BANGLADESH UNIVERSITY OF PROFESSIONALS

Military Institute of Science and Technology

B.Sc. in Environmental, Water Resources, and Coastal Engineering, Term Final (Spring)Examination 2021: July-Aug 2021

Student Group: Earned Credit Hours > 108

Subject: EWC-461, River Engineering and Flood Management

Total	**: 3.00 hours(ForPhysical Examination)**	**Full Marks**	**: 180**
	: 2.00 hours (Online Examination for Section-A + Section-B)		
Section A	**: 1.00 hour (Online Examination)**	**Section A**	**: 90**

INSTRUCTIONS- PHYSICAL EXAMINATION

a. Use **SEPARATE** answer scripts for each section.
b. **Question - 1** in **Section-A** is compulsory.
c. Answer any **OTHER TWO** questions from **Section-A**.
d. Figures in the margin indicate full **marks.**
e. Assume reasonable data if necessary.
f. **Symbolsand abbreviations** used have their usual meanings.

INSTRUCTIONS - ONLINE EXAMINATION(IF PHYSICAL EXAMINATION IS NOT HELD)

a. **Question -1** and **Question - 4OR**(Viva Voce) in **Section A** are compulsory.
b. Answer any **OTHER ONE** question from **Q-2 & Q-3** of**Section-A**.
c. Instructions mentioned in d, e and f for physical examination are also applicable for Online Examination.

SECTION-A

Question – 1 (Compulsory)

a. Explain with figures how width/depth ratio and sinuosity affect the channel pattern. **08**

b. Explain how and why the slope changes along the longitudinal profile of a river. **06**

c. The widths and the corresponding discharges of a river are shown in the following table. Develop the width-discharge relationship. **16**

Width (m)	61.5	65.3	70.7	75.5	80.0	90.2	95.2	110.1
Discharge (m^3/s)	113	135	312	494	629	1100	1740	2940

Question – 2

a. Explain briefly two hypotheses proposed to understand the meandering of river. **06**

b. Explain briefly how the type of sediment load affects the river stability. **05**

c. What is the difference between wash load and suspended load? Explain with a figure why bed load is generally 'capacity dependent' and suspended load is 'supply dependent'. **08**

d. What is 'Shields' parameter'? A river with a velocity of 0.52 m/sec (Chezy's C is 32) has a mean bed material size of 4.3 mm. Determine whether there would be any erosion if the Shields' parameter is 0.033. **11**

Question – 3

a. What are grain roughness and form roughness? Which is dominant **05**

and when?

b. Explain briefly the response of a river to: **06**
   1. Construction of dam
   2. Release of clear water from a dam.

c. What is contraction scour and why it is generally not significant at a bridge site? **05**

d. Determine the fall velocity of a sediment with a mean diameter of 0.2 mm. What would be the sediment concentration at 1.2 m from the bed if the velocity of the river is 1.3 m/sec (Chezy's C is 28) with a slope of 0.15%. The sediment concentration at 0.1 m from the bed is 1350 ppm. Assume reasonable values of missing data. **14**

Question – 4

a. What are the differences between riprap and gabion? What is the soft approach in bank protection and what are its advantages and disadvantages? **08**

b. Explain briefly the factors that affect the navigability of a river. **08**

c. Why is riverine transport generally the cheapest? Explain briefly the process involved in dredging. **08**

d. What is capital dredging? Explain why it is generally not sustainable? **06**

OR

VIVA VOCE (Compulsory in case of Online Examination) **30**

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Section B	**: 1.00 hour (Online Examination)**	**Section B**	**: 90**

INSTRUCTIONS - PHYSICAL EXAMINATION

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

INSTRUCTIONS- ONLINE EXAMINATION(IF PHYSICAL EXAMINATION IS NOT HELD)

a. **Question - 5** and **Question - 8OR**(Viva Voce) in **Section B** are compulsory.
b. Answer any **OTHER ONE** question from **Q-6& Q-7**of **Section-B**.
c. Instructions mentioned in d, e and f for physical examination are also applicable for Online Examination.

SECTION-B

Question – 5 (Compulsory)

a. Differentiate between PMF and SPF. Illustrate the importance of Diversion Channel for Flood Management. **10**

b. Delineate the processes and considerations of flood proofing strategies for coastal areas of Bangladesh. **10**

c. Following Table shows the annual peak discharge of a river for the period of 1980 to 2000. Assume the data are log-normally distributed. Determine 150 year flood. Determine 50 year flooding if the data are normally distributed. **10**

Year	1980	1981	1982	1983	1984	1985	1986
Peak Discharge (m^3/s)	71.5	162.9	215.2	323.4	112.3	83.6	349.1
Year	1987	1988	1989	1990	1991	1992	1993
Peak Discharge (m^3/s)	269.5	495.6	368.4	281.1	62.4	176.2	305.5
Year	1994	1995	1996	1997	1998	1999	2000
Peak Discharge (m^3/s)	267.4	145.6	36.9	54.8	356.2	430.8	192.3

Question – 6

a. What is the difference between clear water scour and live bed scour? Which is higher and why? **06**

b. What is complex pier? Explain with figures the cases when a normal pier will have to be considered as a complex pier? **06**

c. Prove that shear stress and stream power are proportional to square and cube of velocity. **04**

d. Explain with examples the difference between active and passive river training structures. **04**

e. For the purpose of irrigation about 40% of the flow of river along with 10% of the total sediment is diverted from the river. What morphological changes are expected downstream if the depth of flow is reduced by 10% and the mean sediment size remains the same? Explain your answer. **10**

Question – 7

a. Justify how climate, upstream terrain condition, siltation, irrigation project are responsible for flooding in Bangladesh. **10**

b. Mention the roles of flood zoning classification for flood management. **05**

c. Illustrate the processes and associate parameters of flood damage assessment. **10**

d. Explain the impact of dredging in terms of flood management. **05**

Question – 8

a. Differentiate between Dam and Weir. Mention basic design factors of Reservoir. **10**

b. Illustrate if there is any positive outcome from flash flood. **05**

c. Discuss the application of Groynes for flood management in Bangladesh. **15**

OR

VIVA VOCE (Compulsory in case of Online Examination) **30**