BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Environmental, Water Resources and Coastal Engineering, Term Final (Fall) Examination 2022: Jan-Feb 2023

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.

SECTION-A

Question 1 (Compulsory)

a. Define surveying in civil engineering aspects. Who is a surveyor? Briefly describe the classification of surveying based on the nature of the field of survey. **7.5**

b. Briefly describe the different division of work performed by surveyors during survey of a particular area of the ground. As a surveyor of Environmental, Water Resources and Coastal Engineering Department, what are precautionary measures you will undertake while conducting survey in the coastal areas? **7.5**

c. Define ranging in chain survey. Briefly describe the method of reciprocal ranging in chaining. As a surveyor, what are the things you will do during the field reconnaissance in chain survey? **7.5**

d. Define plane table survey. Briefly describe the methods of setting up plane table before starting plane tabling. Write down the most important advantages and disadvantages of plane table survey. **7.5**

Question 2

a. Differentiate between precision and accuracy in survey works. What do you mean by errors in surveying? Describe the different types of errors occur in survey works. **10**

b. Define GIS. Describe the different types of data, GIS to handle and process for its applications. **10**

c. (i) Illustrate the term 'house setting'. Briefly describe procedure of house setting. **05**

(ii) A survey line ABC, crosses a river, cuts its banks at B and C respectively at right angles. A point E was established on the perpendicular BE, such that angle CEF is a right angle. If the chainage of F and of B are 1200 m and 1320 m respectively and BE is 90 m; calculate the width of the river and the chainage of C. **05**

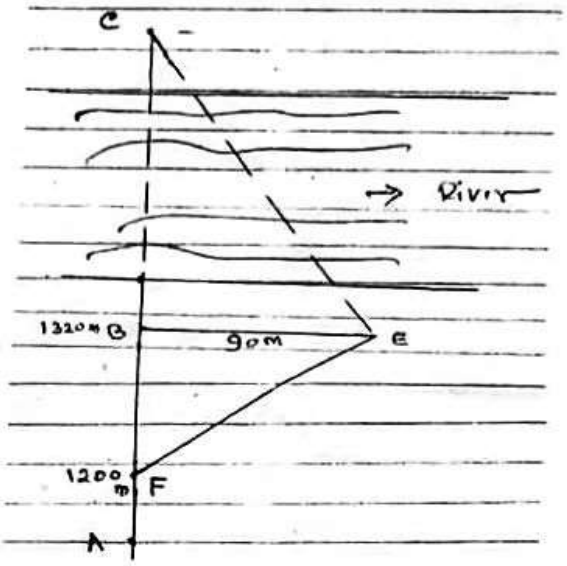


Figure 2(c): Obstacle along chaining [for 2-c(ii)]

Question 3

a. Define geodetic survey. Write down the objectives of geodetic survey. As a surveyor, when are you required to consider the earth's surface as curved one or flat one? Explain. **10**

b. Write down your understanding on GPS. Describe the methods of GPS measurements utilized by the surveyors in civil engineering works. **10**

c. Write down your understanding on the overlapping of aerial photographs. Describe the types of overlapping of aerial photographs in photogrammetric survey. **05**

d. Derive an equation to estimate the number of aerial photographs to cover a given area on the ground. **05**

Question 4

a. Define scale of a Map or a Plan. Describe the different types of scales used in maps and plans. How are you going to choose a scale for plotting the field data on a piece of paper for constructing a map or plan? Explain. **05**

b. If 2 cm on a map represents 1 km on the ground, what will be scale of the map in RF? If a small town is represented by a rectangular area of 12 cm^2 on the same map, find the actual area on the ground in km^2. **05**

c. Define GMT. How is GMT calculated for Bangladesh? Briefly describe the phenomenon of changes of seasons on the earth's surface due to the movement of the sun along ecliptic. **10**

d. (i) Describe the GPS satellites. How the GPS devices work accurately. Write a short note on Bangabandhu Satellite-1. **05**

(ii) A section of line AB appears to be 10.16 cm on a photograph for which the focal length is 16 cm. The corresponding line measures 2.54 cm on a map which has a scale of 1:50000. The terrain has an average elevation of 200 m above mean sea level. Calculate the flying height of the aircraft when the photograph was taken. **05**

SECTION-B

Question 5 (Compulsory)

a. Explain the effects of curvature and refraction in levelling. **05**

b. For determining the discharge, the following readings were taken across a stream with a 4m levelling staff held on the bed of the stream at 3m interval: 0.915, 1.325, 1.550, 2.355, 2.120, 2.225, 2.350, 2.315, 1.725, 1.215 and 0.835. **12**

The instrument had been shifted after 4th and 6th readings. The first reading was at the left bank of the stream and the ground level at that point was known to be 43.775m above MSL. The last reading was at right bank of the stream. The water level of the stream at that cross-section was known to be 43.365m above MSL. Calculate the levels of the different points of the bed of the stream using the collimation method. Apply the usual arithmetical checks and also indicate the highest and lowest depth of water at that section.

c. Describe different types of gauges used to measure the water level in hydrographic surveying. **06**

d. Define sounding. Name different types of instruments used in sounding and discuss any two of them. **07**

Question 6

a. Two sets of tacheometric readings were taken from an instrument station M, reduced level of which was 15.05m to a staff station N. **14**

(i) Instrument A: multiplying constant 100, additive constant 360mm, staff held vertical.

(ii) Instrument B: multiplying constant 95, additive constant 380mm, staff held normal to line of sight.

Instrument	At	To	Height of Instrument	Vertical Angle	Stadia Readings (m)
A	M	N	1.38	+30°	0.714, 1.007,1.3
B	M	N	1.36	+30°	?

Calculate the stadia readings with instrument B.

b. The vertical angles to vanes fixed at 1m and 3m above the foot of the staff held vertically at a station A were 3°10' and 5°24' respectively. Find the horizontal distance and the reduced level of A if the height of the instrument axis was 138.556 meters above datum. **06**

c. Derive the formulae for calculating the reduced level of the object in trigonometric levelling when base of the object is inaccessible and the instrument stations are in the same vertical plane as the elevated object with necessary figures. **10**

Question 7

a. Define vertical curve. Describe the types of vertical curve with necessary figures **08**

b. Two broad gauge lines meet at angle of 67°30'. It is proposed to insert a circular curve of 8 chains with transition curves at the end. The super elevation is 15cm and the rate of super elevation is 1 in 300. Calculate the necessary data for the combined curve. Chainage at the point of intersection is (12+30). Take length of the chain as 30m (100 links). **12**

c. Two straights intersect at a chainage (80+17). The deflection angle is 11°. Calculate the necessary data for setting out a curve by **10**

Rankine's method of tangential angle where the radius of the curve is 573.33m

Question 8

a. Define contour line. Describe the types of contour lines with necessary figures. **06**

b. List down the different methods of locating contour. Compare the merits and demerits of the methods. **06**

c. The area within the contour lines at the site of a reservoir are as follows: **10**

Contour (m)	Area (m^2)
152	223000
150	219000
148	152000
146	74000
144	10000
142	1000

The level of the bottom of the reservoir is 142 m. Calculate the volume of water in the reservoir when the FRL is 152m using the Prismoidal rule.

d. It was required to determine the accurate difference of levels between two points A and B on opposite banks of a river. The level was set up very near to a point A and the staff readings on points A and B were 1.505 and 2.875 respectively. The instrument was then set up at point near B and the observed staff readings on points A and B were 0.750 and 1.895 respectively. Find- **8**

i) the true R.L. of A.
ii) the combined error for curvature and refraction if R.L. of B was 100m and the distance between A and B was 1150m.
iii) the corrected R.L. of A.

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