MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRIBUSINESS MANAGEMENT AND TRADE

SECOND YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

KRM 201: AGRICULTURAL FIELD ENGINEERING

DATE: 19/01/2021   **TIME: 2.00-4.00 PM**

INSTRUCTIONS;

Instructions: Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

a)   Differentiate between the following terms:

    i.   Drilling and precision planting systems   (2 marks)

    ii.   Back sight (BS) and fore sight (FS)   (2 marks)

    iii.   Compression and power engine strokes   (2 marks)

    iv.   Furrow and border irrigation systems   (2 marks)

    v.   Cultural and structural soil conservation practice   (2 marks)

    vi.   One-way and round-and-round ploughing methods   (2 marks)

    vii. Emulsion and suspension applications of farm chemicals   (2 marks)

    viii. Legislative and chemical methods of weed control   (2 marks)

b)   Describe three (3) methods used during hitching of farm machinery   (6 marks)

c)   Table Q1 was extracted from profile leveling field note book where a farm road needs to be constructed. The readings marked 'A' to 'F' were illegible.

Table Q1: Proposed farm road measurements

BS	IS	FS	HI	Reduced Level
0.618			A	20.480
	1.654			B
	C			19.898
2.135		D	E	18.988
	1.231			F
		0.991		20.132

Determine the following:

   i.   Missing Readings   (4 marks)

  ii.   Carry out the arithmetic check   (4 marks)

SECTION B: ANSWER ANY TWO (2) QUESTIONS (40 MARKS)

QUESTION TWO (20 MARKS)

a)   A square farm measures 1435m long at a slope of 8% and soils are deep moderately pervious clay loam. The farmer has reserved 50 ha for grazing, 60 ha for woodlot and the rest for cultivation. Using Tables 1, 2 and Figure 1 estimate by rational formula the runoff overflowing from this farm to the next farm down slope   (10 marks)

b)   Explain the functions of the following systems of a tractor machine:

    i.   Power-take-off (PTO) system   (2 marks)

   ii.   Lubrication system   (4 marks)

  iii.   Hydraulic system   (4 marks)

QUESTION THREE (20 MARKS)

a)   Explain five (5) factors that influence the response of crops to fertilizer application

                       (10 marks)

b)   A distance between point A and B was measured by a 30 m tape. After measuring 1820 m, the tape was re-checked and found to have stretched to 30.128 m. The surveyor continued with further measurements and at the end, re-checked again the tape and discovered that it had stretched further to 30.175 m. If the total distance between A and B was found to be

3km under these conditions, find the distance between these points if the correct length of the tape had been used (10 marks)

QUESTION FOUR (20 MARKS)

a)   Explain five (5) advantages of drip irrigation compared to the other irrigation systems

(10 marks)

b)   A slope distance of 640m was measured using a 20m tape. If the percentage slope of the land was 16%, calculate the correct horizontal distance of the measured line. Assume that the tape was checked before and after fieldwork and found to be of standard length

(10 marks)

QUESTION FIVE (20 MARKS)

a)   Explain the actions taken for the purpose of tractor maintenance after it has been operating for the following hours:

i.   10 hours   (5 marks)

ii.   50 hours   (5 marks)

iii.   200 hours   (5 marks)

b)   Describe five (5) advantages of cultural measures in soil and water conservation management   (5 marks)

Table 1. Runoff coefficient values for use with the Rational formula

Topography and Vegetation	Soil Texture		
	Open Sandy Loam	Clay and Silt Loam	Tight Clay
Woodland			
Flat 0-5 per cent slope	0.10	0.30	0.40
Rolling 5-10 per cent slope	0.25	0.35	0.50
Hilly 10-30 per cent slope	0.30	0.50	0.60
Pasture			
Flat	0.10	0.30	0.40
Rolling	0.16	0.36	0.55
Hilly	0.22	0.42	0.60
Cultivated			
Flat	0.30	0.50	0.60
Rolling	0.40	0.60	0.70
Hilly	0.52	0.72	0.82
Urban Areas	30% of area impervious	50% of area impervious	70% of area impervious
Flat	0.40	0.55	0.65
Rolling	0.50	0.65	0.80

Table 2. Time of concentration for small catchments

Area (ha)	Time of concentration (minutes)
0.4	1.4
2.0	3.5
4.0	4.0
40	17
200	41
400	75

FIGURE 1

Figure 1. Typical rainfall intensity-duration curve for 10 year frequency (Matanga's reservoir)