BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Environmental, Water Resources, and Coastal Engineering
Student Group : Earned Credit Hour > 108, Final Examination (Spring) : Feb 2021

Subject: EWC-461, River Engineering and Flood Management

Total: 2.00 hours **Full Marks: 180**
Section A : 1.00 hour **Section A : 90**

INSTRUCTIONS:

a. Use **SEPARATE** answer scripts for each section.
b. **Question – 1 and Question – 4 (Viva Voce)** in **Section A** are compulsory.
c. Answer any **OTHER ONE** question from this section **(From Q - 2 & Q - 3)**.
d. Figures in the margin indicate full **marks**.
e. Assume reasonable data if necessary.
f. **Symbols** used have their usual meanings.

SECTION-A

Question – 1 (Compulsory)

a. Explain with figures how slope and sediment load affect the channel pattern. **5**

b. What is contraction scour and why it is not very significant in computing local scour? **5**

c. What are the differences between bed load and bed material load? Explain with a figure why bed load is generally 'capacity dependent' and suspended load is 'supply dependent'. **8**

d. Define bank full discharge. If the bank full discharge of a river is 147 m^3/s then determine the corresponding bank full depth from the following data. **12**

Height above river bed (m)	0.5	0.7	1.1	1.5	1.7	2.0	2.1	2.3	2.5
Width (m)	11.3	12.1	16.7	21.3	23.5	27.1	43.1	51.7	54.3

Question – 2

a. Explain with a figure the differences between horse shoe and wake vortices. **5**

b. Define fall velocity and shear velocity. Explain with a figure the role of Rouse's number in determining the distribution of bed load and suspended load. **7**

c. Explain with figure why higher velocity is required to erode a sediment than to keep it in suspension. **5**

d. The discharge of a 176 m wide river with a depth of 2.2m and sand dune bedforms is 655 m^3/s. The velocity near the bed is 13% of the mean velocity and the porosity of sand is 50%. If the length and the height of the dunes are 212 and 19 cm respectively, then estimate the bed load. Assume any other data as necessary. **13**

Question – 3

a. Explain with a figure the roles of depth of flow and pier diameter for scour around pier. **6**

b. Prove that the critical shear stress required to erode very course grained **5**

sediments is a function of only sediment diameter.

c. What is 'slack flow zone'? Explain the difference between permeable and impermeable groynes. **6**

d. A river reach downstream of a sediment retention reservoir flows with a sediment load of 30% compared to the upstream. If the downstream depths and the discharges are 95% and 90% of the upstream values, then calculate the morphological change that is expected downstream. Explain the answer. Assume that there is no change in grain size distribution. **13**

Question – 4 Viva Voce (Compulsory) **30**

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Total: 2.00 hours **Full Marks: 180**
Section B : 1.00 hour **Section B : 90**

INSTRUCTIONS:

a. Use **SEPARATE** answer scripts for each section.
b. **Question – 5 and Question – 8 (Viva Voce)** in **Section B** are compulsory.
c. Answer any **OTHER ONE** question from this section **(From Q - 6 & Q - 7)**.
d. Figures in the margin indicate full **marks**.
e. Assume reasonable data if necessary.
f. **Symbols** used have their usual meanings.

SECTION-B

Question – 5 (Compulsory)

a. Differentiate between flood control and flood management. Illustrate the short term and long term measures of flood management. **13**

b. "Land management can play key role compared to other measures of flood management"- Justify this statement. **5**

c. The annual maximum series of flood magnitudes has a mean and standard deviation of 6000 m^3/s and 3000 m^3/s respectively. If the data is assumed of follow a log normal distribution: **12**

(i) What is the probability in each year that a flood magnitude would exceed 8000 m^3/s.
(ii) Determine the flood magnitude with a return period of 100 years.

Question – 6

a. Differentiate between a weir and a barrage. Also mention the causes of dam failure. **10**

b. Briefly Explain the considerations of a flood proofing strategy. **10**

c. Comment on flood map and flood zoning. "Flood plain zoning reduces the risk and damage"- justify the statement. **10**

Question – 7

a. Briefly describe the advantages and disadvantages of flood proofing. **8**

b. Explain the terms, 'Watershed management' and 'Urban flooding'. Also illustrate the impacts of urban flooding. **12**

c. Briefly explain the purpose and impacts of dredging activities considering different perspective. **10**

Question – 8 Viva Voce (Compulsory) **30**