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, Spring Final Examination: June 2019

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 No-1 in Section A** and **Question-6 in Section B** are compulsory.
c. Answer any **OTHER TWO** questions **from EACH section.**
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

a. What is channel pattern? How do sinuosity and multichanneledness affect the channel pattern? **6**

b. What is regimes of flow? What are the different forms of regime and how does the bed resistance vary with the different forms? **10**

c. The data on width and discharge of a river are shown in the following table. Develop the width discharge relationship. **14**

Width(m)	Discharge(m^3/s)
31.5	11.3
38	28.9
40.7	56.8
42.5	125
43.0	181
55	312
66	503
71	674
75	1740

Question – 2

a. What are the four variables that affect the channel pattern? Explain briefly the effects of each of the Variables. **10**

b. Classify and explain sediment load in terms of mode of transport. What are the differences between wash load and bed material load? **6**

c. What is stream power? Show that stream power is proportional to the cube of velocity. **4**

d. The data on discharge and slope of a meandering river are shown in the following table. Develop the slope-discharge relationship. **10**

Discharge (m^3/sec)	90	150	250	500	1200	3000
Slope	0.0083	0.0067	0.0053	0.0039	0.0027	0.0018

Question – 3

a. Explain two theories regarding formation of meanders. **6**

b. Explain with sheild's diagram the process of erosion of cohesive and non-cohesive bed material. **6**

c. What is settling velocity? Explain how Rouses number affect the distribution of sediment load. **6**

d. What is local scour? Explain the types of local scour. **5**

e. A 100m wide river has a depth of 3.2m and a slope of 0.15%. If the average bed material size is 2cm, then calculate the bed load transported by the river using Meyer-Peter and Muller equation. **7**

Question – 4

a. What are the factors affecting local scour? **4**

b. What is a complex pier? What are the components of a complex pier used in scour estimation? **5**

c. Why pier scour is generally higher than abutment scour? **4**

d. Explain with figures the different types of spurs according to orientation. **5**

e. Why is clear water scour generally higher than live-bed scour? **4**

f. Calculate the maximum scour depth by Lacey- Inglis method for a river with a discharge of $450m^3/sec$ and bed material size of 0.15mm. What are the limitations of this method? **8**

SECTION-B

Question – 5

a. List the factors for effective flood control by structural and non-structural measures. **12**

b. Illustrate past floods occurred in Bangladesh and describe the factors contributing to 1998 flood in Bangladesh. **8**

c. Explain river system network of Bangladesh and highlight the factors on which damages of flood depend. **6+4=10**

Question –6

a. Illustrate the storage zones of a reservoir with the help of a neat sketch. **10**

b. Explain different types of dam according to use with example. In addition mention causes of dam failure. **10**

c. Write down the design considerations of groynes and explain the length and spacing considerations in details. **8+2=10**

Question –7

a. Briefly explain the purposes and impacts of dredging activities from different perspectives. **10**

b. Compile the data required for flood zoning and comment on advantages and disadvantages of flood zoning. **3+7=10**

c. Construction of a levee is under consideration for a reach of river vulnerable to flood damages. The estimated damages from various river stages and the cost of levee affording protection on the given stages are given below. The return periods of the flood stages 6.4, 7.0, 7.6, 8.2, 8.8, 9.4 and 10.0m are 10, 15, 22, 30, 70, 150 and 300 years respectively. What river stage would you recommend for the design of the levee? **10**

Peak Stage(m)	Total damage below indicated stage (Million $)	Project Cost (Million $)
6.1	0	0.4
6.7	3	0.6
7.3	10	0.8
7.9	20	1.0
8.5	32	1.3
9.1	45	1.6
9.7	60	1.8
10.3	80	2.0

Question–8

a. Discuss the salient features and limitations of flood forecasting and warning as practiced in Bangladesh. **10**

b. Comment on flood hazard, risk and vulnerability. Explain factors influencing flood hazard. **5+5=10**

c. Differentiate between tangible and intangible flood damage with appropriate examples. In South-East Asia, an island is subjected to frequent flooding. The region has around 400 people who live mainly on tourism and fishing. The area has 4 hotels, 2 schools and 1 hospital. Compute the risk for 2 years, 5 years and 10 years return period flooding for this specific area. **4+6=10**