ENG 315- Principles of Engineering Survey

Instruction: Answer Questions1 any other three

Date: 15/06/2019

Time:$2\frac{1}{2}hours$

QUESTION 1: (a)Show that the Simpson's rule for calculating the areas enclosed between the base line and irregular boundary line is $A = \frac{h}{3}(F + L + 4E + 2 O)$, where h, F, L and O have their usual meanings. (b) State the limitation of Simpson's rule. (c) The following offsets were taken from a survey line to a curved boundary line
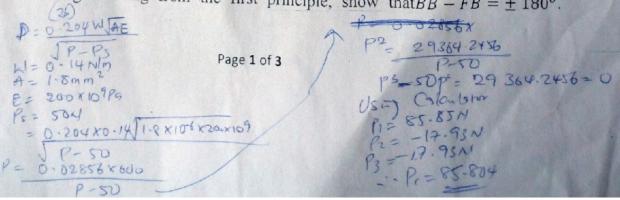
Distance (m)	0	5	10	15	20	30	40	50	60	80	100
Left Offset (m)	2.50	3.80	4.60	5.20	6.10	4.70	5.80	3.90	2.20	2.60	3.20
Right Offset (m)	0.00	2.50	3.04	4.80	6.40	4.20	3.60	2.90	2.70	1.80	1.54

Find the total area between the survey line and curved boundary lines, and the first and the last offsets by: (i) The trapezoidal rule and (ii) Simpson's rule

QUESTION 2: (a) The true length, L_T of a section measured with a tape is expressed as: $L_T = L_f + C_t + C_p + C_s + C_v + C_m$,where L_f is the field measurement; C_t, C_p, C_s, C_v and C_m have their usual meanings. State the meanings of C_t, C_p, C_s, C_v and C_m and their corresponding equations. (b) Starting from the first principle, derive expression forC_s. Hence or otherwise, Show that normal pull of a tape is$P = \frac{0.204 W\sqrt{AE}}{\sqrt{P-P_s}}$ where P_s is the standardized pull. Determine the normal pull of 30 m tape if the unit weight of the tape is 0.14 N/m. The tape is supported at only two points. The properties of the tape are: Standard tension, 50N; cross-section area,1.8mm² , and the Young's Modulus of elasticity is200 X 10⁹Pa

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QUESTION 3: (a) Explain the following terms: True Bearing, Magnetic Bearing, Azimuth and Magnetic Declination. State the sources of error in compass traversing. Give three examples of each. (b)The angles of a triangular net POR named clockwise are found by compass at $58°.25, 62°.50$ and $60°.00$ respectively. If the corrected magnetic bearing of QP is N15.75W and declination $3°E$, tabulate the geographic fore bearing of the sides

QUESTION 4 (a) Define Fore bearing, FB and Back bearing, BB with respect to compass traversing. Starting from the first principle, show that$BB - FB = \pm 180°$.

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(2b)

$D = \frac{0.204 W\sqrt{AE}}{\sqrt{P-P_s}}$

$W = 0.14 N/m$
$A = 1.8mm^2$
$E = 200 \times 10^9 Pa$
$P_s = 50N$

$= \frac{0.204 \times 0.14\sqrt{1.8 \times 10^{-6} \times 200 \times 10^9}}{\sqrt{P-50}}$

$P = \frac{0.02856 \times 600}{\sqrt{P-50}}$

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$P = 0.02856x$

$P^2 = \frac{29364.2456}{P-50}$

$P^3 - 50P^2 = 29364.2456 = 0$

Using Calculator
$P_1 = 85.85N$
$P_2 = -17.93N$
$P_3 = -17.95N$
$\therefore P_r = 85.804$

Explain the term Local attraction. State how it can be detected in the field during compass traversing

(b) The following were the observed bearings of the lines of a traverse ABCDEA where local attraction was suspected:

Side	FB	BB
AB	$191^\circ 45'$	$13^\circ 00'$
BC	$39^\circ 30'$	$222^\circ 30'$
CD	$22^\circ 15'$	$200^\circ 30'$
DE	$242^\circ 45'$	$62^\circ 45'$
EA	$330^\circ 15'$	$147^\circ 45'$

(i) Compute the interior angles of the traverse and exercise necessary check.
(ii) State the stations affected by local attraction. Find the correct bearings of the lines

QUESTION 5 (a) Explain the main principle of surveying. State the obstacles in chaining. A big pond obstructs chain line AB, a line AL was measured on the left of line AB for circumventing the obstacle. The lengths AL was 901 m. similarly, another line AM was measured on the right of line AB whose length was 1100 m. points M, B and L are on the same straight-line. Lengths of lines BL and BM are 502 m and 548 m respectively. Derive Equation for finding AB, hence determine the numerical value of AB

(b) Describe 'Stepping method' of chaining on sloping ground. The following distances were measured along a chain line with a 30 m chain

Slope distance (m)	28.7	23.4	20.9	29.6
Angle of slope (degree)	5	7	10	12

It was observed afterwards that the chain was 0.025 m too short, find the horizontal distance.

QUESTION 6 (a) What are the uses of levelling? Define the following terms: Reduced level, Line of collimation, Back sight, Fore sight, Bench mark and intermediate sight
(b) State the differences between two systems of booking leveling operations.
(c) The following consecutive readings were taken with a dumpy level along a proposed highway at a common interval of 15 m. The first reading was at chainage 165 m where RL is 98.085. The instrument was shifted after fourth and ninth readings: 3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035 m. find the reduced level of all points using collimation method. Carry out all the arithmetic check. Determine the gradient of the proposed highway.