L-4/T-2/WRE Date : 08/01/2013

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

Sub : **WRE 411** (Hydraulic Structures)

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) Differentiate between weir and barrage. **(4)**

   (b) Draw a neat layout of diversion head-works and indicate the various components of the system. Briefly indicate the function of each component. **(2+3⅓+6½)**

   (c) Write short notes on (i) stream lines and equipotential lines, (ii) Inverted filter and launching apron, (iii) Afflux and Pond level. **(7½)**

2. (a) What are the corrections applied for determining the percentage of pressure at various keypoints of a hydraulic structure? Why it is needed? **(8)**

   (b) An impervious floor of a weir on permeable soil which has upward slope 3 : 1 and downward slope 5 : 1 is 16 m long and sheet piles at both the ends. The upstream pile is 6 m deep and downstream pile is 8 m deep and both of the pile is 0.6 m thick. The weir creates a net head of 3.5 m. Neglecting the thickness of the weir floor, calculate the uplift pressures at the key points, by using Khosla's theory. Use the relevant equations and for 3 : 1, slope correction factor is 4.5 and for 5 : 1, slope correction factor is 2.8. Also see figure 1. **(11⅓)**

   (c) 'The crest level of the head regulator is kept higher than the crest level of the under-sluices' - explain why? **(4)**

3. (a) How does Lane's theory differ from Bligh's creep theory? **(5)**

   (b) Write short notes on (i) piping, (ii) Direct uplift, (iii) Critical Exit gradient. **(6)**

   (c) A barrage is to be constructed on a river having a high flood discharge of about 8200 cumec, with the given data as follows. **(12⅓)**

Average bed level of river	= 250 m
High flood level (before)	= 255.2 m
Permissible afflux	=1.0 m
Pond level	= 253 m

   Assume safe exit gradient = ⅙, Lacey silt factor = 0.8, 0.5 m retrogression, and 20% discharge concentration. Determine : (i) waterway, (ii) crest levels of under-sluices and barrage bays, (iii) Design of under-sluice portion at high flood condition, discharge concentration and retrogression.

Contd P/2

WRE 411

4. (a) Design a suitable cross-drainage work by using the following data. See figure 2. **(13 ⅓)**

Full supply discharge = 32 cumec
Full supply level = RL 213.5 m
Canal bed level = RL 212 m
Canal bed width = 20 m
Trapezoidal canal section with 1.5 H : 1 V slopes
Canal water depth = 1.5 m

Drainage :

High flood discharge = 300 cumec
High flood level = RL 210.0 m
High flood depth = 2.5 m
General ground level = RL 212.5 m

Determine:

(i) Drainage waterway and
(ii) Canal waterway.

(b) What are the different types of cross-drainage works? **(6)**

(c) What factors govern the selection of a suitable type cross-drainage work? **(4)**

SECTION – B

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

5. (a) Define hydraulic structure. How does it differ from other structures? **(5)**

(b) The section of a non-overflow portion of a gravity dam built of concrete is shown in Figure 3. Considering the wave forces (h_w = 0.8 m) and neglecting earthquake forces, calculate (i) the major principal stress at the toe, and (ii) the intensity of shear stress on a horizontal plane near toe. Assume unit weight of Concrete as 24 kN/m^3. **(18 ⅓)**

6. (a) Illustrate the estimation of wave forces acting on a dam. **(5)**

(b) Determine the crest length of an overflow spillway section having a upstream slope of 3 on 2 (3 V : 2H). The design discharge is 220 m^3/s. The upstream water surface at design discharge and the average channel bed is at an elevation of 104.2 m and 100.0 m, respectively. Given, H_d = 3 m and H_e = 3.5 m. Also show the expression and qualitative shape of the spillway if K = 1.939 and n = 1.810. Relevant chart is provided in Figure 4. **(13 ⅓)**

(c) Explain the effect of tail water depth on the character and location of a hydraulic jump. **(5)**

Contd P/3

WRE 411

7. (a) What factors govern the selection of a suitable site for construction of a dam? **(5)**

   (b) What is the total force exerted against the slab of a chute spillway if the slab is curved on a radius of 20 ft, has an included angle of 40°, and is tangent to the horizontal at its downstream end and to a straight chute at its upper end? The spillway is 30 ft wide, the discharge is 3000 cfs with a coefficient of discharge of 4.02, and the water depth at the toe of the spillway (downstream) is 2 ft. Assume no loss in energy and neglect approach velocity. **(18⅓)**

8. (a) Write short notes on (i) tainter (radial) gate, and (ii) drum gate. **(4+4)**

   (b) Briefly describe the flow conditions in a shaft spillway with neat sketches. **(6)**

   (c) Discuss the scour protection works of energy dissipation to solve the problem for the condition of upper conjugate depth is always below tailwater. **(9⅓)**

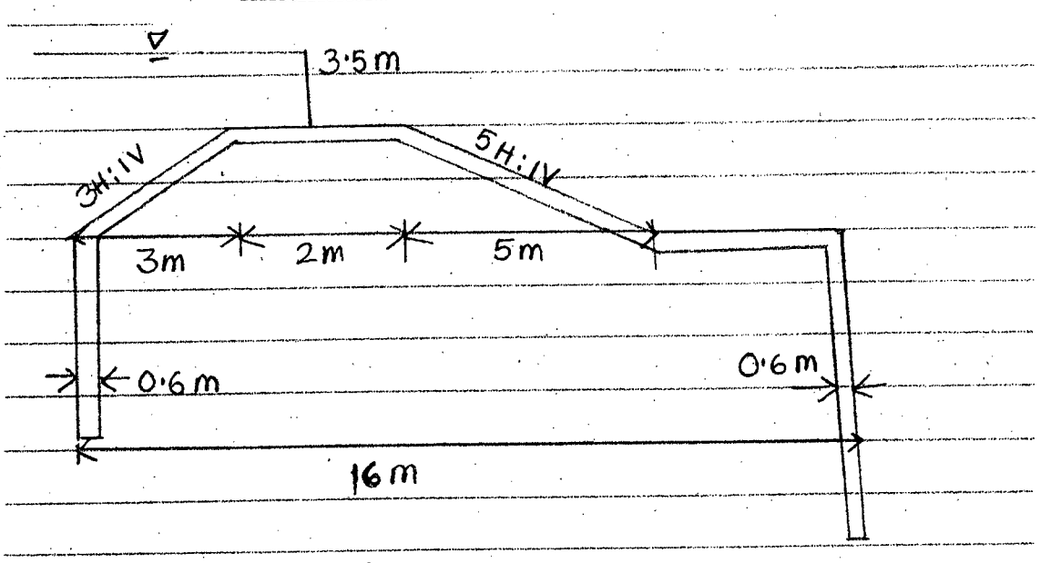

Figure 1 for Q: 2(b)

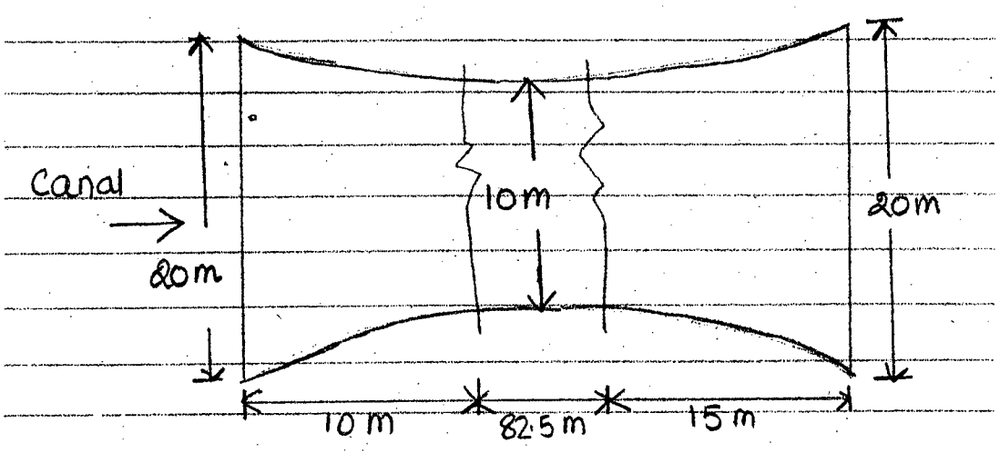

Figure 2 for Q: 4(a)

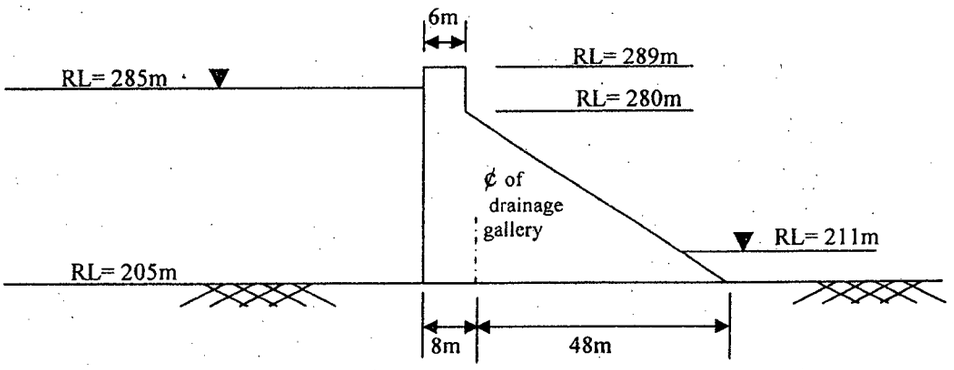

Figure 3 for Q. 5(b)

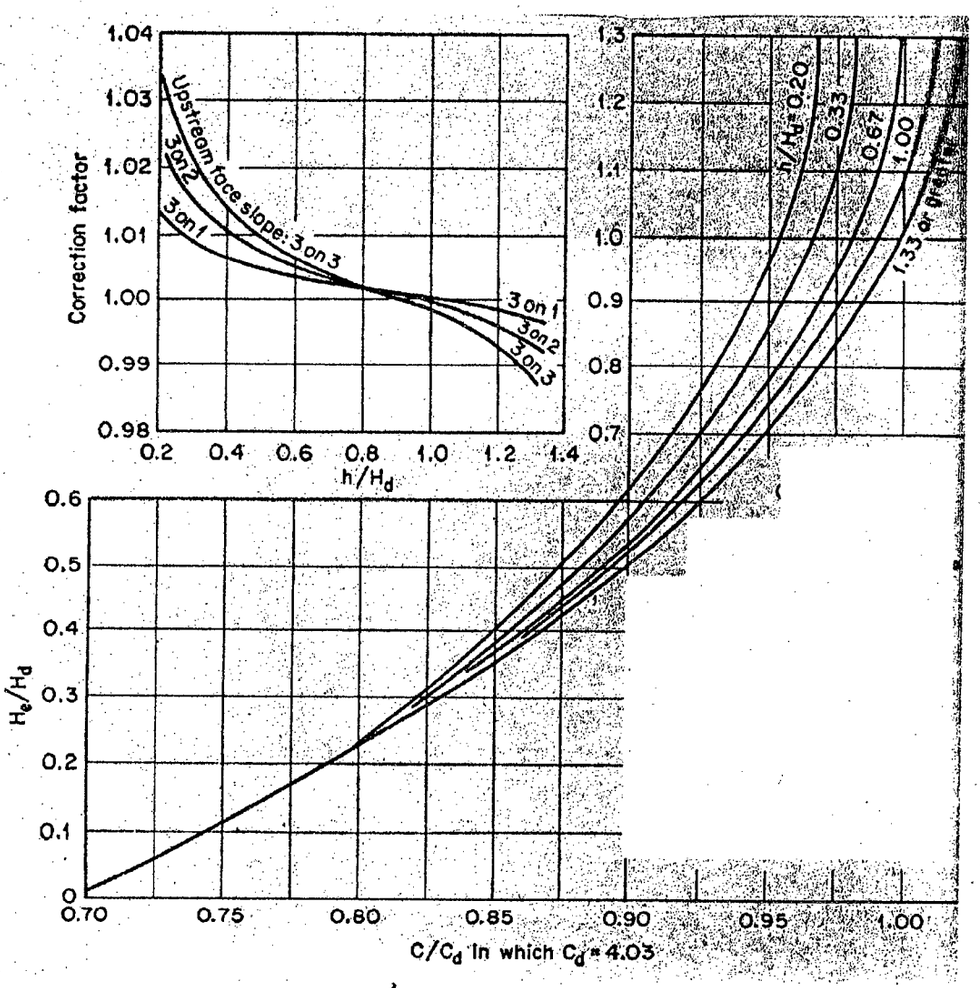

Figure 4 for Q. 6(b)

L-4/T-2/WRE Date : 18/12/2012

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

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 buffers with respect to acid rain. (3 ⅓)

   (b) Which of the UV radiations is the most critical regarding ozone depletion and why? (3)

   (c) Briefly explain the catalytic chain reaction. (3)

   (d) Explain why ozone depletion in Antarctic Vortex ceases Later in the spring (i.e. Mid December). (3)

   (e) What happens to cyclones and hurricanes due to global warming and why? (3)

   (f) Define ozone hole. Is it an actual hole in the ozone shield? (3)

   (g) Explain why El Nino is associated with fierce bush fire for Pacific South-West (i.e. Indonesia and Australia). (3)

   (h) What are the advantages of HFC over CFC regarding ozone depletion? (2)

2. (a) 'Regional climatic differences in a flat country are minor' – explain with regard to Bangladesh. (3 ⅓)

   (b) Briefly discuss about CFC as a greenhouse gas. (3)

   (c) Explain in brief the secondary cause for the rise in sea level due to global warming. (3)

   (d) What are the effects of earth's atmosphere on the three main components of solar radiation? (3)

   (e) How La Nina condition improves fishing in the Pacific Ocean near Peru? (3)

   (f) Explain why the freshwater wetlands are sources of Methane. (3)

   (g) Explain why La Nina is associated with Hurricanes for Pacific South-West (i.e. Indonesia and Australia). (3)

   (h) Define oceanic upwelling. (2)

3. (a) Differentiate between Tropical Monsoon Climate and Tropical Rain Forest Climate. (3 ⅓)

   (b) Differentiate between Cirrostratus and Cirrocumulus clouds). (3)

   (c) Define middle and upper atmospheres. (3)

Contd P/2

WRE 431

Contd ... Q. No. 3

(d) Differentiate between Subarctic Climate with Cool Summers (dry winter) and Subarctic Climate with Cold Winters (dry winter). **(3)**

(e) Explain the positive and negative charges that build up in the cloud and on the ground before lightning. **(3)**

(f) Mention three distinguish characteristics of arid climate (i.e. BWh and BWk). **(3)**

(g) Mention three distinguishing characteristics of Mediterranean climates. **(3)**

(h) Mention two locations for Continental Climates. **(2)**

4. (a) Briefly explain any two of the natural causes that increase the duration of flood in Bangladesh. **(3 ⅓)**

(b) Define: (i) type II stratospheric cloud, (ii) Trade wind, (iii) buffer to acid rain, (iv) photochemical smog, (v) Contrails, and (vi) ENSO. **(6×2=12)**

(c) Define atmospheric inversion. **(3)**

(d) Briefly explain the 1970 cyclone of Bangladesh. **(3)**

(e) Define Tundra climate. **(2)**

SECTION – B

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

5. (a) What are the major components of earth's climate? Write down their importance in the climate system. **(2+8)**

(b) Differentiate between: **(6)**

(i) Applied climatology and applied meteorology

(ii) Climate variables and climate forcings

(iii) Microclimate and synoptic climate.

(c) What is Parameterization of climate models? State some typical climate model parameterizations. **(2+2)**

(d) Write a short note on AOGCM. **(3 ⅓)**

6. (a) How do the Coriolis effect and Centrifugal effect modify the generalized circulation of the atmosphere. **(4)**

(b) Define the atmospheric circulation cells, global pressure systems and climate belts and show them in a neat sketch. **(10)**

Contd P/3

WRE 431

Contd ... Q. No. 6

(c) Write short notes on: **(6)**

(i) Cyclostrophic wind

(ii) Anticyclones

(iii) Katabatic winds

(d) Explain the basic physics that take place during the coupling of atmosphere and ocean. **(3 ⅓)**

7. (a) Describe the salient features of wind driven circulation with a neat sketch showing the oceanic gyres. **(9)**

(b) What is Thermocline? Explain the vertical ocean temperature profile. **(1+5)**

(c) Write a short note on North Atlantic Deep Water (NADW). **(4)**

(d) "Asian-Australian Monsoon system is the dominant monsoon circulation of the earth" – explain. **(4 ⅓)**

8. (a) What are the fundamental ways to change the radiation balance of the earth? **(3)**

(b) How does the land-atmosphere coupling take place? **(5)**

(c) Define Planetary Boundary Layer. Describe its major parts with proper sketches. **(10)**

(d) "There is a net radiative heating near equator and net cooling near pole" – explain with proper sketch. **(5 ⅓)**

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L-4/T-2/WRE Date : 18/12/2012

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

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

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   (c) Explain in brief the secondary cause for the rise in sea level due to global warming. **(3)**

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Contd P/2

WRE 431

Contd ... Q. No. 3

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(d) Briefly explain the 1970 cyclone of Bangladesh. **(3)**

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SECTION – B

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

5. (a) What are the major components of earth's climate? Write down their importance in the climate system. **(2+8)**

(b) Differentiate between: **(6)**

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Contd P/3

WRE 431

Contd ... Q. No. 6

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L-4/T-2/WRE **Date : 01/01/2013**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

Sub : **WRE 413** (Coastal Engineering)

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**.

Symbols have their usual meanings.

1. (a) What do you mean by 2-D ocean waves? Knowledge of wave is important — why? **(4)**

   (b) What are the significance of spatial and temporal variable in a progressive wave? **(3⅓)**

   (c) Define: **(6)**

   (i) angular frequency

   (ii) wave steepness

   (iii) relative wave height

   (d) Distinguish between deep water wave and shallow water wave. **(6)**

   (e) Write up the assumptions in "Small Amplitude Surface Wave" theory. **(4)**

2. (a) How can you identify coastal zone in a country? **(4)**

   (b) Coastal engineering works are divided into three phases — explain. **(4)**

   (c) Discuss the process of diffraction and wave breaking in nearshore area. **(5)**

   (d) A uniform beach has a slope of 1 : 100 (V:H). The wave period is 6 sec. Find the wave length L and wave celerity C at a distance of (i) 200 m and (ii) 18,000 m from the shoreline? **(7⅓)**

   (e) What is the main difference between non-breaking wave forces and breaking wave forces on a vertical wall? **(3)**

3. (a) What is a stable shoreline? **(3)**

   (b) What do you mean by statistical representation of wave? **(3)**

   (c) Draw the pressure distribution diagram for non-breaking wave on a vertical wall and identity the key features. **(5)**

   (d) Classify estuary according to tidal range and its geological origin. **(6⅓)**

   (e) A wave is travelling shoreward. At a depth of d = 12 m, the wave height is 1.2 m and wave period is 4.0 sec. Find the local horizontal and vertical velocities u and w, and accelerations a_x and a_z at an elevation of z = –3 m below the SWL when $\theta = (kx - \sigma t) = \frac{\pi}{6} = 30°$. **(6)**

Contd P/2

WRE 413

4. (a) Define wave spectrum. **(3)**

(b) What are the main processes in coastal zone that are primarily governed by winds and tides? **(3)**

(c) What is the importance of 'radiation stress' in coastal sedimentation process? **(3)**

(d) A smooth faced wall (λ = 1.0) with a wave height at the structure if the structure were not there is H_i = 1.4 m, the depth of water at the structure d = 6 m and the wave period is T = 5 sec. The angle of wave approach is $\alpha = 75^\circ$ and the wall has a shore wand sloping face of 10:1 (V:H). For the non-breaking wave condition find the reduced horizontal wave force. (See Figure 1 and Figure 2). **(14⅓)**

SECTION – B

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

5. (a) Define tidal bore, lowest astronomical tide, priming of tide, lagging of tide, tidal station. **(5)**

(b) Give Newtonian explanation of tidal phenomenon. Why is this called statical theory? What is dynamic theory of tide? **(8)**

(c) List various components of a harbor and write down one main function of each of those components. **(10⅓)**

6. (a) With neat sketches show (i) typical cross-section and layout of sea dike, (ii) typical cross-section of sloping front seawall/revetment, (iii) typical beach configurations with detached nearshore breakwater and (iv) horizontal composite caisson breakwater. **(12)**

(b) Discuss the major functions and design considerations of (i) groins (ii) beach drains. **(11⅓)**

7. (a) Based on stability considerations, what are the criteria of selecting wave height used in the design of coastal structures? **(3)**

(b) Explain the design criteria of revetment toe protection. With neat sketches show the typical revetment toe protection works of different toe scour conditions. **(4+6=10)**

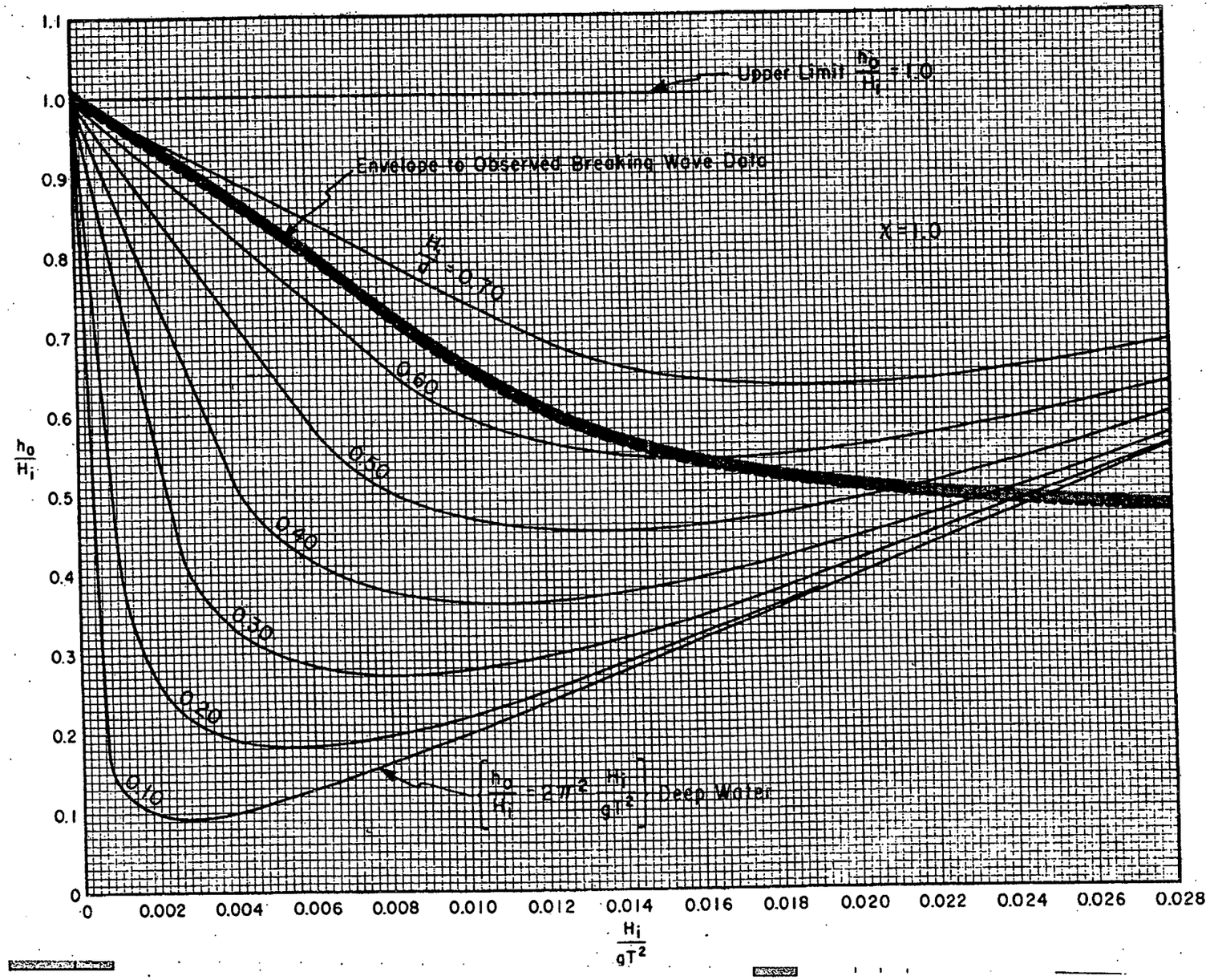
(c) Write down the usual steps needed to design an adequate shore protection revetment. **(10⅓)**

8. (a) Explain how the stability of armor unit used in shore protection work is ensured. **(6)**

(b) Differentiate between the working principles of hydraulic and mechanical dredging. Briefly describe bucket ladder dredger. **(4+4=8)**

(c) Describe the (i) area of application of plain suction dredger and (ii) working method of cutter suction dredger. **(3+6⅓=9⅓)**

Figure 1 : Nonbreaking waves ($\gamma = 1.0$)



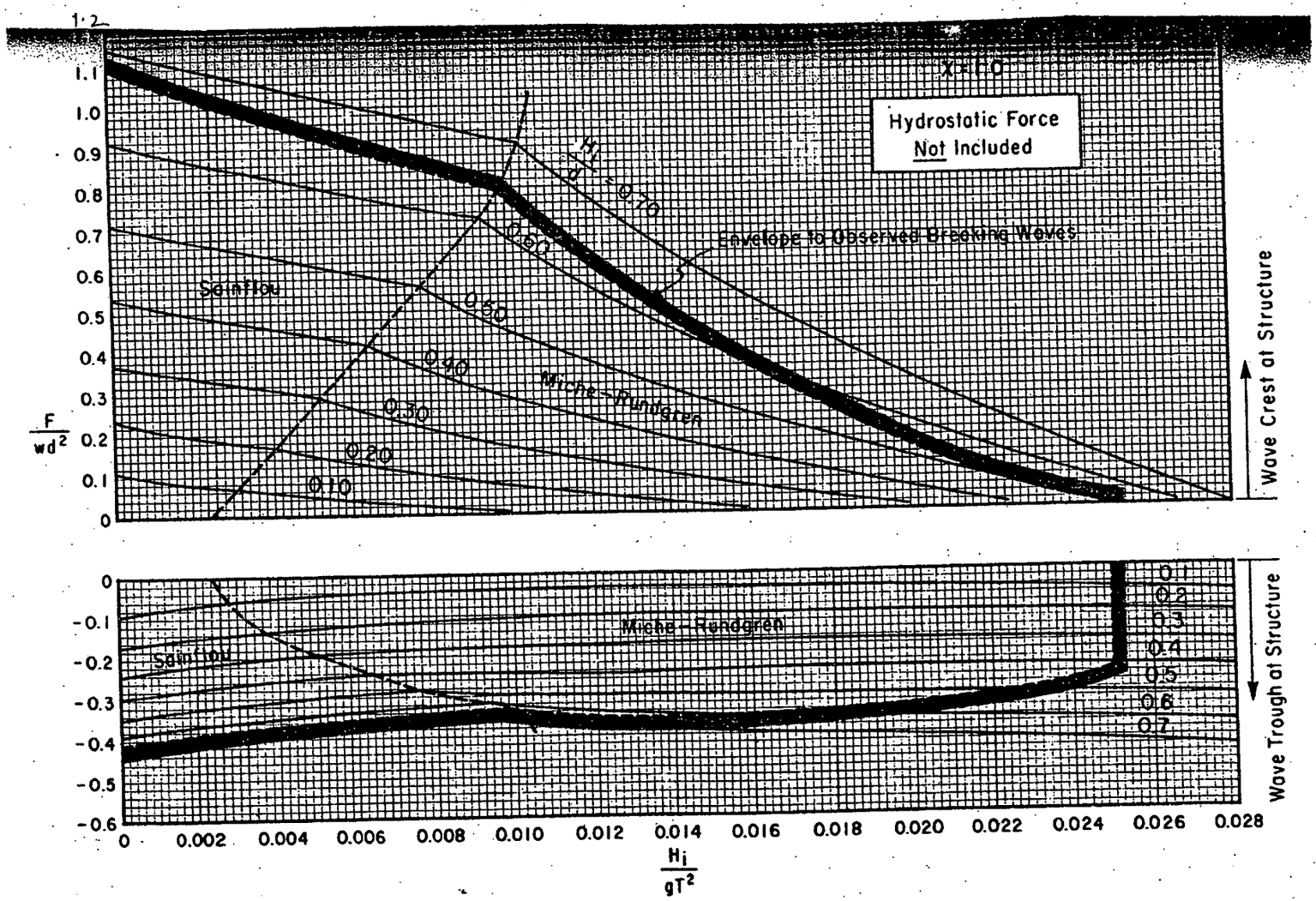


Figure 2. Nonbreaking wave forces; $\chi = 1.0$.

L-4/T-1/WRE **Date : 15/12/2012**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-1 B. Sc. Engineering Examinations 2010-2011

Sub : **WRE 401** (Irrigation and Flood Control)

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) 'All the waters are not fit for irrigating crop' - Discuss briefly and critically the statement. **(6)**

   (b) Write short notes on (i) Leaching, (ii) Sodium Absorption ratio, (iii) Advantages of irrigation. **(9)**

   (c) What is the classification of irrigation water having the following characteristics: Concentration of Na, Ca and Mg are 22, 3 and 1.5 milli-equivalents per liter respectively, and the electrical conductivity is 200 micromhos per cm at 25^0c? What problem might arise in using this water on fine textured soils? What remedies do you suggest to overcome this trouble? **(10)**

   (d) Explain various types of canal seepage losses. Mention the factors affecting seepage losses. **(10)**

2. (a) Mention the major causes of flood in Bangladesh. **(5)**

   (b) Discuss the remedial measures of water logging. **(10)**

   (c) Design an earth canal section using Kennedy's theory for the data given below. **(15)**

   Canal discharge = 4000 cumac

   Canal bed slope = 1 in 5250

   Critical velocity ratio = 1.085

   Manning's n = 0.021

   (d) What are the purpose the berms served? **(5)**

3. (a) What is water-logging? Explain the basic causes of water-logging. **(10)**

   (b) What are the advantages and disadvantages of subsurface drainage system? **(5)**

   (c) An irrigate area has to be provided with the drains so that the water table lies at least 2 m below the ground surface. The drains are spaced at 20 m c/c and are placed 2.5 m below the ground surface. Find the maximum rate of flow in each of the drains if they are 200 m in length each. Depth of the impervious stratum below ground surface is 5 m and $k = 10^{-4}$ cm/sec. **(10)**

   (d) Describe : (i) Salt balance equation . and (ii) leaching requirement. **(10)**

Contd P/2

WRE 401

4. (a) Draw neat sketch of the different types of subsurface drainage layout. **(5)**

(b) Differentiate between Kennedy's and Lacey's theory. **(5)**

(c) The gross command area for a distributary is 6000 ha, 80% of which is culturable irrigable. The intensity of irrigation of Rabi is 50% and that for Kharif is 25%. If the average duty at the head of distributary is 2000 ha/cumec for Rabi and 900 ha/cumec for Kharif, find out the discharge required at the head of distributary from average demand consideration. **(15)**

(d) Write short notes on (i) Gross and Culturable command area, (ii) kor depth and kor period. **(10)**

SECTION – B

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

5. (a) Define and show in a diagram the different classes of soil water. Also indicate their availability to plants and their drainage characteristics. **(8)**

(b) What do you mean by soil moisture tension? Briefly describe the working principle and disadvantages of a tensiometer. **(2+8=10)**

(c) Gravimetric samples prior to irrigation in a 2.0 ha field yields the following results. The field capacity of the soil is 16% and the root zone depth is 1.6 m. Determine the time required to irrigate the field using a stream of 40 l/s assuming application losses of 25%. **(12)**

Sampling depth (cm)	Sample volume (cm^3)	Wt. of moist sample (gm)	Dry wt. of moist sample (gm)
0-40	155.0	220.5	200.8
40-80	158.0	232.4	210.2
80-120	148.0	235.2	213.5
120-160	145.0	240.3	215.3

(d) Explain why loam soil is considered the most suitable for crop production. **(5)**

6. (a) State the factors affecting Evapotranspiration. **(6)**

(b) Write short notes on: **(3×3=9)**

(i) Irrigation scheduling

(ii) Soil moisture characteristic curve

(iii) Field irrigation requirement.

(c) Briefly describe the non-weighting percolation type lysimeter with sketch to determine the consumptive use of a crop in the field and also state its limitations. **(9)**

Contd P/3

WRE 401

Contd ... Q. No. 6

(d) Wheat is to be grown at a place, the useful data of which is given below. Determine the consumptive use and field irrigation requirement if the water application efficiency is 70%. Make use of Blaney-Criddle equation and a crop factor of 0.75. **(11)**

Month	Mean temperature t°c	Percent day-time, hr	Effective rainfall (cm)
November	17.0	7.30	1.6
December	16.0	7.10	1.1
January	13.0	7.20	2.2
February	15.0	7.50	2.4

7. (a) Distinguish between: **(3×3=9)**

(i) Check flooding and basin flooding

(ii) Aqueduct and siphon aqueduct

(iii) Weir and barrage.

(b) Define diversion head works. State the requirements of a good module in an irrigation project. **(2+5=7)**

(c) "Furrow irrigation is associated with slat accumulation in the ridges" - Explain. **(5)**

(d) A stream of 140 liters per second was diverted from a canal and 100 liters per second was delivered to the field. An area of 1.8 ha was irrigated in nine hours. The effective depth of root zone was 1.5 m. The runoff loss in the field was 440 m^3. The depth of water penetration varied linearly from 1.5 m at the head end of the field to 0.9 m at the tail end. Available moisture holding capacity of the soil is 18 cm/m depth of soil. Irrigation was started at a moisture extraction level of 50% of the available moisture. Determine water conveyance efficiency, water application efficiency, water storage efficiency and water distribution efficiency. **(14)**

8. (a) State the limitations of sprinkler irrigation. **(4)**

(b) Write down the functions of the following structures in an irrigation project with sketches: **(3×3=9)**

(i) Under sluices (ii) Canal head regulator (iii) River training works.

(c) Describe the working principle of a centrifugal pump with a sketch. Give a comparison between a volute type centrifugal pump and a turbine pump. **(7+5=12)**

(d) A pump lifts 95,000 liters of water per hour against a total head of 22 meters. Compute the water horse power. If the pump has an efficiency of 70%, what size prime mover is required to operate the pump? If a direct drive electric motor, having an efficiency of 75%, is used to operate the pump, compute the cost of electrical energy in a month of 30 days. The pump is operated for 10 hours daily. The cost of electrical energy is 6.00 Tk. per unit. **(10)**

L-4/T-2/WRE **Date : 01/01/2013**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

Sub : **WRE 413** (Coastal Engineering)

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**.

Symbols have their usual meanings.

1. (a) What do you mean by 2-D ocean waves? Knowledge of wave is important — why? **(4)**

   (b) What are the significance of spatial and temporal variable in a progressive wave? **(3 ⅓)**

   (c) Define: **(6)**

   (i) angular frequency

   (ii) wave steepness

   (iii) relative wave height

   (d) Distinguish between deep water wave and shallow water wave. **(6)**

   (e) Write up the assumptions in "Small Amplitude Surface Wave" theory. **(4)**

2. (a) How can you identify coastal zone in a country? **(4)**

   (b) Coastal engineering works are divided into three phases — explain. **(4)**

   (c) Discuss the process of diffraction and wave breaking in nearshore area. **(5)**

   (d) A uniform beach has a slope of 1 : 100 (V:H). The wave period is 6 sec. Find the wave length L and wave celerity C at a distance of (i) 200 m and (ii) 18,000 m from the shoreline? **(7 ⅓)**

   (e) What is the main difference between non-breaking wave forces and breaking wave forces on a vertical wall? **(3)**

3. (a) What is a stable shoreline? **(3)**

   (b) What do you mean by statistical representation of wave? **(3)**

   (c) Draw the pressure distribution diagram for non-breaking wave on a vertical wall and identity the key features. **(5)**

   (d) Classify estuary according to tidal range and its geological origin. **(6 ⅓)**

   (e) A wave is travelling shoreward. At a depth of d = 12 m, the wave height is 1.2 m and wave period is 4.0 sec. Find the local horizontal and vertical velocities u and w, and accelerations a_x and a_z at an elevation of z = –3 m below the SWL when $\theta = (kx - \sigma t) = \frac{\pi}{6} = 30^\circ$. **(6)**

Contd P/2

E 413

a) Define wave spectrum. **(3)**

b) What are the main processes in coastal zone that are primarily governed by winds and tides? **(3)**

c) What is the importance of 'radiation stress' in coastal sedimentation process? **(3)**

d) A smooth faced wall ($\lambda = 1.0$) with a wave height at the structure if the structure were not there is $H_i = 1.4$ m, the depth of water at the structure d = 6 m and the wave period is T = 5 sec. The angle of wave approach is $\alpha = 75^\circ$ and the wall has a shore and sloping face of 10:1 (V:H). For the non-breaking wave condition find the reduced horizontal wave force. (See Figure 1 and Figure 2). **(14⅓)**

SECTION – B

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

a) Define tidal bore, lowest astronomical tide, priming of tide, lagging of tide, tidal station. **(5)**

b) Give Newtonian explanation of tidal phenomenon. Why is this called statical theory? What is dynamic theory of tide? **(8)**

c) List various components of a harbor and write down one main function of each of those components. **(10⅓)**

a) With neat sketches show (i) typical cross-section and layout of sea dike, (ii) typical cross-section of sloping front seawall/revetment, (iii) typical beach configurations with attached nearshore breakwater and (iv) horizontal composite caisson breakwater. **(12)**

b) Discuss the major functions and design considerations of (i) groins (ii) beach drains. **(11⅓)**

a) Based on stability considerations, what are the criteria of selecting wave height used the design of coastal structures? **(3)**

b) Explain the design criteria of revetment toe protection. With neat sketches show the typical revetment toe protection works of different toe scour conditions. **(4+6=10)**

c) Write down the usual steps needed to design an adequate shore protection revetment. **(10⅓)**

a) Explain how the stability of armor unit used in shore protection work is ensured. **(6)**

b) Differentiate between the working principles of hydraulic and mechanical dredging. Briefly describe bucket ladder dredger. **(4+4=8)**

c) Describe the (i) area of application of plain suction dredger and (ii) working method cutter suction dredger. **(3+6⅓=9⅓)**

26.12.12

L-4/T-2/WRE **Date : 26/12/2012**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

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

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) "Engineers make our lives better" — Justify the statement. **(7)**

   (b) What is the practice of professional engineering and who can practice professional engineering? **(8)**

   (c) List scopes of professional practices of (i) Water Resources Engineer and (ii) Civil Engineer. **(8⅓)**

2. (a) Discuss briefly different types of feasibility studies. **(7)**

   (b) Draw a flow diagram showing project development stages. **(8)**

   (c) Write down the general and supplementary conditions of a contract. **(8⅓)**

3. (a) List the contents of a Standard Tender Document as per PPR-2008. **(5)**

   (b) List the typical set of clauses of general requirement of a "Specifications" of a contract. **(5)**

   (c) Elaborate the "General specification" of a typical dredging works. **(13⅓)**

4. (a) Name the general elements of Bill of Quantity. What are the classes of work covered by work classification for the preparation of BOQ. **(7)**

   (b) What are the basic principles of Professional ethics and ethical behavior? **(6)**

   (c) Answer the following questions: **(10⅓)**

   (i) What are the types of reports?

   (ii) What is the basis of report writing?

   (iii) Prepare a short "Guide lines" of better technical report writing.

Contd P/2

WRE 421

SECTION – B

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

5. (a) What do you mean by project screening? Explain how the screening of a flood management project differs from that of an irrigation project. **(11⅓)**

   (b) Write short note on: **(3×4=12)**

   (i) Eligible Tenderer

   (ii) Trade Union and Industrial Relation in Bangladesh.

   (iii) Environmental Impact Statement.

6. (a) Define Internal Rate of Return. Suppose the feasibility estimate of a project is Tk. 10.0 million with an expected operating life of 10 years. Annual maintenance and operating expenses are forecast as Tk. 555000 per year. Using a 10% discount rate, what net annual income must be received to recover the capital investment of the project? **(2+5=7)**

   (b) Why claims and disputes arise in a Water Resources/Civil Engineering Contract? **(7+3=10)**

   Categorize claims in contracts

   (c) How do arbitration can play effective role in solving disputes in contracts. **(6⅓)**

7. (a) Enumerate the impacts of water resources projects on environment. **(8)**

   (b) Explain briefly the techniques of Environmental Impact Assessment (EIA). **(10)**

   (c) Show the generalized EIA Process in a flow chart. **(5⅓)**

8. (a) Describe the composition and job of a Tender Evaluation Committee. **(11⅓)**

   (b) What do you mean by Tender Evaluation? Describe the procedure that is followed during evaluation of tender according to Public Procurement Rules 2008. **(2+10=12)**

L-4/T-2/WRE

Date : 20/11/2012

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2010-2011

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**.

1. (a) Discuss the factors contributing to recurring floods in Bangladesh. **(12)**

   (b) Elaborate on the various types of floods in Bangladesh and their characteristics. **(12)**

   (c) Briefly describe with the help of a neat diagram the operation of a storage reservoir for flood mitigation. What are the limitation of this method? **(11)**

2. (a) What are the factors to be considered for effective flood mitigation by structural measures? Discuss the demerits of flood mitigation embankment. **(12)**

   (b) Discuss the salient features and limitations of flood forecasting and warning as practised in Bangladesh. **(11)**

   (c) What do you mean by flood fighting? Discuss the various problems encountered and remedial measures undertaken during flood fighting. **(12)**

3. (a) Distinguish between direct flood damages and indirect flood damages. Give examples of each category. **(7)**

   (b) Briefly describe how flood risk analysis is carried out. **(13)**

   (c) The average annual damage from floods in a river basin is estimated to be Tk. 280 lakh. Estimates are made for five alternative proposals for flood mitigation works. The initial investment, annual O&M costs and annual damages are given in the following table. Select the most economic project using an interest rate of 8 percent. Assume that the life of channel improvement work is 25 years and the life of dam is 50 years. The capital recovery factors for interest rate of 8% and project lives of 25 and 50 yrears are 0.0934 and 0.0817 respectively. **(15)**

Alternative	Project	Investment (lakh Tk.)	Annual O&M (lakh Tk.)	Annual Flood damage (lakh Tk.)
I	Channel improvement	210.0	70.0	175.0
II	Dam at site A	840.0	42.0	133.0
III	Dam at site B	1120.0	56.0	87.5
IV	Dam at site A with channel improvement	1050.0	112.0	70.0
V	Dam at site B with channel improvement	1330.0	126.0	42.0

Contd P/2

WRE 423

4. (a) Distinguish with a sketch between (i) bed load and bed material load (ii) suspended load and wash load. **(8)**

(b) What is critical tractive stress? Show that Shield's entrainment function at critical stage of bed movement is a function of particle Reynold number. **(12)**

(c) Write down the continuity equation for bed form movement and explain the variable with a sketch. **(7)**

(d) Compare upper flow regime with lower flow regime in a tabular form. **(8)**

SECTION – B

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

Assume reasonable value if not given.

5. (a) Define the following terms used in River Engineering: **(10)**

(i) Alternating bars

(ii) Anabranched stream

(iii) Bed shear

(iv) Base flood plains

(v) Canalization

(b) Illustrate with sketch, zones of land water interaction of fluvial hydro-systems. **(10)**

(c) How you will assess the velocity of the river for design purpose? Water levels of a river reach of 1 km length are 7.68 m and 7.65 m and average depth water is 20 m; calculate the depth averaged velocity of river channel. The channel is carrying bed sediment of size 0.15 mm. Assume reasonable value if not given. **(15)**

6. (a) Write down the salient characteristics of 'Confluences' and 'Bifurcations'. Give Examples. **(10)**

(b) What is meant by "at a station hydraulic geometry"? Calculate the hydraulic geometry parameters of the river Ganges. Assume reasonable data for the river Ganges. **(15)**

(c) Enumerate the possible reasons of river bank failure. Also briefly explain the major causes of bank failure in Rivers of Bangladesh. **(10)**

7. (a) Write down the components of total scour in river bed and identify the causes of their occurrence. **(8)**

(b) Sketch the plan view of scour pattern around the bridge pier and abutment. **(7)**

(c) A bridge is to be constructed across a river with a slight bend. Given the following data: **(20)**

Contd P/3

WRE 423

Contd ... Q. No. 7(c)

Discharge = 12000 m^3/s

Depth of flow = 25 m

Width of the river = 900 m

Width of circular pier = 4.0 m

Radius of bend = 3.0 km

Size of bed material = 0.10 mm

Calculate the **total** scour. Assume reasonable data if not given.

8. (a) Define scour velocity. **(10)**

Calculate the time dependent scour depth for the river Jamuna for smooth bed condtion after t = 1 year: Given that

Discharge = 60,000 m^3/s

Depth of flow = 10 m, and av. width = 8 km

Critical velocity = 0.3 m/s

Assume coefficients and other data reasonably if not given.

(b) Draw a typical bank protection works and show its various components. Design a falling apron for Q = 1200 m^3/s and D_{50} = 0.15 mm. Also estimate the volume of launching materials for a slope 1V : 2.5 H and cover layer thickness 400 mm. **(10)**

(c) Briefly write notes on: **(15)**

(i) Comparison of local scour formulae around bridge piers

(ii) Causes of deterioration of IWT routes of Bangladesh and its improvement

(iii) Dredging and dredge spoil disposal
