MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRONOMY, BACHELOR OF SCIENCE IN HORTICULTURE AND BACHELOR OF SCIENCE IN SOIL SCIENCE WITH INFORMATION TECHNOLOGY

MAIN CAMPUS

AAG 303: TOPOGRAPHICAL SURVEY

Date: 9th December, 2016 Time: 3.30 - 6.30 pm

INSTRUCTIONS:

- Answer question ONE and any other TWO questions.

QUESTION ONE

a) Answer the following
   i. Define what you understand by the term surveying as used in this unit (2Marks)
   ii. Measurements in survey basically fall under four main categories. List these categories (2Marks)
   iii. Discus any four qualities of a good surveyor (4Marks)

b) Briefly discuss how the following surveying instruments can be used in carrying out a survey field work (10Marks)
   i. Measuring tape
   ii. Clinometer
   iii. Plumb bob
   iv. Dumpy level
   v. Surveyors compass

c) Discus any five objectives that may make one carry out a survey exercise (5Marks)
d) The work of a surveyor consists of five phases. Briefly discuss these phases (5Marks)
e) Clearly distinguish amongst accuracy, precision and error as used in surveying (3Marks)
f) Depending on the source, errors in survey can be broadly classified instrumental, personal and natural errors. Briefly explain how each of these errors may occur (3Marks)

QUESTION TWO (20Marks)

a) Linear measurements in survey refer to measuring horizontal distances between any two survey stations. Mention any three main methods of linear measurements (3Marks)
b) *Ranging out* is a term used surveying
   i. What does it mean to you? (1 Mark)
   ii. What is the importance of ranging out in linear surveying (2Marks)
   iii. Briefly explain how ranging can be done by use of range rods/ ranging poles (2 Marks)
c) Often linear measurements involve taping between two points (ie A and B) which may be far apart.
   i. List the equipment required for taping on a flat ground for work requiring very high level of accuracy (3Marks)
   ii. Clearly outline the standard procedure of carrying out the exercise (4.5Marks)
   iii. Show how the final results can be computed for the exercise in ii) above stating any assumptions made. Also assume the last tape length laid is not full tape length (take 21.345m) (1.5Marks)
d) Errors in linear measurements can be broadly classified as *random errors* and *mistakes*. Under each category, discuss in brief any three errors falling under the category.
e) Errors are inevitable in any survey. Discuss any five ways in which you may use to reduce minimize errors in linear measurements (5Marks)

QUESTION THREE

a) Define *levelling* as used in engineering survey (1Marks)

b) Define the following terminologies as used in engineering survey (3Marks)

i. Datum

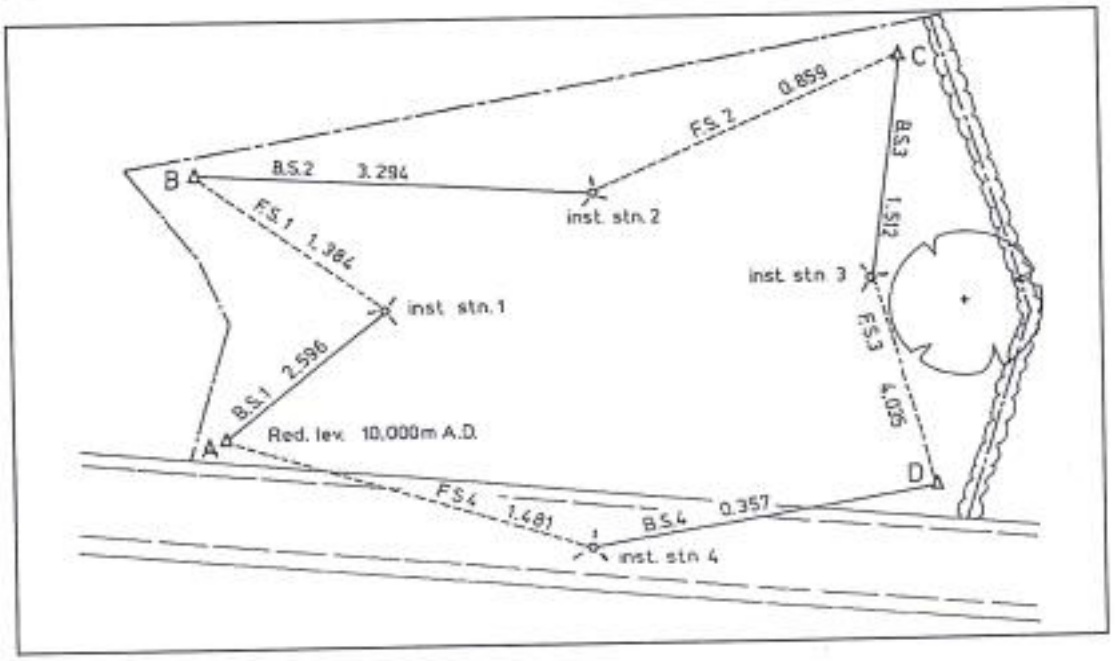
ii. Bench Mark

iii. Survey Station

c) Briefly explain, **using sketches** how the ordinary spirit level is used in levelling survey (3Marks)

d) In carrying out levelling work, errors are inevitable just like in any other survey work. Discus ways in which such errors can be eliminated or minimized (5Marks)

e) The figure below shows a proposed construction site with four survey stations (A to D) marked with pegs. The pegs are to be used as Temporary Bench Marks (TBM) for the duration of the construction works. The elevation of peg A has already been established as 10,000m above sea level. Flying levelling was made around the site in order to establish the reduced levels of the pegs



a) Book the readings using rise and fall method and calculate the reduced levels (6Marks)

b) Carry out a check for arithmetic computations (1Marks)

c) Check also the accuracy work (1Marks)

QUESTION FOUR

a) Calculate the scale of a plan where 1cm represents 35m (2Marks)

b) A parcel of ground was measured on 1:250 scale map, using a planimeter and found to be 65.56 cm^2. Calculate the ground area in:

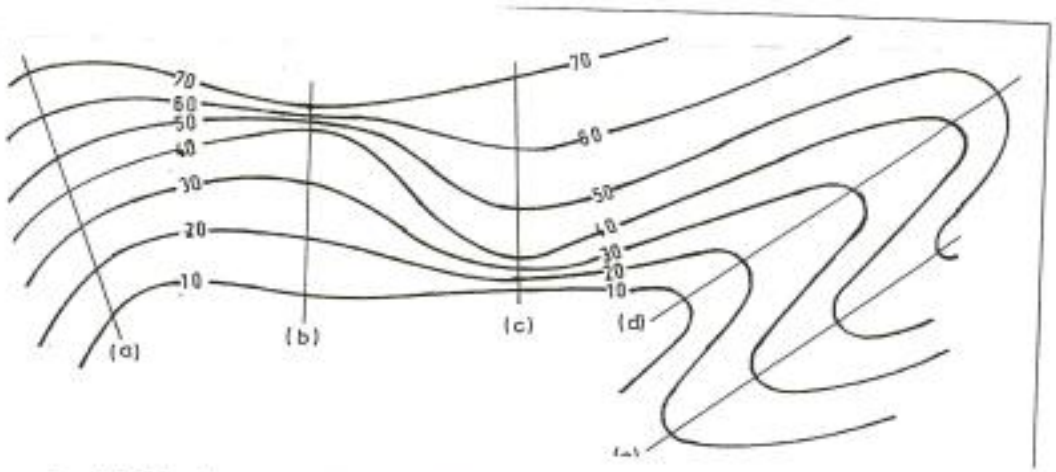
i. hectares (1.5Marks)

ii. acres (1.5Marks)

c) The following data was obtained from a topographical map
   - The difference in elevation between two consecutive contours = 0.5 m and the average horizontal plan distance between any two contours = 20cm
   - The scale of the map was 1:100

   i. Determine the vertical interval for the map (1Marks)
   ii. Compute the average percentage slope for the area presented on the map (2Marks)

d) The figure below shows a set of contours in a site plan.



   i. Explain the topographical features portrayed by the sections marked by the following letters (a), (b), (c), (d), (e) (5Marks)
   ii. Compute the vertical interval for the topographical plan
   iii. If the horizontal distance between the bottom and the top contours along feature a) is 1.2km, determine the average ground slope (2Marks)

e) In a survey exercise, the slope length between two points was found to be 500m. The difference in elevation between the two points was measured using a dumpy level and was found to be 2.5m. Determine the plan length between the two points (2Marks)

f) The dimensions of a room on a 1:50 scale plan are 60mm x 85mm. Calculate the area of the room in m^2 (2Marks)

QUESTION 5 (MARKS 20)

a) Answer the following

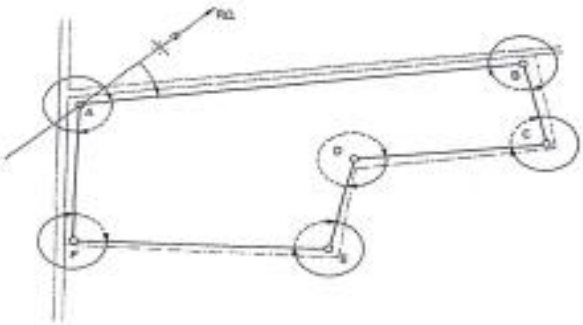
i. What do you understand by the term traversing in survey (1Mark)

ii. Name two types of traversing which you know based on traverse route (2Marks)

iii. List the survey instruments which you may need for a traverse survey (3Marks)
Theodolite/compass, tape, tape grip, spring balance, spirit level, ranging rods, survey pins,
Tape

iv. Outline the procedure of observing horizontal angles using a theodolite (4Marks)

b) The figure below shows a route of a traverse survey. The values of exterior angles measured by one second theodolite are given in the table below.



The whole circle bearing of line AB is 43° 40' 45''

Angle	ABC	BCD	CDE	DEF	EFA	FAB
Mean observed value	272^{O} 03' 10''	272^{O} 05' 51''	104^{O} 50' 31''	261^{O} 11' 06''	266^{O}10' 15''	263^{O} 38' 25''

a) Determine the angular error of the traverse (2Marks)

b) Adjust the angles of the traverse to eliminate the error (4Marks)

c) Calculate the bearing of all other lines of the traverse (4Marks)