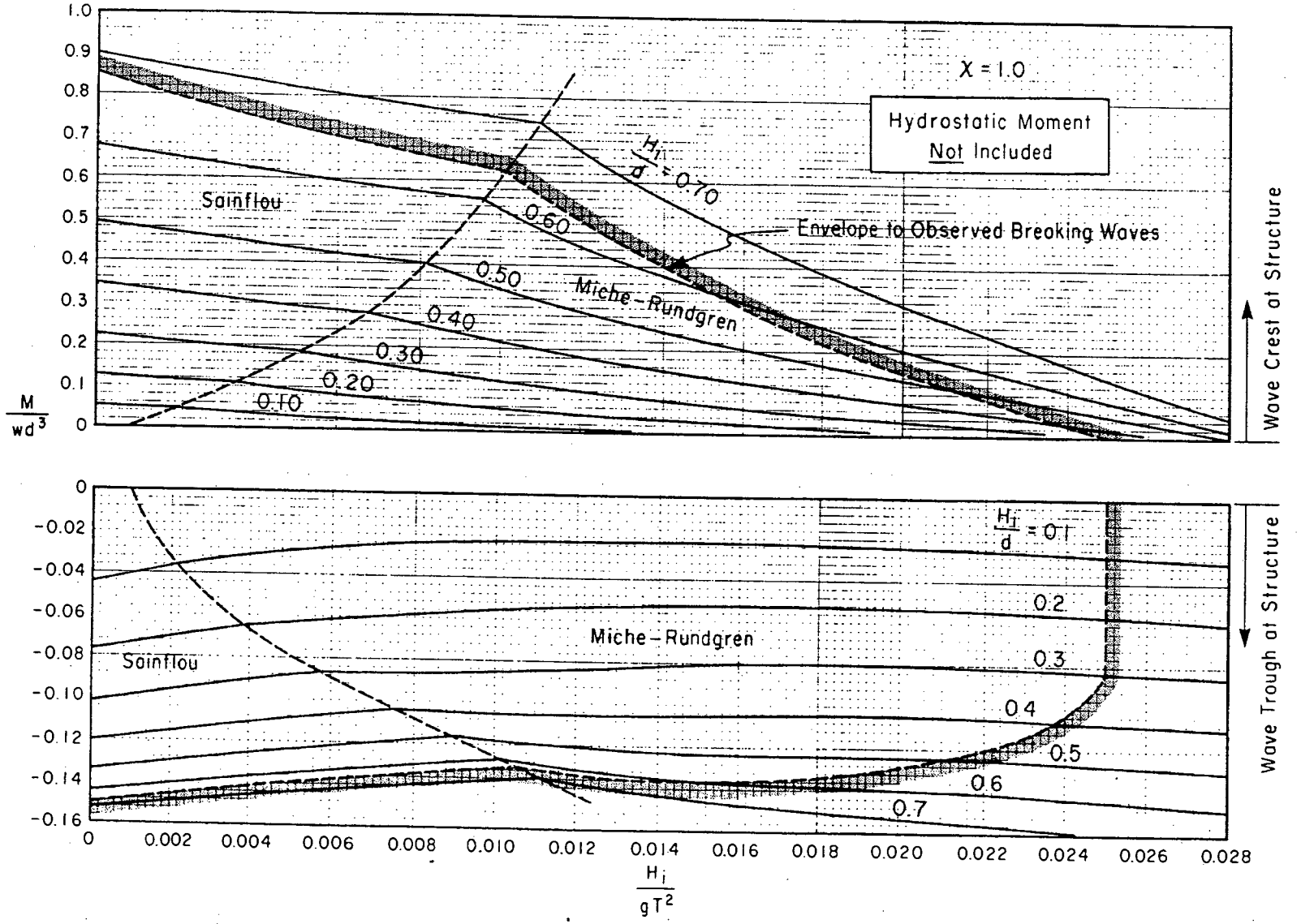

Figure 3 Nonbreaking wave moment; $\chi = 1.0$.

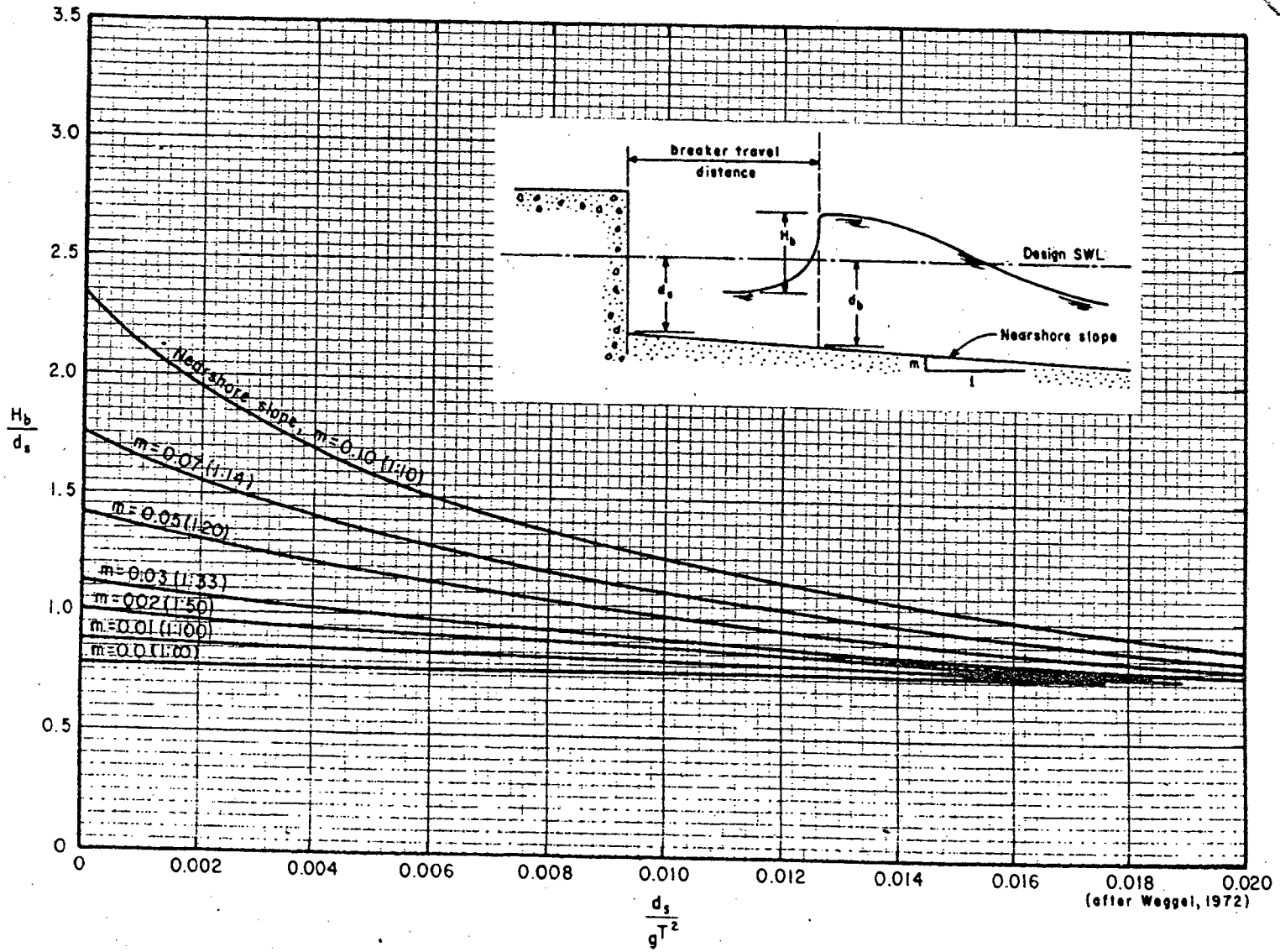

Figure 7-4. Dimensionless design breaker height versus relative depth at structure.

Table 2-2
...gh Slope Runup Correction Factors (Carstea et al. 1975b)

Armor Type	Slope (cot θ)	Relative Size H / K_r[a,b]	Correction Factor r
Quarrystone	1.5	3 to 4	0.60
Quarrystone	2.5	3 to 4	0.63
Quarrystone	3.5	3 to 4	0.60
Quarrystone	5	3	0.60
Quarrystone	5	4	0.68
Quarrystone	5	5	0.72
Concrete Blocks[c]	Any	6[b]	0.93
Stepped slope with vertical risers	1.5	$1 \le H_o'/K_r$[d]	0.75
Stepped slope with vertical risers	2.0	$1 \le H_o'/K_r$[d]	0.75
Stepped slope with vertical risers	3.0	$1 \le H_o'/K_r$[d]	0.70
Stepped slope with rounded edges	3.0	$1 \le H_o'/K_r$[d]	0.86
Concrete Armor Units			
Tetrapods random two layers	1.3 to 3.0	-	0.45
Tetrapods uniform two layers	1.3 to 3.0	-	0.51
Tribars random two layers	1.3 to 3.0	-	0.45
Tribars uniform one layer	1.3 to 3.0	-	0.50

[a] K_r is the characteristic height of the armor unit perpendicular to the slope. For quarrystone, it is the nominal diameter; for armor units, the height above the slope.
[b] Use H_o' for $d_s/H_o' > 3$; and the local wave height, H_s for $d_s/H_o' \le 3$.
[c] Perforated surfaces of Gobi Blocks, Monoslaps, and concrete masonry units placed hollows up.
[d] K_r is the riser height.

Table 2-3
Suggested Values for Use in Determining Armor Weight (Breaking Wave Conditions)

Armor Unit	n[1]	Placement	Slope (cot θ)	K_D
Quarrystone				
Smooth rounded	2	Random	1.5 to 3.0	1.2
Smooth rounded	>3	Random	1.5 to 3.0	1.6
Rough angular	1	Random	1.5 to 3.0	Do Not Use
Rough angular	2	Random	1.5 to 3.0	2.0
Rough angular	>3	Random	1.5 to 3.0	2.2
Rough angular	2	Special[2]	1.5 to 3.0	7.0 to 20.0
Graded riprap[3]	2[4]	Random	2.0 to 6.0	2.2
Concrete Armor Units				
Tetrapod	2	Random	1.5 to 3.0	7.0
Tripod	2	Random	1.5 to 3.0	9.0
Tripod	1	Uniform	1.5 to 3.0	12.0
Dolos	2	Random	2.0 to 3.0[5]	15.0[6]

[1] n equals the number of equivalent spherical diameters corresponding to the median stone weight that would fit within the layer thickness.
[2] Special placement with long axes of stone placed perpendicular to the slope face. Model tests are described in Markle and Davidson (1979).
[3] Graded riprap is not recommended where wave heights exceed 5 ft.
[4] By definition, graded riprap thickness is two times the diameter of the minimum W_{50} size.
[5] Stability of dolosse on slope steeper than 1 on 2 should be verified by model tests.
[6] No damage design (3 to 5 percent of units move). If no rocking of armor (less than 2 percent) is desired, reduce K_D by approximately 50 percent.

Table 2-4
Layer Coefficients and Porosity for Various Armor Units

Armor Unit	n	Placement	K_Δ	P (%)
Quarrystone (smooth)	2	Random	1.00	38
Quarrystone (rough)	2	Random	1.00	37
Quarrystone (rough)	≥3	Random	1.00	40
Graded riprap	2[a]	Random	N/A	37
Tetrapod	2	Random	1.04	50
Tribar	2	Random	1.02	54
Tribar	1	Uniform	1.13	47
Dolos	2	Random	0.94	56

[a] By definition, riprap thickness equals two cubic lengths of W_{50} or 1.25 W_{100}.


L-4/T-2/WRE **Date : 18/01/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2014-2015

Sub : **WRE 431** (Climatology)

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 how boulder quarrying in Bhutan aggravated the flood situation in Bangladesh in 2004. **(3)**

   (b) Explain in brief the adverse outfall condition in the Bay of Bengal during 1998 flood. **(3)**

   (c) Mention the effects of acid rain on soil. **(3)**

   (d) Differentiate between Photochemical and Sulfurous smogs. **(3)**

   (e) Why the deforestation in the hills and mountains of Bhutan, Nepal and India can affect the flood in Bangladesh? **(3)**

   (f) Explain why normal flood during rainy season is essential in ensuring production of HYV rice during dry season in Bangladesh. **(3)**

   (g) Explain why the Ozone depletion in the Antarctic Vortex ceases later in the Spring. **(3)**

   (h) Draw the temperature profile of earth's atmosphere in troposphere and stratosphere. **(2 ⅓)**

2. (a) Explain how the atmospheric inversion can eventually lead to air pollution. **(3)**

   (b) Explain how the ozone depletion can adversely affect the primary productivity in the oceans. **(3)**

   (c) What are the effects of earth's atmosphere on the three major types of solar radiations? **(3)**

   (d) Write down and briefly explain the catalytic chain reaction. **(3)**

   (e) Which of the UV radiations is the most critical regarding Ozone depletion and why? **(3)**

   (f) Explain why Ozone depletion does not occur during polar winter even if there is high concentration of Chlorine present. **(3)**

   (g) 'There is a dynamic balance between creation and destruction of Ozone in the stratosphere' – explain. **(3)**

   (h) What is the advantage of HCFC over CFC regarding Ozone depletion? **(2 ⅓)**

3. (a) How the excessive amount of CO_2 dissolved in the ocean is related to the oceanic bio-systems? **(3)**

   (b) Differentiate between natural and anthropogenic greenhouse effects. **(3)**

   (c) Why we are not particularly worried about water vapor as a greenhouse gas? **(3)**

   (d) Briefly explain Nitrous Oxide as a greenhouse gas. **(3)**

   (e) What happens to visible light after it is being absorbed by the earth? **(3)**

Contd P/2

WRE 431

Contd ... Q. No.3

(f) Explain how global warming can change the frequency and intensity of violent storms. **(3)**

(g) How the global warming can adversely affect Sundarbans? **(3)**

(h) Briefly explain Northwesters. **(2 ⅓)**

4. (a) Differentiate between lower and upper atmosphere. **(3)**

(b) Differentiate between tropical rain forest and tropical monsoon climates. **(3)**

(c) Mention three distinguishing characteristics of Icecap climate. **(3)**

(d) Explain in brief the Thermohaline circulation. **(3)**

(e) Explain why earth's major deserts occur in the horse latitudes. **(3)**

(f) Name three locations each for arid climates (i.e. BWh and BWk). **(3)**

(g) Write down a location, a controlling factor and a distinguishing characteristics for highland climates. **()**

(h) Define Paleoclimatology. **(2 ⅓)**

SECTION – B

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

Assume reasonable values if any data is missing.

5. (a) Explain how cloud, land-use change and aerosol affect albedo and hence climate. **(6)**

(b) Write short notes on (i) Thermal inversion (ii) Sensible and latent heat fluxes; (iii) Hypsometric equation. **(6)**

(c) Calculate the shortwave radiation for the Maldives Island (3.25°N) for the following two conditions: **(6)**

(i) Month = April, daily maximum temperature = 31°C, daily minimum temperature = 27°C, extraterrestrial radiation = 40 MJ/m^2/day. No other data is available.

(ii) Month = May, extraterrestrial radiation = 45 MJ/m^2/day. No other data is available.

(d) Define climatology. Write down the fundamentals ways to change the radiation balance of the earth. **(5 ⅓)**

6. (a) How does cryosphere and humidity influence climate? **(6)**

(b) Determine the net radiation in South Africa in March with the following data: **(8)**

Latitude = 25°S, Total sunshine hours in March = 350, a mean monthly daily maximum and minimum air temperature are of 30 and 21°C, vapor pressure = 2.5 kPa, Albedo = 0.3, Stefan-Boltzmann constant = 4.903×10^{-9} MJ K^{-4}/m^2/day, friction of extraterrestrial radiation (R_a) reaching on the earth on overcast days = 0.2, fraction of R_a reaching on the earth on clear days = 0.75. Assume reasonable values if any data is missing.

$$R_a = \frac{24\,(60)}{\pi} G_{sc}\, d_r\, [\omega_s \sin(\varphi)\sin(\delta) + \cos(\varphi)\cos(\delta)\sin(\omega_s)]$$

Contd P/3

WRE 431

Contd ... Q. No. 6

(c) Show the steps of the development and use of a climate model in a schematic diagram. **(4)**

(d) Write short note on the earth's orbital parameter. Explain how these parameters influence climate. **(5 ⅓)**

7. (a) (i) Is solar energy playing any significant role recent in climate change? Justify your answer. **(6)**

(ii) Write down the advantages and disadvantages of eddy covariance method.

(b) Air with a temperature of 27°C moves across a catchment at a speed of 5 m/s. The catchment is wet and the air is just at saturation. The insolation is 600 W/m^2 and downward longwave radiation at the ground is 300 W/m^2. The longwave emissivity of the surface is 0.95 and the albedo of the surface is 0.3. What will be surface temperature in equilibrium? Given, air density = 1.2 kg/m^3 and $C_D = 2 \times 10^{-3}$, C_p = 1004 J/kg/K, latent heat flux = 3.4 × sensible heat flux. **(6)**

(c) Describe different types of climate model. **(6)**

(d) What is climate feedback? Briefly describe how changes in albedo can act as both positive and negative forcing of climate change. **(5 ⅓)**

8. (a) Consider a simple greenhouse with two layer of atmosphere with temperature T_1 in the upper layer and T_2 in the bottom layer. Derive the expression for surface temperature in terms of emission temperature of the earth. Assume atmosphere is completely transparent for shortwave radiation, earth surface has an emissivity of one (blackbody) and atmosphere is completely opaque to infrared radiation. **(6)**

(b) In an energy balance model, the atmosphere is represented by a single layer of gas to account the greenhouse effect. The model assumes that all of the incoming solar radiation is absorbed by the atmosphere, rather than at the surface. Compute the surface temperature. Assume earth surface has an emissivity of one (blackbody) and atmosphere is completely opaque to infrared radiation. **(6)**

(c) Derive an expression for the vibration of height with pressure, z(p), in terms of the surface pressure (P_0), surface temperature (T_0), and lapse rate (Γ). Determine the height of the 850 mb pressure surface above the surface (assume the surface is at sea level). Given T_0 = 288 K, P_0 = 1013.5 hPa, and $\Gamma = 6.5°C\ km^{-1}$. **(6)**

(d) Describe the possible effects of climate change on the climate variables of Bangladesh? **(5 ⅓)**

L-4/T-2/WRE **Date : 24/01/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2014-2015

Sub : **WRE 435** (Hydraulic Structures)

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**.

Two normal graph papers are supplied.

1. (a) Write down the classification of various types of dam based on the construction material. Explain the fish problem of a dam. **(7)**

   (b) Describe and show with neat sketches the following types of energy dissipators **(8)**

   (i) roller bucket

   (ii) sloping apron below river bed.

   (c) Annual runoff in terms of depth over a catchment of area 1950 km^2 of a reservoir is given below: **(20)**

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Runoff (cm)	120	148	175	90	105	115	160	130	110	95

   Draw the flow mass diagram. What is the average yield from the catchment? What should be the live storage capacity from the reservoir to use the source fully? If the dead storage is 15% of the live storage, what is the gross storage? Mark the filling and emptying periods on the mass curve.

2. (a) State the basic features of the USBR stilling basin in the case of Froude Number (F1) lies between 2.5 and 4.5. Show with neat sketches. **(7)**

   (b) Derive the expression for principal and shear stresses near the toe and heel of a gravity dam considering reservoir full condition and a tail water at d/s side. **(14)**

   (c) (i) Write down the characteristics of hydraulic structure that deviate from other structures, (ii) Define bank storage, surcharge storage, normal pool level and dead storage of a dam reservoir. **(6+8=14)**

3. (a) Explain how the stability of a concrete gravity dam against shear failure (sliding) is ensured. **(5)**

   (b) Figure 1 shows the section of a non-overflow portion of a gravity dam built of concrete. Considering the earth quake effects on reservoir full case, check the stability of the dam against principal and shear stresses near toe and heel, against overturning and against sliding. Assume the unit weight of concrete as 23.5 kN/m^3. Assume the reasonable value of any other data if required. **(30)**

Contd P/2

WRE 435

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

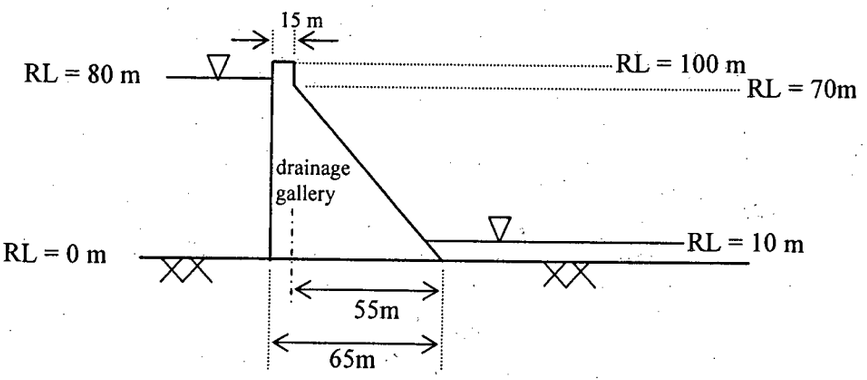

Figure 1 for Ques. 3(b)

4. (a) Write down the basic features and working principles of chute spillway, shaft spillway and siphon spillway. **(12)**

(b) Design a suitable section for the over flow portion of a concrete gravity dam (ogee spillway) having d/s face sloping 2H:1V. The design discharge for the spillway is 7250 cumec. The height of the spillway above the river bed is 90 m. The spillway length consists of 7 spans having a clear width of 8 m each and thickness of each pier is 2 m. Assume, $K_p = 0.02$, $K_a = 0.1$, velocity head is negligible, u/s face of the dam is vertical. Sketch the design section of the spillway. **(23)**

SECTION-B

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

5. (a) What are the main causes of failure of hydraulic structures constructed on permeable foundation and what remedial measures are taken to prevent them? **(8)**

(b) Discuss the functions of guide banks and marginal bunds in river regulation scheme. **(7)**

(c) Use Khosla's seepage formulas to calculate uplift pressures at various key points of barrage foundation profile shown in Figure. 1 applying necessary corrections. Seepage formulas are given below and slope correction for 1 in 4 slope is 3.3. **(20)**

For pile on u/s and d/s end, $\Phi_E = \frac{1}{\pi}cos^{-1}\left(\frac{\lambda-2}{\lambda}\right)$; $\Phi_D = \frac{1}{\pi}cos^{-1}\left(\frac{\lambda-1}{\lambda}\right)$;

$\lambda = \frac{1+\sqrt{1+\alpha^2}}{2}$; $\alpha = \frac{b}{d}$

For intermediate piles, $\Phi_E = \frac{1}{\pi}cos^{-1}\left(\frac{\lambda 1-1}{\lambda}\right)$; $\Phi_C = \frac{1}{\pi}cos^{-1}\left(\frac{\lambda 1+1}{\lambda}\right)$; $\Phi_D = \frac{1}{\pi}cos^{-1}\left(\frac{\lambda 1}{\lambda}\right)$;

$\lambda = \frac{\sqrt{1+a1^2}+\sqrt{1+a2^2}}{2}$; $\lambda 1 = \frac{\sqrt{1+a1^2}-\sqrt{1+a2^2}}{2}$; $\alpha 1 = \frac{b1}{d}$; $\alpha 2 = \frac{b2}{d}$

Contd P/3

WRE 435

Contd... Q. No. 5(c)

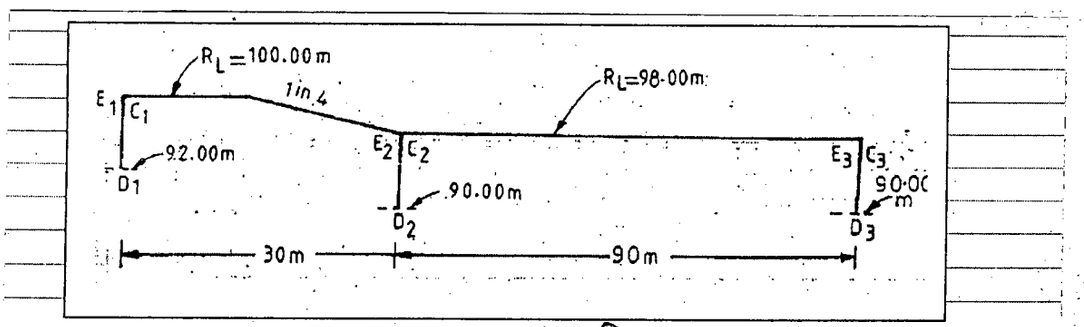

Figure: 1 for Q. No. 5(c)

6. (a) Write down the classification of weirs and differentiate between a weir and a barrage. **(13)**

(b) A barrage is to be constructed on an alluvial river having a flood discharge of 8500 cumec. The relevant data are as follows: **(22)**

Average river bed level = 200.0 m
HFL (before construction of barrage) = 205.3 m
Permissible afflux = 1.0 m
Lacey silt factor = 0.8

Determine (i) the crest level of under sluices and barrage bays; (ii) the waterway to pass the flood discharge; (iii) downstream floor level for under sluices portion considering a retrogression of 0.5 m and 20% discharge concentration.

7. (a) Sketch typical layout of diversion beadworks showing all components. **(5)**

(b) Example principles of slit control with reference to different types slit regulation work. **(10)**

(c) Under what circumstances you will recommend the use of following cross drainage works: **(8)**

(i) Syphon;
(ii) Inlet-outlet.

(d) Using Bligh's creep theory, determine whether the percolation gradient is safe for the following structure given in figure 2. Also calculate thickness of the floor and uplift pressure at points A, B and C. **(12)**

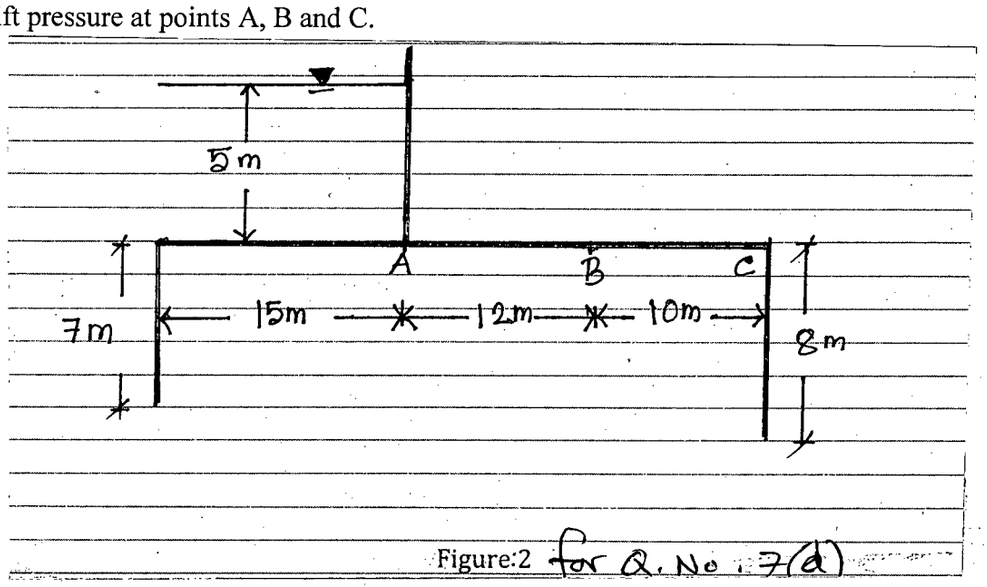

Figure:2 for Q. No. 7(d)

Contd P/4

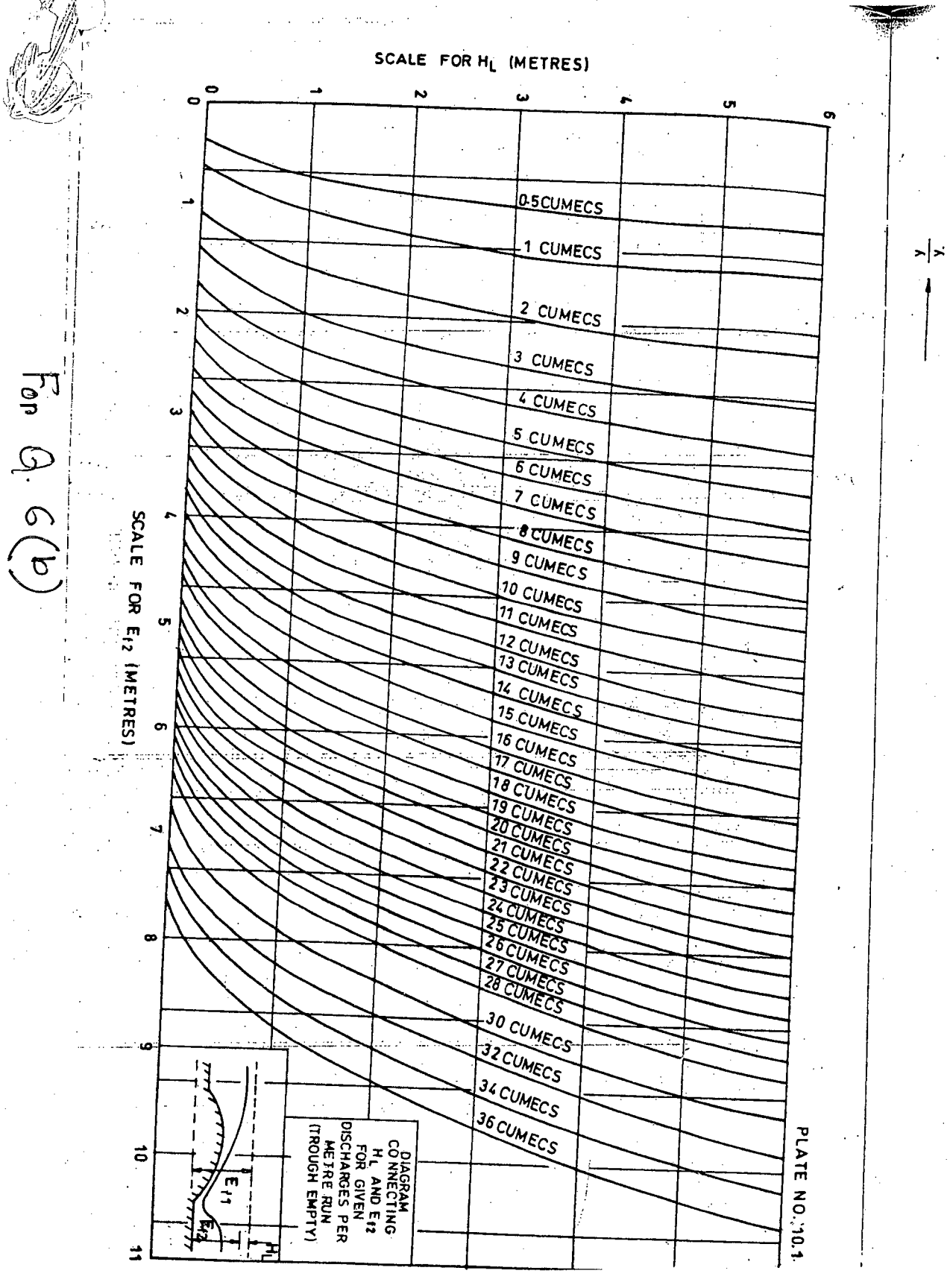

DIAGRAM CONNECTING H_L AND E_{12} FOR GIVEN DISCHARGES PER METRE RUN (TROUGH EMPTY)

PLATE NO. 10.1.

For Q. 6 (b)

WRE 435

8. (a) Which cross drainage work is suitable for the following data at the crossing of a canal and drainage. **(15)**

Canal	Drain
Flow rate = 30 cumec	High flood discharge = 250 cumec
Bed width = 20 m	High flood level = 247.50 m
Depth of water = 1.5 m	High flood depth = 2.5 m
Full supply level = 251.50 m	General ground level = 251.00 m

Design (i) Waterways; (ii) contraction and expansion transitions; (iii) Trough. Given, length and width of flumed rectangular potion of canal are 74.5 m and 10 m respectively.

(b) Write short notes with neat sketches on: **(15)**

(i) Superpassage

(ii) Level Crossing

(iii) Type II Aqueduct

(c) Explain the effects produced by weir on river regime and retrogression. **(5)**

L-4/T-2/WRE **Date : 29/01/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2014-2015

Sub : **WRE 421** (Professional Practice and Communication)

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 **Q. No. 1** and any **TWO** from the rest.

1. (a) Write down the role and responsibilities of a professional in the society. **(6×7=42)**

(b) Define Engineering. Write down the requirements and challenges of engineering profession.

(c) How are Engineers accountable to multiple constituents?

(d) What are the guidelines for "Advertising and Presentations" of skills under ethical rules of conduct.

(e) Write the characteristics of peer reviews.

(f) List the importance of effective communication for Engineers.

2. (a) Discuss the key factors in the management of Professional practice. **(17½)**

(b) Write down the characteristics and responsibilities of professional engineers. **(7)**

(c) List the key factors in effective presentation of a research report. **(7)**

3. (a) "Professional engineers shall conduct themselves with integrity, honesty, fairness and objectivity in their professional activities." — Discuss this statement. **(17½)**

(b) What are the activities of different members of an engineering team? **(7)**

(c) Write down the guidelines to effective public meeting management. **(7)**

4. (a) Write the guidelines for professional practice management plan (PPMP). **(7)**

(b) List the guidelines for effective writing. **(7)**

(c) Write briefly the code of ethics of Institute of Engineers, Bangladesh. **(7)**

(d) "Aurest Corporation has been advised by a pollution-control agency that it has 60 days to apply for a permit to discharge manufacturing wastes into an adjacent lake. The agency has also advised Aurest of the minimum standard that must be met. In an effort to convince the agency that the lake will still meet established environmental standards after receiving the manufacturing wastes, the corporation employs Rick Titude, P.Eng., to perform consulting engineering services and submit a detailed report. After completion of his studies, but before completion of any written report, Rick concludes that the discharge from the plant will lower the quality of the lake below established standards. He further concludes that corrective action will be very costly. Rick orally advises Aurest Corporation of his findings. Subsequently, the corporation terminates Rick's contract with full payment for his services performed and instructs him not to render a written report to the corporation." **(10½)**

Contd P/2

WRE 421

Contd... Q. No. 4(d)

Thereafter, Rick learns that the authority has called a public hearing and that Aurest has presented information to support its view that the present discharge meets minimum standards.

(i) What should Rick now do after hearing about the public meeting under the confidentiality of information? Explain.

(ii) What is the lacking you think Rick had in his consultancy work?

SECTION-B

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

5. (a) Define Professional Practice. "Engineers make life better" — Explain. **(3+5)**

(b) Write down the sequential steps of project preparation. **(8)**

(c) Briefly discuss different types of drawing. **(12)**

(d) What is feasibility study? Name different types of feasibility study. **(7)**

2. (a) What are the components of Tender Documents? **(8)**

(b) What is contract? Name different types of contract. **(3+4½)**

(c) Compare the following– (i) Turnkey and Cost-Reimbursement Contracts, (ii) Consideration and Consent of Contract. **(5+5)**

(d) What are the methods of selecting contractor? Before signing contract document what conditions must be satisfied. **(5+4½)**

7. (a) Write short note on the following– (i) Competitive tendering, (ii) Negotiated Tendering. **(5+5)**

(b) What is Procurement? What are the main causes of delays in Public procurement? **(3+8)**

(c) What are the methods of procurement? Write down the important considerations of procurement. Write down the advantages and disadvantages of procurement through Quotation. **(5+4+5)**

8. (a) Write down the characteristics of a well-written specifications. What are the types of construction Specification? **(9+3)**

(b) Write short note on– (i) Liquidated Damage, (ii) Warranties and Guaranties. **(5+5)**

(c) What is Bill of Quantities? Briefly describe the major parts of Bill of Quantities. **(3+10)**

L-4/T-2/WRE **Date : 04/02/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2014-2015

Sub : **WRE 423** (River Engineering and Flood Mitigation)

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 data if not given. Sketch wherever necessary.

1. (a) Define the following terms used in River Engineering **(15)**
   (i) Alternating bars
   (ii) Dominant discharge
   (iii) Channel pattern
   (iv) Armoring
   (v) Channelization

   (b) Discuss the various uses of river water in context of Bangladesh. **(10)**

   (c) What do you mean by schematization of channel section? How it can be done? Answer with example of (i) a meandering section and (ii) braided river section. **(10)**

2. (a) Explain the cause and consequence of helical movement of water flow in river bend. **(10)**

   (b) What are the variables that govern the meandering process? Write down the causes of meandering process. Explain one of the causes. **(10)**

   (c) Write down the at-a-station hydraulic geometry relationships. Bankful discharge of the river Jamuna is 50000 m^3/s. Calculate the required hydraulic geometry and average velocity of the river. Assume any reasonable values of the exponents and coefficients. **(15)**

3. (a) Sketch a typical Shield's diagram and write down its various practical uses. For a wide river, calculate boundary shear stress and the depth at which the bed particle (size = 0.15 mm) starts to move. The river longitudinal slope is 4 cm in 1 km. Take $\tau_{*c} = 0.045$. **(10)**

   (b) The following hydraulic data are available for construction of a circular bridge pier: **(15)**
   Discharge: 50,000 m^3/s
   Average width: 350 m
   Approaching depth: 15.0 m
   Pier diameter: 2.5 m

   Calculate the local scour depth using the (i) Laursen formula (ii) Shen et al. and (iii) CSU formula. Assume reasonable data if not given.

   (c) Draw a typical revetment protection works and mention its various components. What types of protection techniques are commonly used in Bangladesh? Answer with sketches. **(10)**

Contd P/2

WRE 423

4. (a) For river Meghna, following data are given. **(20)**

   Design discharge = 100,000 m^3/s

   Design Highest Flood (HFL) = 8.0 m PWD

   River bed level = -10.0 m PWD

   Median bed material size = 0.10 mm

   Design and sketch a guide bank to train the river at bridge site. Assume reasonable data for your design, if not given.

   (b) Discuss briefly about the **(9)**

   (i) Types of sediment and its size

   (ii) Sediment load and

   (iii) Bed form.

   (c) "For improvement of Inland Waterways Transport (IWT) routes of Bangladesh, dredging activities is essential" – Justify the statement. **(6)**

SECTION – B

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

5. (a) Write down the names of different structural and non-structure measures for flood control. **(11)**

   (b) What are the ill effects of flood? Describe different planning's for disaster management. **(11)**

   (c) Under your consideration, which flood control measure/s would be the most suitable in case of Bangladesh? Justify your answer. **(13)**

6. (a) Elaborate various design considerations in choosing a reservoir location and dam type. **(11)**

   (b) Discuss different environmental impacts of a reservoir. Discuss different causes of failure of an earthen dam/levee. **(12)**

   (c) Describe various type of channel improvement methods in reducing flood damages. **(13)**

7. (a) What are the challenges in developing an accurate flood forecasting model? What are the general considerations in developing flood forecasting models? **(10)**

   (b) What are the different flood zones? How flood zoning can be effective in reducing flood control damages? **(10)**

   (c) Describe different factors affecting flood hazard. **(5)**

   (d) Describe various type of watershed management techniques in reducing flood damages. **(10)**

8. (a) Describe various Flood Action Plans that have been implemented in Bangladesh. **(10)**

   (b) Describe various type of flood proofing methods in reducing flood damages **(10)**.

   (c) Distinguish between the following terms: **(15)**

   (i) Rural flooding and Urban flooding

   (ii) Flood hazard mapping and Flood risk mapping

   (iii) Tangible damages and Intangible damages
