



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SOIL**  
**SCIENCES**  
**2<sup>ND</sup> YEAR 1<sup>ST</sup> SEMESTER 2017/2018 ACADEMIC YEAR**  
**MAIN REGULAR**

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**COURSE CODE: ALS 3214**

**COURSE TITLE: SOIL CHEMISTRY**

**EXAM VENUE:**

**STREAM: (B Sc. Agric.)**

**DATE:**

**EXAM SESSION:**

**TIME: 2.00 HOURS**

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**Instructions:**

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

## Question 1

- a) What are the mineral contents of inorganic soil fraction? Name these mineral fractions. (3 marks)
- b) Name at least three major importance soil organic fraction. (3 marks)
- c) Briefly discuss the importance of soil moisture to the soil fraction. (3 marks)
- d) Discuss the importance of sodic soils to the chemistry of soils. (3 marks)
- e) Briefly discuss the following phenomenon that happens in soils.
- Soil moisture.
  - Saline soils
- (4 marks)
- f) Explain, in brief, the function of the following physical-chemical soil properties to the chemistry of soils in a particular region.
- Dissolved Oxygen
  - Dissolved Carbon (IV) oxide
  - Biological Oxygen Demand
  - Soil Air
- (5 marks)
- (h) Write short notes on each of the following
- Acidification from  $\text{CO}_2$
  - Acidification from organic acids
  - Acidification from oxidation of S and N
- (3 marks)
- g) Describe the major classification of Soils according to the arrangements of the  $\text{SiO}_4$  tetrahedral structure. (6 marks)

**Section B. Answer any TWO questions**

**Question 2.**

(a) Describe following factors that affects soil fertility.

- i. Aluminum ions (5 marks)
- ii. pH (5 marks)
- iii. Organic matter (5 marks)
- iv. Potassium ions (5 marks)

**Question 3**

a) Soil acidification is a major concern in plant growth. What are the major soil acidification processes? Give examples to support your answers? (20 marks)

**Question 4**

- a) What are the common phyllosilicate minerals in soils (10marks)
- b) Describe in detail at least one method used in soil analysis. (10 marks)

**Question 5**

- a) What is soil acidification? 2 Marks
- b) Outline the importance of human contribution to the soil acidification.(8 marks)
- c) Describe the following important factors based on the soil acidification.
  - i. Ferrous materials
  - ii. Elemental sulfur

- iii. Acid rain
- iv. Mining wastes
- v. Role of aluminum in soil acidification

(10 marks)

**Periodic table**

		← Atomic number, Z		← Element symbol		← Relative atomic mass, A <sub>r</sub>	
1	2	1	H	1.008			
3	4	6	Li	6.94	9.01		
11	12	19	Na	22.99	24.31		
19	20	21	K	39.10	40.08	44.96	23
37	38	39	Rb	85.47	87.62	88.91	24
55	56	57	Cs	132.91	137.34	178.49	25
87	88	89	Fr	[261]	[261]	[262]	26
103	104	105	Nh	[285]	[285]	[286]	27
111	112	113	Rg	[272]	[272]	[273]	28
119	120	121	Uue	[289]	[289]	[290]	29
127	128	129	Uuh	[288]	[288]	[289]	30
135	136	137	Uuq	[286]	[286]	[287]	31
151	152	153	Uus	[284]	[284]	[285]	32
167	168	169	Uuo	[283]	[283]	[284]	33
173	174	175	Uuq	[281]	[281]	[282]	34
189	190	191	Uuq	[280]	[280]	[281]	35
205	206	207	Uuq	[279]	[279]	[280]	36
221	222	223	Uuq	[277]	[277]	[278]	37
237	238	239	Uuq	[276]	[276]	[277]	38
253	254	255	Uuq	[274]	[274]	[275]	39
269	270	271	Uuq	[273]	[273]	[274]	40
285	286	287	Uuq	[271]	[271]	[272]	41
311	312	313	Uuq	[269]	[269]	[270]	42
327	328	329	Uuq	[268]	[268]	[269]	43
353	354	355	Uuq	[266]	[266]	[267]	44
369	370	371	Uuq	[265]	[265]	[266]	45
395	396	397	Uuq	[263]	[263]	[264]	46
411	412	413	Uuq	[261]	[261]	[262]	47
427	428	429	Uuq	[260]	[260]	[261]	48
453	454	455	Uuq	[258]	[258]	[259]	49
469	470	471	Uuq	[257]	[257]	[258]	50
495	496	497	Uuq	[255]	[255]	[256]	51
511	512	513	Uuq	[253]	[253]	[254]	52
527	528	529	Uuq	[252]	[252]	[253]	53
553	554	555	Uuq	[250]	[250]	[251]	54
569	570	571	Uuq	[249]	[249]	[250]	55
595	596	597	Uuq	[247]	[247]	[248]	56
611	612	613	Uuq	[245]	[245]	[246]	57
627	628	629	Uuq	[244]	[244]	[245]	58
653	654	655	Uuq	[242]	[242]	[243]	59
669	670	671	Uuq	[241]	[241]	[242]	60
695	696	697	Uuq	[239]	[239]	[240]	61
711	712	713	Uuq	[237]	[237]	[238]	62
727	728	729	Uuq	[236]	[236]	[237]	63
753	754	755	Uuq	[234]	[234]	[235]	64
769	770	771	Uuq	[233]	[233]	[234]	65
795	796	797	Uuq	[231]	[231]	[232]	66
811	812	813	Uuq	[230]	[230]	[231]	67
837	838	839	Uuq	[228]	[228]	[229]	68
853	854	855	Uuq	[227]	[227]	[228]	69
879	880	881	Uuq	[225]	[225]	[226]	70
895	896	897	Uuq	[224]	[224]	[225]	71
921	922	923	Uuq	[222]	[222]	[223]	72
937	938	939	Uuq	[221]	[221]	[222]	73
963	964	965	Uuq	[219]	[219]	[220]	74
979	980	981	Uuq	[218]	[218]	[219]	75
1005	1006	1007	Uuq	[216]	[216]	[217]	76
1021	1022	1023	Uuq	[215]	[215]	[216]	77
1047	1048	1049	Uuq	[213]	[213]	[214]	78
1063	1064	1065	Uuq	[212]	[212]	[213]	79
1089	1090	1091	Uuq	[210]	[210]	[211]	80
1105	1106	1107	Uuq	[209]	[209]	[210]	81
1131	1132	1133	Uuq	[207]	[207]	[208]	82
1147	1148	1149	Uuq	[206]	[206]	[207]	83
1173	1174	1175	Uuq	[204]	[204]	[205]	84
1189	1190	1191	Uuq	[203]	[203]	[204]	85
1215	1216	1217	Uuq	[201]	[201]	[202]	86
1231	1232	1233	Uuq	[200]	[200]	[201]	87
1257	1258	1259	Uuq	[198]	[198]	[199]	88
1273	1274	1275	Uuq	[197]	[197]	[198]	89
1300	1301	1302	Uuq	[195]	[195]	[196]	90
1316	1317	1318	Uuq	[194]	[194]	[195]	91
1342	1343	1344	Uuq	[192]	[192]	[193]	92
1358	1359	1360	Uuq	[191]	[191]	[192]	93
1384	1385	1386	Uuq	[189]	[189]	[190]	94
1400	1401	1402	Uuq	[188]	[188]	[189]	95
1426	1427	1428	Uuq	[186]	[186]	[187]	96
1442	1443	1444	Uuq	[185]	[185]	[186]	97
1468	1469	1470	Uuq	[183]	[183]	[184]	98
1484	1485	1486	Uuq	[182]	[182]	[183]	99
1510	1511	1512	Uuq	[180]	[180]	[181]	100
1526	1527	1528	Uuq	[179]	[179]	[180]	101
1552	1553	1554	Uuq	[177]	[177]	[178]	102
1568	1569	1570	Uuq	[176]	[176]	[177]	103
1594	1595	1596	Uuq	[174]	[174]	[175]	104
1610	1611	1612	Uuq	[173]	[173]	[174]	105
1636	1637	1638	Uuq	[171]	[171]	[172]	106
1652	1653	1654	Uuq	[170]	[170]	[171]	107
1678	1679	1680	Uuq	[168]	[168]	[169]	108
1694	1695	1696	Uuq	[167]	[167]	[168]	109
1720	1721	1722	Uuq	[165]	[165]	[166]	110
1736	1737	1738	Uuq	[164]	[164]	[165]	111
1762	1763	1764	Uuq	[162]	[162]	[163]	112
1778	1779	1780	Uuq	[161]	[161]	[16	