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

Student Group: 0<Earned Credit Hours ≤ 36

Subject: EWCE 131, Ecology and Environmental Pollution

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. Briefly discuss with neat sketch the following terms: **10**
   i) Acid rain
   ii) Photochemical smog
   iii) Ozone depletion
   iv) Formation of secondary pollutant

b. Briefly describe the control methods of Particulate Matter (PM) of air pollution. **12**

c. Define AQI. Calculate the AQI for the days with the following conditions: **08**
   i) 15 $\mu g/m^3 PM_{2.5}$ (24 hour average); 80 ppb O_3 (8 hour average)
   ii) 5 ppm CO (8 hour average); 100 $\mu g/m^3$ $PM_{2.5}$ (24 hour average) 0.1 ppm SO_2 (1 hour average).
   Summarize the actions advised for population in the area with the AQI. (Break point table attached)

Question 2

a. Briefly discuss the sources and effects of the following pollutants in surface water: **15**
   i) Oxygen demanding waste
   ii) Nutrients
   iii) Pathogens
   iv) Toxic organic compounds
   v) Suspended solids

b. How agricultural activities can affect the environment? Explain with examples. **10**

c. What are the parameters to be tested for water quality monitoring? Give examples. **05**

Question 3

a. Explain in tabular form the sources and effects of soil pollution. **12**

b. Suppose a coal based power plant discharges effluent in a river nearby which increases temperature and adversely affects the aquatic animals. Describe the methods that can be undertaken to control thermal pollution. **10**

c. What are the sources of noise pollution? To calculate the sound power level of a machine, an engineer has conducted the following sound pressure measurement in a free field. The sound pressure level for 12 points is given below: **08**

No	1	2	3	4	5	6	7	8	9
dB	70	78	73	85	71	77	87	69	84
No	10	11	12						
dB	94	89	88						

What is the total sound pressure level (SPL_T) of the machine?

Question 4

a. Briefly discuss about the pollution due to textile dye and detergent. **10**

b. How does Nuclear pollution occur? Explain the types, storage and disposal of nuclear wastes. **10**

c. What is Ecologically Critical Area (ECA)? Discuss some of the activities undertaken by DoE towards protecting the environment. **10**

SECTION-B

Question 5 (Compulsory)

a. Define bioremediation. Briefly explain the mechanism of different phytoremediation techniques from the perspectives of heavy metal pollution management. **3+12 = 15**

b. Assess the ecological health of the following ecosystems based on Simpson's Index, Shanon-Weinar Index and Pielou's Index. **15**

Species	Description	No of Individuals	
		Ecosystem-P	Ecosystem-Q
A	Grasshopper-green, with red legs	08	10
B	Grasshopper-brown, with yellow stripes	10	05
C	Butterfly-blue, large	05	10
D	Butterfly-blue, small	15	15
E	Butle-red and blue	12	10

Question 6

a. Briefly discuss how the prescription drugs are released into environment. Explain how the footprint of pharmaceutical waste can be minimized. **4+6 = 10**

b. Explain how human activities alter the hydrological cycle and the carbon cycle. **10**

c. Define the "Rules of 10" from the perspectives of ecological pyramids. Briefly explain- **4+6 = 10**
   i) pyramid of productivity
   ii) pyramid of biomass

Question 7

a. Explain how the structural adaptation mechanism of different species act as the means of their natural selection. **10**

b. Briefly discuss about the characteristics of low and high CEC soils. Explain how the cation exchange capacity (CEC) of soil can influence the remediation of contaminated soil. **6+4 = 10**

c. Explain how human activities cause the loss of biodiversity. **10**

Question 8

a. Explain how toxic dose, toxic response and environmental fate influence the toxicity of pesticides. **10**

b. Delineate how the exposure to persistent pollutants in ecological level can give early warning about potential human health impacts. **10**

c. Explain how the speciation and genetic drift act as the means of species evolution as well as biodiversity enrichment. **10**

Breakpoints							AQI	Category
O_3 (ppm) 8-hour	O_3 (ppm) 8-hour[1]	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	CO (ppm)	SO_2 (ppm)	NO_2 (ppm)		
0-0.064	–	0-54	0-15.4	0-4.4	0-0.034	([2])	0-50	Good
0.065-0.084	–	55-154	15.5-40.4	4.5-9.4	0.035-0.144	([2])	51-100	Moderate
0.085-0.104	0.125-0.164	155-254	40.5-65.4	9.5-12.4	0.145-0.224	([2])	101-150	Unhealthy for sensitive groups
0.105-0.124	0.165-204	255-354	65.5-150.4	12.5-15.4	0.225-0.304	([2])	151-200	Unhealthy
0.125-0.374 (0.155-0.404)[4]	0.205-0.404	355-424	150.5-250.4	15.5-30.4	0.305-0.604	0.65-1.24	201-300	Very unhealthy
([3])	0.405-504	425-504	250.5-350.4	30.5-40.4	0.605-0.804	1.25-1.64	301-400	Hazardous
([3])	0.505-0.604	505-604	350.5-500.4	40.5-50.4	0.805-1.004	1.65-2.04	401-500	Hazardous

Air Pollutant Breakpoint Table for the Ques No. 1 (c)