NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONOURS) DEGREE
PART I SUPPLEMENTARY EXAM.-SEPT.- 2008
ENGINEERING SURVEY I – TCW 2102

INSRUCTIONS
Answer any four questions

Time : 3hours
Total Marks : 100

QUESTION 1

(a) List any three types of tapes that you have learnt. (3 marks)

(b) List the classes of survey you know and explain the difference between them. (4marks)

(c) A baseline of exactly 635m is to be set out. What measurement would you make with a 60m tape which is known to be 0,5% too short to obtain the correct distance ?(3marks)

(d) What do you understand by coefficient of thermal expansion of a tape material ?(3marks)

(e) A steel tape of nominal length 30m was used to measure a line AB by suspending it between supports. The following measurements were recorded :

Line	Length measured(m)	Slope angle	Mean temperature	Applied tension(N)
AB	29,872	$+ 3^0\ 40'$	5^0C	120

The standardized length of the tape was known to be 30,014m at 20^0C and 50N tension. The tape has a mass of $0,170kgm^{-1}$ and cross-sectional area of $2mm^2$, $E = 200kN/mm^2$ and coefficient of thermal expansion of the tape material of $0,0000112/^0C$. Calculate the horizontal length of AB. (12 marks)

QUESTION 2

(a) The following compass bearings were taken at Chipangali when magnetic declination was 10^0E.

AB 175^0 30'
BC 246^0 30'
CD 142^0 00'
DE 357^0 00'
EF 96^0 10'
Calculate the true compass bearings.(5 marks)

(b) Write the following compass bearings as whole circle bearings (5 marks)

(i) N 10^0 W, (ii) S 50^0 E , (iii) S 40^0 W , (iv) N 50^0 E and (v) N 45^0 W.

© Eliminate the effects of local attraction from the given observed values. Tabulate your work , showing the amount of adjustment and the adjusted bearings. (15 marks)

Line	Observed Value
AE	137^0 00'
AB	60^0 30'
BA	230^0 15'
BC	358^0 00'
CB	182^0 00'
CD	148^0 15'
DC	328^0 15'
DE	219^0 00'
ED	44^0 30'
EA	316^0 15'

QUESTION 3

Calculate the total area in square metres of a piece of land shown in fig. 3 , using any two methods for the irregular bounded area (25 marks)

QUESTION 4

The following levels were taken over a stretch of ground where it is required to excavate a trench , 1,1metres wide with vertical sides for carrying a pipe at a downgrade of 1: 50 from A to F.The bottom of the pipe is to be 1,7metres vertically below A. Ground elevation at A = 1300,000 m.

Station	Horizontal distance from A(m)	B.S.	I.S.	F.S.
A	-	3,094		
B	15		2,194	
C	37		1,524	
D	57	0,640		0,381
E	67		1,143	
F	76			2,652

(i) Reduce the levels using the rise and fall method and hence determine the amount of cut at every station. (25marks)

QUESTION 5

(a) Fig. 5a shows a 10m square grid with the depth of excavation to formation level shown for a basement. Calculate the volume of excavation. (10 marks)

(b) Fig.5b shows contour lines that were obtained at a reservoir construction site. The plan area contained by each contour was obtained using a planimeter. Given the following information :

Contour	Area enclosed (m^2)
150	-
148	15 100
145	13 700
140	12 300
135	11 200
130	9 800
125	7 100
120	4 600

Calculate the volume of water that is going to be contained in the reservoir using any two methods (15 marks)

List of formulae

$$V = \frac{d}{2}\left(A_1 + A_N + 2\left(A_2 + A_3 + \ldots\ldots A_{(N-1)}\right)\right)$$

$$V = \frac{d}{3}\left(A_1 + A_N + 4O + 2E\right)$$

$$C = L_m \frac{(L'-L)}{L}$$

$$C = L_m (t_f - t_s)\,\alpha$$

$$C = L_m (1-\cos\theta)$$

$$C = L_m \frac{(T_f - T_s)}{AxE}$$

$$C = \frac{Lm}{24}\frac{(Mg)^2}{T^2}$$

$$A = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$$

$$A = \frac{d}{2}\left[O_1 + O_N + 2\left(O_2 + O_3 + O_4 + \ldots O_{(N-1)}\right)\right]$$

$$A = \frac{d}{3}\left[X + 2O + 4E\right]$$

FIG.3

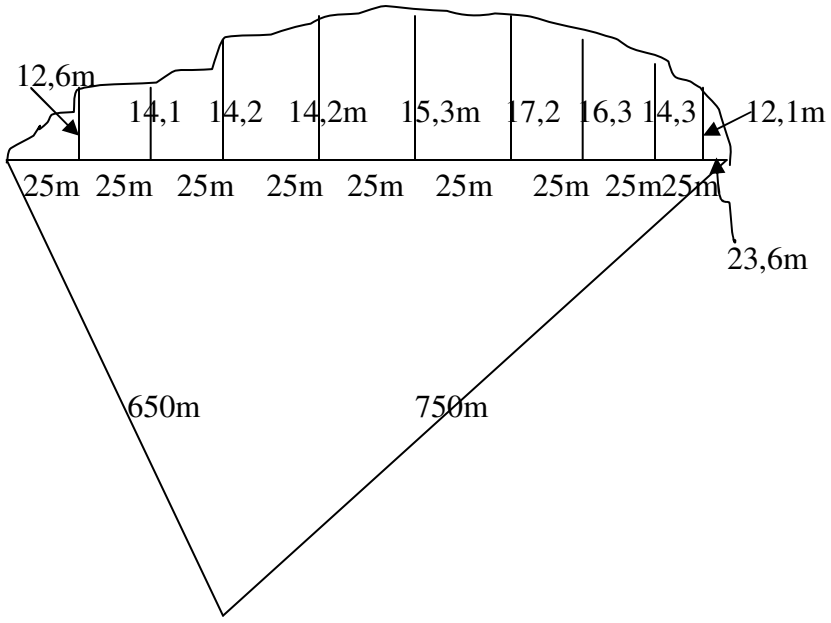


FIG. 5A

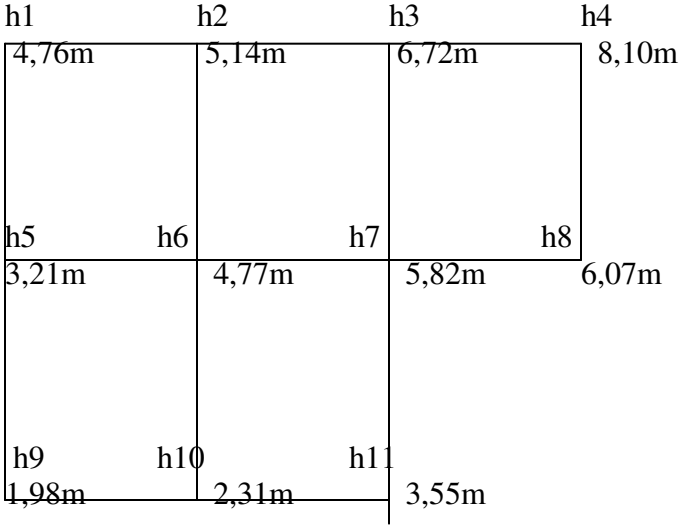
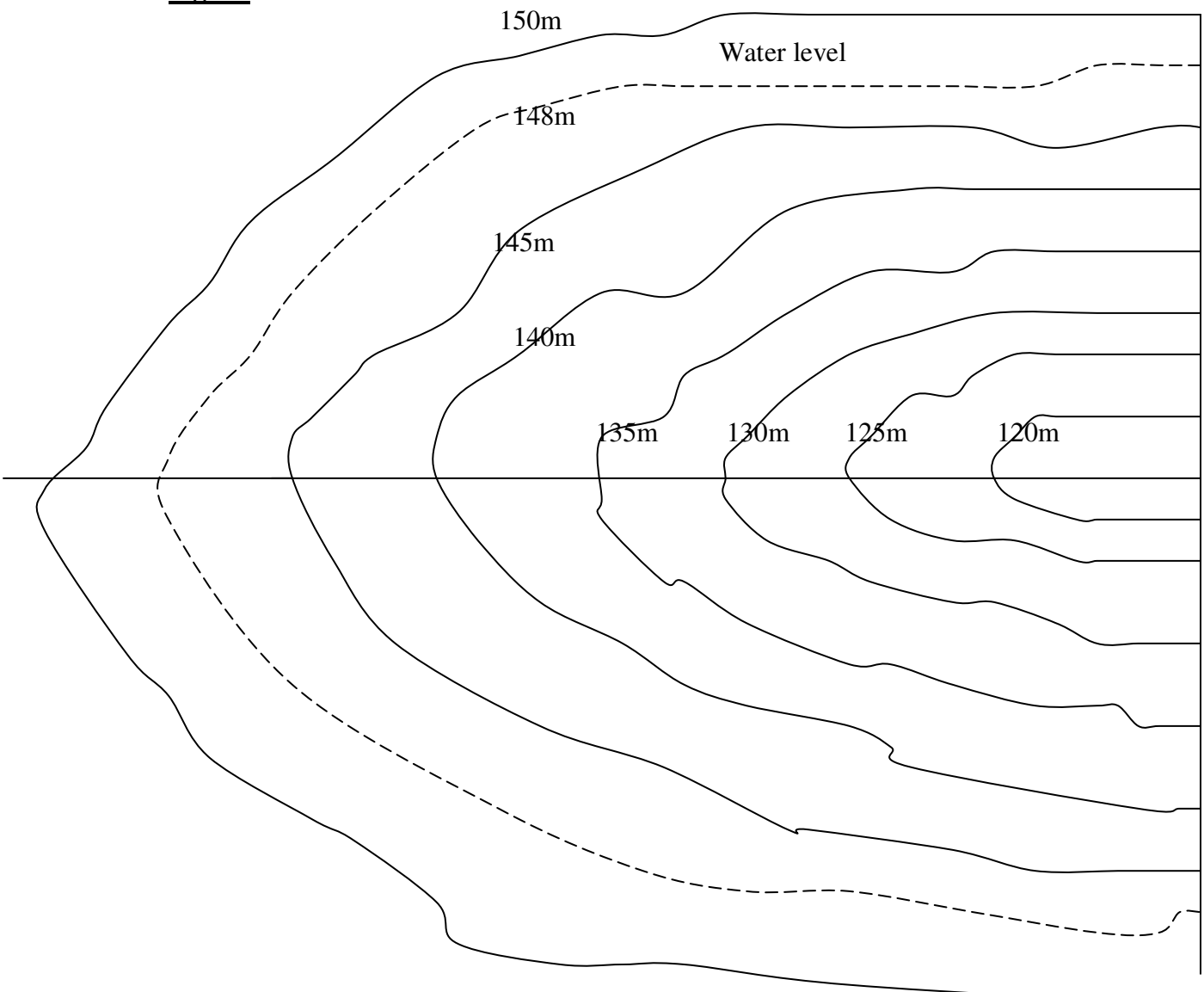

h1
h2
h3
h4
4,76m
5,14m
6,72m
8,10m
h5
h6
h7
h8
3,21m
4,77m
5,82m
6,07m
h9
h10
h11
1,98m
2,31m
3,55m

Fig. 5b


150m
Water level
148m
145m
140m
135m
130m
125m
120m