UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2023/2024

COURSE NAME   : ENGINEERING GEOMATIC

COURSE CODE   : BFC 20703

PROGRAMME CODE   : BFF

EXAMINATION DATE   : JANUARY / FEBRUARY 2024

DURATION   : 3 HOURS

INSTRUCTIONS   : 1. ANSWER ALL QUESTIONS
                            2. THIS FINAL EXAMINATION IS CONDUCTED VIA
                               ☐ Open book
                               ☒ Closed book
                            3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

TERBUKA

Q1   (a)   Plan is a document that shows the details found in an area it represents. If a plan of an area is produced using a small scale (1:500) and a large scale (1:50000), explain briefly how this scale affects the features of the topographic details found in this plan.

(5 marks)

      (b)   Compare the significant difference between Global Positioning System (GPS) and Geographic Information System (GIS) in terms of their uses and data collection.

(5 marks)

      (c)   Error that most often occurs in traverse survey is during the process of setting up the instruments (total station and prism), explain in detail the cause of this error with appropriate examples and diagrams.

(5 marks)

      (d)   List **FIVE (5)** sources of error that often occur during the field work of levelling survey.

(5 marks)

Q2   (a)   **Table Q2(a)** shows the data for traverse survey fieldwork. Calculate the value in the space marked with **X**.

(8 marks)

Table Q2(a) Data for traverse survey fieldwork

Stn	Bearing Face Left	Bearing Face Right	Bearing Average	Fr	Definite Bearing	To	VA	HD	Definite Distance
	Datum			S20	249 53 00	S21			
S31	249 53 00	69 53 00	X	S20	93 57 30	S1			26.478
S20			C +10						
S1	93 57 18	273 57 30	93 57 34						
S20	X	93 57 24	194 56 58	S1	X	S2			24.687
S1			C +20						
S2	194 57 00	X	194 57 18						
S1	14 56 58	X	281 40 20	S2	281 41 00	S31			58.849
S2			C +30						
S31	X	101 40 13	281 40 50						
S2	X	281 40 20	X	S31	69 53 00	S20			40.036
S31			C +40						
S20	69 52 28	249 52 10	69 52 59						

(b)   Based on the definite bering and the definite distance in **Table Q2(a)**, calculate the linear misclosure for this traverse survey work.

(8 marks)

(c)   Based on the linear misclosure value obtained from the calculation in **Q2(b)**, give your comments, if this traverse can be used as a horizontal control for civil engineering works.

(4 marks)

Q3   (a)   **Table Q3(a)** shows the levelling survey fieldwork data. Find the adjusted reduce level value using the Height of Collimation (HOC) method if the value of TBM 6 is 1.812 m.

(10 marks)

Table Q3 (a) The levelling survey fieldwork data

BS	FS	IS
1.145		
	-2.053	
	-0.074	
1.320		1.350
1.360		1.285
	1.089	
	-0.517	
1.380		1.500
	-0.411	
	2.971	
1.510		1.500
		1.075

(b)   Justify why the HoC method is more appropriate to use than the rise and fall method to calculate the adjusted reduce level in **Q3(a)**.

(5 marks)

(c)   Change Point (CP) is the point where the foresight and the backsight observation are made. Suggest a best practices to minimize the error during CP set-up process.

(5 marks)

Q4   (a)   Two straight lines with deflection angle of 16° 30' are to be connected by a circular curve with a radius of 500m along with transition curves at both ends. The design velocity is 60km/h and the radial acceleration changes along the transition curve does not exceed 0.3m/s². Chainage I is 7119.20m. Calculate the setting out data required to staking the curve if the interval for transition surve is 10m and circular curve is 20m.

(15 marks)

      (b)   Explain briefly with the help of a suitable diagram the role of the transition curve in helping motorists in terms of driving safety and driving comfort.

(5 marks)

Q5   (a)   Table Q5(a) is the field work data of detailed observation using electronic tacheometry method. Find the reduce level of each detail if the reduce level of station S1 is 9.156 m.

(10 marks)

Table Q5(a) The field work data of detailed observation using electronic tacheometry method

From Stn.	To Stn.	RL Stn.	Inst. Height (m)	Bearing	Horizontal Dist. (m)	Target Height (m)	Vertical Dist. (m)	RL	Remark
S1			1.398						
	S2			69° 53′	40.036	1.300	0.209		Reference
	Pk1			36° 34′	4.446		-0.077		Pokok 1
	Pk2			47° 57′	15.639		-0.014		Pokok 2
	Bb1			52° 40′	13.327		0.005		Bucu bangunan 1
	Bb2			55° 22′	13.670		0.016		Bucu bangunan 2
	Bb3			53° 56′	13.147		0.002		Bucu bangunan 3
	Bb4			54° 09′	13.861		0.014		Bucu bangunan 4

      (b)   **Figure Q5(b)** is a proposed construction site for a swimming pool. Levelling survey was carried out to get the height of each point as shown in **Table Q5(b)**. Calculate the volume of soil that needs to be excavated if the reduce level of the pool bottom is 2.971 m. Swimming pool size is 10m x 10m.

(10 marks)

CONFIDENTIAL

Table Q5(b) Reduce level for each point of proposed construction site

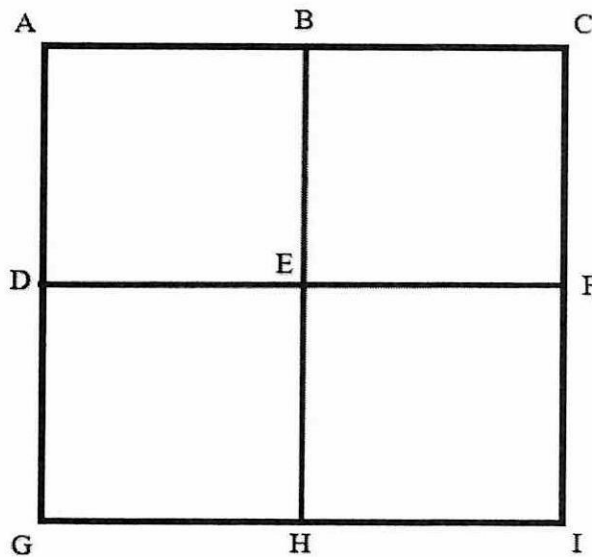| Point	Reduce level (m)
A	5.170
B	4.173
C	7.119
D	3.322
E	3.529
F	4.003
G	3.215
H	4.173
I	4.002

Figure Q5(b) Proposed construction site for a swimming pool

- END OF QUESTIONS -