



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND  
TECHNOLOGY  
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES  
UNIVERSITY EXAMINATION FOR THE DIPLOMA IN BUILDING AND CIVIL  
ENGINEERING  
1<sup>ST</sup> YEAR 2<sup>ND</sup> SEMESTER 2016/17  
MAIN REGULAR**

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**COURSE CODE: SCH 2121**

**COURSE TITLE: GENERAL CHEMISTRY 2**

**EXAM VENUE: PHY LAB**

**STREAM: DIP. BUIL. CIV.**

**DATE:**

**EXAM SESSION:**

**TIME: 2:00 HRS**

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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**

## Section A (30 marks)

### Answer All Questions in Section A

#### Question 1

- a) In the laboratory, how would you prepare 425 g of an aqueous solution containing 2.40 % by mass of sodium acetate,  $\text{NaC}_2\text{H}_3\text{O}_2$ .  
(3 marks)
- b) Glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , is a sugar that occurs in fruits. It is also known as “blood sugar” because it is found in blood and is the body’s main source of energy. What is the molality of a solution containing 5.67 g of glucose dissolved in 25.2 g of water? (3 marks)
- c) Briefly describe the three colligative properties of solutions. (3 marks)
- d) What is your understanding of a zero order reaction rate, a first order reaction rate and a second order reaction rate? (6 marks)
- e) There are three naturally occurring isotopes of carbon, what are there symbolic representations. (3 marks)
- f) Differentiate between the catenation property of carbon and allotropes of carbon. (3 marks)
- g) Differentiate between the five structural forms of carbon namely Graphite, Diamond, Fullerenes, Charcoal and Coke. (5 marks)
- h) Carbon can form alloys with other elements such as iron, zinc, nickel, tungsten, chromium, manganese and cobalt. What is the composition of the following alloys of steel. (4 marks)
- Stainless steel
  - Tungsten steel

- iii. Cobalt steel
- iv. Manganese steel

## **Section B**

**Answer any Two Questions (30 marks)**

### **Question 2**

Briefly discuss the chemistry of the following carbon allotropes in terms of structure, properties and uses. (15 marks)

- a. Diamond*
- b. Graphite*
- c. Fullerenes*
- d. Charcoal*
- e. Coke*

### **Question 3**

- a. Briefly describe how elemental silicon is obtained. (7.5 marks)
- b. For the manufacture of solid-state devices, it is necessary to start with extremely pure silicon. Describe the process of purifying impure silicon. (7.5 marks)

### **Question 4**

- a. Silicon is the basic material in the semiconductor devices that make up CD players. Briefly discuss the chemistry of silicon (composition, synthesis and uses) under the following compounds of silicon.
  - i. Silica*
  - ii. Quartz*
  - iii. Silicates*

iv. *Silicones*

v. *Cement*

(15 marks)

**Question 5**

Quartz crystals have a very interesting and useful property: they exhibit the *piezo-electric effect*. Briefly describe this effect and outline areas in the industry where it is applied. (15 marks)

## Periodic table

		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18																																																													
		Atomic number, Z		Element symbol		Relative atomic mass, A <sub>r</sub>																																																																																											
1	1	H	1.008	2	H	1.008																																																																																											
3	4	Li	6.94	4	Be	9.01																																																																																											
11	12	Na	22.99	12	Mg	24.31																																																																																											
19	20	K	39.10	20	Ca	40.08																																																																																											
37	38	Rb	85.47	38	Sr	87.62																																																																																											
55	56	Cs	132.91	56	Ba	137.34																																																																																											
87	88	Fr	223	88	Ra	226.03																																																																																											
Lanthanoids				57	La	138.91																																																																																											
Actinoids				89	Ac	227.03																																																																																											
		21	Sc	44.96	21	Sc	44.96	22	Ti	47.90	22	Ti	47.90	23	V	50.94	23	V	50.94	24	Cr	52.01	24	Cr	52.01	25	Mn	54.94	25	Mn	54.94	26	Fe	55.85	26	Fe	55.85	27	Co	58.93	27	Co	58.93	28	Ni	58.69	28	Ni	58.69	29	Cu	63.54	29	Cu	63.54	30	Zn	65.41	30	Zn	65.41	31	Ga	69.72	31	Ga	69.72	32	Ge	72.59	32	Ge	72.59	33	As	74.92	33	As	74.92	34	Se	78.96	34	Se	78.96	35	Br	79.91	35	Br	79.91	36	Kr	83.80	36	Kr	83.80
		39	Y	88.91	39	Y	88.91	40	Zr	91.22	40	Zr	91.22	41	Nb	92.91	41	Nb	92.91	42	Mo	95.94	42	Mo	95.94	43	Tc	98.91	43	Tc	98.91	44	Ru	101.07	44	Ru	101.07	45	Rh	102.91	45	Rh	102.91	46	Pd	106.42	46	Pd	106.42	47	Ag	107.87	47	Ag	107.87	48	Cd	112.40	48	Cd	112.40	49	In	114.82	49	In	114.82	50	Sn	118.71	50	Sn	118.71	51	Sb	121.75	51	Sb	121.75	52	Te	127.60	52	Te	127.60	53	I	126.90	53	I	126.90	54	Xe	131.30	54	Xe	131.30
		55	La-Lu	55	La-Lu	178.49																																																																																											
		87	Ac-Lr	87	Ac-Lr	178.49																																																																																											
		61	Pm	146.92	61	Pm	146.92	62	Sm	150.35	62	Sm	150.35	63	Eu	151.96	63	Eu	151.96	64	Gd	157.25	64	Gd	157.25	65	Tb	158.92	65	Tb	158.92	66	Dy	162.50	66	Dy	162.50	67	Ho	164.93	67	Ho	164.93	68	Er	167.26	68	Er	167.26	69	Tm	168.93	69	Tm	168.93	70	Yb	173.04	70	Yb	173.04	71	Lu	174.97	71	Lu	174.97																														
		91	Pa	231.04	91	Pa	231.04	92	U	238.03	92	U	238.03	93	Np	237.05	93	Np	237.05	94	Pu	239.05	94	Pu	239.05	95	Am	241.06	95	Am	241.06	96	Cm	244.07	96	Cm	244.07	97	Bk	249.08	97	Bk	249.08	98	Cf	252.08	98	Cf	252.08	99	Es	252.09	99	Es	252.09	100	Fm	257.10	100	Fm	257.10	101	Md	258.10	101	Md	258.10	102	No	259	102	No	259	103	Lr	262	103	Lr	262																		