

SECTION B: SURVEYING III

Answer at least TWO questions from this section.

- (a) State the **three** factors which affect the accuracy of the horizontal length measurement in tangential tacheometry. (3 marks)
- (b) Using a well labelled diagram, derive the basic principle of tacheometry. (10 marks)
- (c) Tacheometric observations from a station A to a point B were made to a vertical staff as follows:

Instrument Station	Staff Station	Vertical circle Reading	Staff Readings
A	B	84°30'	1.809, 2.209, 2.609

The tacheometer was fitted with anallactic lens. At a second station C, the staff could not be held vertically because of overhanging tree branches.

Instrument Station	Staff Station	Parallactic Angle	Staff Intercept
A	C	+4°10'	3.000 m

The horizontal angle BAC was measured as 105°10'. Calculate the horizontal length BC. (7 marks)

- (a) Using a sliding arm planimeter with the pole block inside the figure the following readings were recorded.

Initial Reading	Final Reading
7.915	5.900
5.902	3.888
3.900	1.883

Given that one revolution represents 2.5 hectares at a scale of 1 : 2500 and the zero constant is 25.500, determine the area on the ground. (4 marks)

- (b) A cutting is to be formed as part of a proposed road having a formation width of 7.50 m and side slopes of 1 in 2.5. A cross-section is to be taken at chainage 2000 m, where the depth of dig to the proposed formation level is 9.10 m and the existing ground level is horizontal at right angles to the proposed centre line. Calculate the plan width and the area of cut required at this cross-section. (5 marks)

(c) With reference to mass haul diagram, explain each of the following terms:

- (i) haul;
- (ii) borrow;
- (iii) limit of economical haul.

(3 marks)

(d) An embankment is to be formed on a straight section of a proposed road. The values of eight consecutive cross-sectional areas taken at a constant horizontal distance interval of 50 m are 300 m^2 , 373 m^2 , 431 m^2 , 555 m^2 , 609 m^2 , 525 m^2 , 422 m^2 and 337 m^2 , respectively.

Calculate the volume contained between the first and last cross-section using:

- (i) the end areas method;
- (ii) the prismatical formula.

(8 marks)

7. (a) Distinguish between the following terms as used in setting out:

(a) Define each of the following terms as used in photogrammetry:

- (i) aerial photogrammetry;
- (ii) terrestrial photogrammetry;
- (iii) remote sensing;
- (iv) stereo model.

(4 marks)

(b) In camera calibration, outline the six minimum amount of interior orientation information that is determined.

(6 marks)

(c) Outline the five conditions to be fulfilled so that two overlapping photographs of a scene can produce a spatial/stereo model.

(5 marks)

(d) From an aerial photograph of a building the following information was obtained:

- Height of the camera = 1200 m
- Measurement in photograph from top of the building = 105.45 mm.
- Measurement in photograph from the top of the building and the bottom of the building = 4.55 mm.
- Camera focal length = 210 mm.

Estimate the height of the buildings.

(5 marks)

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