



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4314 : ENGINEERING SURVEYING - III

END OF SEMESTER EXAMINATION

SERIES: AUGUST, 2024

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

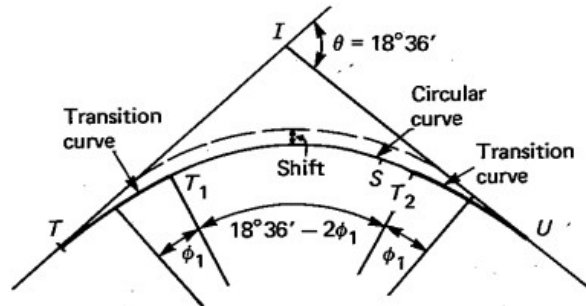
This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (COMPULSORY – 20 Marks)

- a). A road has a formation breadth of 12.00 m, and side slopes of 1 in 1 cut, and 1 in 3 in fill. The original ground had a cross fall of 1 in 5. If the depth of excavation of the centre lines of two sections 40 metres apart were provided as 0.4 and 0.6 metres respectively, compute the volumes of the **cut** and **fill** over this length **(6 Marks)**.
- b). *Cubic spiral transition curves and circular curve* (Fig 2). It is required to join two straights having a total deflection angle $18^{\circ}36'$ right by a circular curve of 600 m radius, having cubic spiral transition curves at each end. The design velocity is 70 km/hr and the rate of change of radial acceleration along the transition curve is not to exceed 0.3 m/s^3 . The chainage of l is 2524.20 m **(14 Marks)**.



ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a). In a tape offset survey, the following offsets were taken to a fence from a survey line. Calculate the area in to the nearest hectares **(6 Marks).**

Chainage (m)	0	20	40	60	80	100	120	140	160
Offsets(m)	0	6.49	10.77	6.49	10.76	13.99	10.86	5.67	2.93

- b). A cutting is to be made in the ground which had a traverse slope of 1:5. The width of formation was 8.00 m and the side slopes are 1 vertical to 2 horizontals. If the depths of the centre lines of three sections of 20 metres apart were 4.50, 5.10 and 6.30 m respectively, compute the volume of the earth involved in this length of cutting **(14 Marks).**

QUESTION THREE (20 Marks)

- a). The diagram below (Fig. 2) shows the existing ground levels on a 15 square grid forming part of a site which is to be excavated to a uniform formation level of 10 m above the datum. Compute the volume of earth to be excavated assuming vertical sides **(14 Marks).**

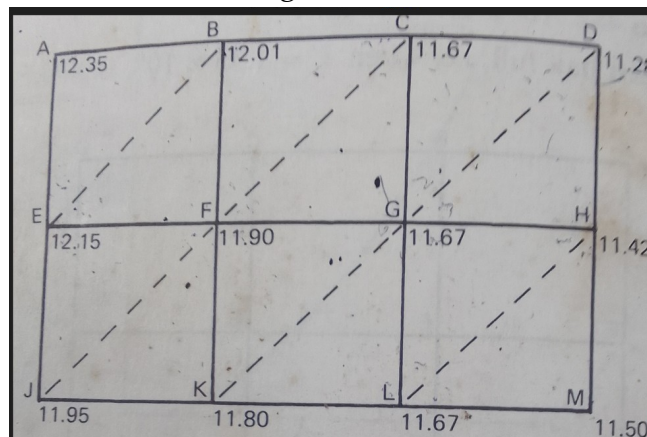


Fig 2. Area to be excavated.

- b). Explain the following terms as used in mass excavation
- i). Mass Haul Diagram
 - ii). Limit of Economic Haul
 - iii). Bulking / Swelling
- (6 Marks)**

QUESTION FOUR (20 Marks)

- a) Tabulate the data required to set out a simple circular curve using **a tape and a chain** a circular curve of 600 m to connect by two straights, with a deflection angle of $20^{\circ}24'$, given that the chainage of the intersection point (I) is 3032.042 m **(10 Marks)**.
- b) Coordinates (E, N) of corners of a polygonal area of ground were taken as follows A (0,0), B (-28,40), C (-40,128), D (15,300), E (90,154), F (110,72), G (28,-20) returning to A. Calculate the area enclosed to the nearest hectares. Assume that the tape used had nominal length of 20 m and was found to be 0.1 m too long, what would be the corrected value of the area? **(10 Marks)**.

QUESTION FIVE (20 Marks)

- a). With an aid of a skech show that the widths of a section with a cross - fall is given by:

$$W_1 = \left(\frac{b}{2} + mh \right) \left(\frac{k}{k-m} \right)$$

$$W_2 = \left(\frac{b}{2} + mh \right) \left(\frac{k}{k+m} \right)$$

(12 Marks)

- b). Discuss the following methods of determining areas of irregular figures.
- i). Counting squares
 - ii). 'Give and take' line
- c). Using appropriate formula, state Simpson's rule
- (5 Marks).**
(3 Marks).