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SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Engineering (Civil)

First Year, First Semester Examination – 2017

QS11033- Fundamentals of Engineering Surveying

Instructions for Candidates:

Answer any **Five (05)** questions.

All question carry equal marks

No. of questions : 06

No. of pages : 04

Time : Three (03) hours

1.

- i. Define the terms “**Plane Surveying**” and “**Geodetic surveying**” (04 marks)
 - ii. State five types (classifications) of surveying. (05 marks)
 - iii. Briefly explain the phases of survey work. (06 marks)
 - iv. Briefly discuss the way of taking distance measurements for the rough and accurate works with examples (05 marks)
- (Total 20 marks)

2.

- i. State the purpose of following equipments in taping
 - a. Ranging poles
 - b. Arrows
 - c. Pegs
 - d. Plumb bob
 - e. Clinometers
 - f. Tensometer(06 marks)
- ii. A base line was measured by tape suspended in catenary under a pull of 145N, the mean temperature being 14°C. The lengths of various segments of the tape and the difference in level of the two ends of a segment are given in Table.
If the tape was standardized on the flat under a pull of 95 N at 18°C, **determine the correct length of the line** by considering the followings.
 $g = 9.81 \text{ m/s}^2$
Cross-sectional area of the tape = 3.35 mm^2
Mass of the tape = 0.025 kg/m

Coefficient of linear expansion = 0.9×10^{-6} per $^{\circ}\text{C}$

Young's modulus = 14.8×10^4 N/mm²

Bay/Span	Length (m)	Difference in level (m)
1	29.988	+ 0.346
2	29.895	- 0.214
3	29.838	+ 0.309
4	29.910	- 0.106

(14 marks)

(Total 20 marks)

3.

- i. State the requirements of superior field book. (04 marks)
- ii. Briefly discuss the precautions to be taken while entering the field book. (04 marks)
- iii. Briefly discuss the followings
 - a. Reconnaissance
 - b. Reference sketches (04 marks)
- iv. While measuring a chain line AB, the following offsets are taken. **Enter these data on a field book page** which is prepared using the double line entry method
 - An electrical post is 10m perpendicularly from 2.5m chainage to the right of the chain line.
 - A road crosses obliquely from left to right at 10m and 14 m chainage. Perpendicular offsets are 2m and 3m to the side of the road from 5m and 20m chainage respectively.
 - A tube well is 5m perpendicularly from 30m chainage to the left of the chain line
 - Total chainage of AB is 45m (08 marks)

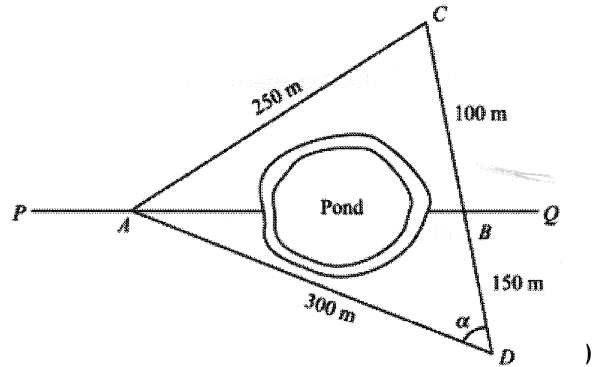
(Total 20 marks)

4.

- i. A 30m steel tape was standardized of 20°C and under a pull of 5N. The tape was used in catenary at a temperature of 25°C and under a pull of 11N. The cross sectional area of the tape is 0.02 cm^2 , its weight per unit length is 22 g/m, Young's modulus $E = 2 \times 10^6 \text{ kg/cm}^2$, coefficient of thermal expansion $\alpha = 11 \times 10^{-6}$ per $^{\circ}\text{C}$ and $g = 9.81 \text{ m/s}^2$. If the tape was too short by 0.01m, Total measured length was 30m. Find the correct horizontal distance.

(10 marks)

- ii. A chain line PQ intersects a pond. Two points A and B are taken on the chain line on opposite sides of the pond. A line AC, 250m long, is set out on the left of AB and another line AD, 300m long, is set out on the right of AB. Points C, B and D are in the same straight line. CB and BD are 100 and 150m long respectively. Calculate the length of AB.



(10 marks)

(Total 20 marks)

5.

- i. Describe the rules for counting significant figures with example (06 marks)
- ii. An angle A was observed by the method of repetition by three different observers and the values were as below

Observers	Angle A	Number of measurements
1	$40^{\circ}20'$	2
2	$40^{\circ}30'$	3
3	$40^{\circ}45'$	4

Find the most probable value of the angle. (06 marks)

- iii. a horizontal length was measured 8 times as follows 10.567, 10.568, 10.571, 10.570, 10.566, 10.569, 10.566, 10.565

Calculate the followings;

- Most probable value
- Residuals
- Standard deviation
- Most probable error (E_{50})

(08 marks)

(Total 20 marks)

6.

- i. Briefly explain the following EDM instruments
 - a. Microwave
 - b. Visible light
 - c. Infrared. (06 marks)
 - ii. State the main visible parts of a total station. (04 marks)
 - iii. State the applications of a total station. (03 marks)
 - iv. What is the main different between mirror reflector and prism reflector in EDM? (03 marks)
 - v. State the characteristics of EDM. (04 marks)
- (Total 20 marks)