BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Environmental, Water Resources, and Coastal Engineering, Term Final (Spring) Examination 2023: Jul-Sep 2023

Student Group: Earned Credit Hours > 108

Subject: EWC 461, River Engineering and Flood Management

Time: 3.00 hours **Full Marks: 180**

INSTRUCTIONS:

a. Use **SEPARATE** answer scripts for each section.
b. **Question-1** in **Section-A** and **Question-5** in **Section-B** are compulsory
c. Answer any other **TWO** questions out of **THREE** from each section.
d. Figures in the margin indicate full **marks**.
e. Assume reasonable data if necessary.
f. **Symbols** and **abbreviations** used have their usual meanings.

SECTION-A

Question 1 (Compulsory)

a. What is river pattern? Explain with figures the factors that affect the river pattern. **12**

b. What is hydraulic geometry? Write down the equations that define the hydraulic geometry of a river. **05**

c. Develop the slope discharge relationship of a river from the data shown in the following table: **13**

Dicharge (m^3/sec)	12	52	110	210	300	500
Slope (cm/ km)	15	11	9	8.5	7.8	7.2

Question 2

a. Explain why a meandering river is more stable compared to braided river. **05**

b. Explain the terms: bed material load, bed load and wash load. **05**

c. Explain with a figure why there is no sharp demarcation between suspended load and bed load. **05**

d. What are the differences between competence and capacity? What is dissolved load and why is it not part of the sediment load? **05**

e. A river with a velocity of 1.25 m/ sec (Chezy's constant is 32) has bed material size of 0.25 mm. If the Shield's parameter is 0.032 then is the bed erodible? What should be the minimum size of non-erodible bed material? Assume reasonable value missing data. **10**

Question 3

a. What is flow regime? Briefly explain the major differences between upper and lower flow regime. **07**

b. Why does roughness coefficient change as the flow changes from lower to upper regime? **03**

c. Explain with a figure why wash load never settles down in a river? **05**

d. What is the difference between shear velocity and fall velocity? Why is dissolved load not part of the sediment load? **05**

e. A river with a depth of flow of 4 m and slope of 1 in 4444, carries fine sediment with a fall velocity of 0.04 m/sec. If the sediment concentration at 0.4 m from bed is 400 ppm then determine the concentration at 1 m. Assume reasonable values of missing data. **10**

Question 4

a. Explain the morphological changes in the main river at: (1) downstream of a confluence of a tributary (2) downstream of the off-take of a distributary. **06**

b. Explain the terms: wake vortex, critical scour velocity and equilibrium scour depth. **06**

c. What is contraction scour? When is contraction scour not considered? **04**

d. Explain briefly the morphological factors affecting navigation. **06**

e. What is the effective pier diameter of 1.5 m bridge pier with 4m × 11m pile cap placed at river bed level? The 125 m wide river has a discharge of 245m^3/sec with a slope of 0.02 % (Manning's n is 0.025) **08**

SECTION-B

Question 5 **(Compulsory)**

a. Explain the factors responsible for flood in Bangladesh. **10**

b. Explain in brief the economical evaluation of flood mitigation project. **10**

c. What is flood forecasting? Explain the role of flood forecasting in flood management. **10**

Question 6

a. What are the major types flood in Bangladesh? Explain in brief the measures for flood control in Bangladesh. **10**

b. Explain in brief the considerations for developing a flood proofing strategy. **10**

c. Explain flood diversion. What are some of the advantages and disadvantages of flood diversion work? **10**

Question 7

a. The table below shows the annual daily maximum rainfall for a given catchment. Assuming that the rainfall data is normally distributed, determine the 100-year rainfall. **10**

Year	1990	1991	1992	1993	1994	1995	1996	1997
Max daily rainfall (mm)	43	44	38	31	47	49	52	31
Year	1998	1999	2000	2001	2002	2003	2004	2005
Max daily rainfall (mm)	51	40	41	43	37	36	34	38

Year	2006	2007	2008	2009	2010	2011	2012	Remarks
Max daily rainfall (mm)	36	37	43	34	53	49	47	-

b. What is flood zoning? Explain in brief the approaches and data required for flood zoning? **10**

c. Explain in brief why water shed management is important compared to other measures of flood management. **10**

Question 8

a. Explain with examples the differences between active and passive river training structures. **04**

b. Why is scour higher in complex pier compared to normal pier? **04**

c. What is the difference between open and closed joint revetment? Which one is suitable in which case? **05**

d. What are some of the advantages and disadvantages of nature-based bank protection? **05**

e. Explain with a figure the morphological consequences of a cut-off. **05**

f. Explain briefly the processes involved in river dredging. **07**