BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Environmental, Water Resources, and Coastal Engineering,
Term Final (Fall) Examination 2021: Jan-Feb 2022

Student Group: 0 < Earned Credit Hours ≤ 36

Subject: EWCE–103, Surveying

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.
g. Draw necessary sketches/diagrams as needed.

SECTION-A

Question 1 (Compulsory)

a. What is surveying in civil engineering aspect? Under what circumstances, the earth's surface to be considered as curved or plane during surveying? Write down the objectives of geodetic survey. **05**

b. Define map and plan. What do you mean by the scale of map/plan? Describe the method of representation of scale in a map. **05**

c. What is chaining in chain survey? What do you understand by the 'Field Book' used in chain survey? Write down the characteristics of field book used in chain survey. **05**

d. What do you mean by drone survey? Describe the benefits of using drones in civil engineering survey. **05**

e. What is GIS? Describe the basic functions of GIS. **05**

f. How do you define project survey in the execution of civil engineering project? What types of survey, you are going to suggest for the construction of public university complex and why? **05**

Question 2

a. What do you mean by 'Principles of Survey'? Briefly describe the aspects of basic principles of survey in civil engineering works. **06**

b. How are you going to classify the survey? Describe in brief the classification of survey based on the nature of field survey. **06**

c. What is ranging in chain survey? Describe the procedure of ranging along a survey line when both ends of the survey lines are not inter-visible. **06**

d. How do you differentiate between precision and accuracy in surveying? Describe the different types of errors that occur while surveying in the field. **06**

e. A rectangular plot of land, measures 400 m X 250 m on an old village plan, drawn to a scale of 10 m to 1 cm. The plan is found to be shrunk, so that a line originally 10 cm long now measures 9.7 cm only. Find out the shrunk scale and shrunk area on the plan of the village. 06

Question 3

a. Define astronomical survey. Describe the location of 'X' on the earth's surface and location of a star on the celestial sphere with neat sketches. 06

b. What is GMT? How do you calculate GMT of Bangladesh? Why the standard time of India is always half an hour behind the Bangladesh standard time? 06

c. What do you mean by the overlapping of the aerial photographs? Describe the various reasons for overlapping aerial photographs. 06

d. What is RS System? Describe the different characteristics of RS System. 06

e. Derive an equation for the number of photographs required to cover a given area of the aerial photography. 06

Question 4

a. Why the chain survey is being called 'triangulation survey'? Describe the 'field works' to be conducted during the entire operations of the chain survey. 06

b. Define Plane Table Survey. What do you mean by the orientation of Plane Table during plane table surveying? Describe the different methods of orientation during plane tabling. 06

c. What do you mean by the 'closing error' in close traverse survey? Describe the graphical method for adjusting closing error in traverse survey. 06

d. What is GPS? How GPS works? Briefly describe the basic structure of GPS. 06

e. There is an obstacle in the form of a pond of which surveyors can go around, along the chain line PQ. Two points R and S were taken on the opposite sides of the water-body along the chain line PQ. On the left, a line RT was laid out 110 m in length and on the right, a second line RU 100 m in length was laid out. A line joining UT, intersect PQ line at S. If the length of US is 60 m and TS is 80 m, find out the obstructed length RS. 06

SECTION-B

Question 5 (Compulsory)

a. Differentiate between
   i. Fly levelling and Reciprocal levelling
   ii. Direct and indirect methods of contouring

03+05=08

b. The following consecutive staff readings were taken on pegs at 15 m interval on a continuously sloping ground: 0.895, 1.305, 2.800, 1.960, 2.690, 3.255, 2.120, 2.825 and 3.450. The reduced level of the last point is known to be 51.060. Calculate the reduced levels of the points by the Height of Instrument method and also calculate the gradient of the slope. Apply arithmetic checks. **12**

c. The results of reciprocal levelling between stations A and B 250 m apart on opposite sides of a wide river were as follows: **10**

Level at	Readings on	
	A	B
A	1.399	2.518
B	0.524	1.332

The error in the collimation adjustments of the level is +0.06 m in 100 m. Calculate
   i. the true difference of level between A and B
   ii. the refraction

Question 6

a. Give a definition sketch of a simple circular curve and define all related notations and parameters. **08**

b. Calculate the reduced levels of the various points on a vertical curve which connects an upgrade of 1% and downgrade of 0.5%. Chainage at the point of intersection is 1400 ft and the R.L at the point of intersection is 850.75 ft. Take the rate of change of grade as 0.1% per chain of 100 ft length. **10**

c. Two straight alignments of a proposed road intersect at chainage (58+34) the angle of intersection being 137°30′. It is proposed to insert a circular curve in between alignments. Calculate the necessary data to set out circular curve with a radius of 300 m by drawing radial offsets from tangents. The chain is 20 m long (100 links). **12**

Question 7

a. What is hydrographic surveying? Write down five major purposes of hydrographic surveying. **05**

b. Briefly discuss the principle of echo-sounding with sketch. Discuss the shoreline surveying and its objectives. **05**

c The following data are obtained in a stream gauging operation. A current meter with calibration equation $V = (0.32N+0.32)$ m/s; where, N = revolution per second was used to measure the velocity at 0.6 depth. Calculate the discharge and mean velocity for the entire section from the data given below: **12**

Distance from the left water edge (m)	0	1.0	3.0	5.0	8.0	9.0	11.0	12.0
Total depth (m)	0	1.1	2.0	2.5	2	1.7	1.0	0
Revolution of current meter	0	39	58	112	90	45	30	0
Duration of observation (sec)	0	100	100	150	150	100	100	0

d. The following perpendicular offsets were taken from a chain line to a hedge:

Chainage (m)	0	15	30	45	60	75	90
Offset (m)	7.6	8.0	10.1	12.0	7.5	7.9	6.4

Calculate the area between the chain line, the hedge and the end offsets using trapezoidal rule and Simpson's rule. Comment on the difference of the results obtained from these two methods.

Question 8

a. For what type of project(s) tacheometric surveying is suitable? Write down the main features of a tacheometer. 06

b. A tacheometer is set up at an intermediate point on a traverse course AB and the following observations are made on a vertically held staff: 12

Staff Station	Vertical Angle	Staff Intercept	Axial hair readings
A	+9°16′	3.120	2.930
B	+5°3′	2.880	2.475

The instrument is fitted with an anallactic lens and the constant is 100. Compute the length of AB and the reduced level of B, that of A being 212.70 m.

c. In order to determine the elevation of top Q of a signal on a hill, observations were made from two stations P and R. P, R and Q were on the same plane. If the angle of elevation of the top Q of the signal measured at P and R were 23°35′ and 15°05′ respectively. Determine the elevation of the foot of the signal if the height of the signal above its base was 4 m. The staff readings upon the bench mark (105.42 m) were 2.755 m and 3.855 m respectively when the instrument was at P and at R. The distance between P and R was 120 m. 12