TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN CIVIL ENGINEERING

BSC CE

ECE 2306 : SURVEYING III

SEMESTR EXAMINATION

APRIL 2014 SERIES

2 HOURS

Instructions to candidates:

This paper consists of **FIVE** questions
- Scientific calculator
- Answer booklet

Answer question **ONE** (compulsory) and any other **TWO** questions

QUESTION ONE

a) Define the following terms

(i) Mass Harl diagram

(ii) Harl distance

(iii) Average Harl distance

(iv) Waste

(v) Borrow

(5marks)

b) Given that the deflection angle of a circular curve whose radius is 200m is 20° 40',

calculate the targent length, the arc length and the chord length. (6marks)

c) Explain the purposes of vertical curves. (4marks)

d) In a survey of a field endorsed by a fence, offsets were taken to the fence from the chain line as follows:

Drainage (m)	0	10	20	30	40	50	60	70	80	90
Offset(m)	4.41	6.61	9.08	11.14	11.20	9.16	7.08	4.82	2.56	0

(i) State the Simpson's rule of determination of area (2marks)

(ii) Determine the area between the chain and the fence using the Simpson's rule (3marks)

e) Calculate the setting out data for a circular curve of radius 400m connecting two straight sections of road with a deflection angle of 20°, The drainage of the intersection point is 2000m and the centre line pegs are to be located made in yan Calenlations.

f) Sketch the cross sections and compute the volume by end areas method for two level sections 75 in a part with centre heights 4.8 and 7.2m in fill, base width 30m and side slopes 2:1.

QUESTION TWO

a) The coordinates of the stations of a closed ring traverse ABCDEA are as show in the table below :

Print	**E(m)**	**N(m)**
A	201.47	411.32
B	461.22	603.14
C	653.86	719.28
D	819.28	594.77
E	783.11	382.89

The traverse is to be split into two equal areas by a straight live C, which meets live AE at X. Calculate the coordinates of points X. (7marks)

b) Explain five methods used to compute areas endorsed by irregular lines. (5marks)

c) Discuss the 4 major uses of mass Harl Diagrams (4marks)

d) Describe how a circular arrive differs from a compound active and a transitional curve. (4marks)

QUESTION THREE

a) A straight section of a proposed road having a formation width of 16.00m is to be constructed on ground having a transverse slope at right angles to the centre line of 1 in 10. The existing ground levels on the centraline are as shown in the table below. The reduced level of the formation centerline at drainage 200m is 76.20m and the formation is to have a rising gradient of l in 50 from the drainage 200m to drainage 280m. The slopes are to be 1 in 2 for both out and fill. Calculate the volumes of cut and fill required to form the road between drainages 200m and 280m using prismoidal method. (13marks)

b) Outline any of characteristics of mass Harl Diagrams (7marks)

QUESTION FOUR

A circulation curve of radius 900m is to be constructed between two straights of a proposed highway. The deflection angle between the straights is 14° 28' 06'' and the curve is to be set out by the tangential angles method. The through drainage of the intersection point is 1345.82m and pegs are required on the centerline at exact 20m multiples of through drainage for this horizontal curve,

a) Compute the tangent lengths of the circular arrive and the through drainages of the two tangent points (8marks)

b) Tabulate the data required to set out the curve. (12marks)

QUESTION FIVE

a) A piece of ground has 3 straight sides AB, BC and CD and a fourth side AD which is irregular. The horizontal distances are DAB = 422m, DBC = 640m, DCD = 456m, DAD = 798m and DAC = 842m. Offsets outwards from AD to the irregular boundary have values of 0m, 150m,330m, 434m and 798m respectively, from A. Calculate the area of this piece of ground. (10marks)

b) Given V+ Ax = L in a least square parametric case, show that