RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. Honors in Chemistry
Third Year - Semester II Examination – July 2020

CHE 3222 – ELECTRONICS AND IT FOR CHEMISTS

Time: Two (2) hours

Answer all Questions

1.

a)

i. What is the difference between a Microsoft Excel function and Excel formula? (10 marks)

ii. A user wishes to remove a Microsoft Excel spreadsheet from a workbook. What is the correct sequence of events that will do this? (10 marks)

b) What is a molecular editor software? (10 marks)

c)

i. Write down a short account of open source technology? (30 marks)

ii. What is Shell in a UNIX system? (20 marks)

iii. Explain the importance of directories in a UNIX system (10 marks)

iv. Write a command to list down file / folder lists alphabetically in a UNIX system? (10 marks)

2.

a)

i. Write down a short account of subject gateway (30 marks)

ii. What is a "search engine"? Briefly explain with examples (15 marks)

b) Assume that you have a protein pdb file called 2VDY.pdb and it is located on "C:\rasmol\" Write a rasmol script file that opens the pdb file, change background color as white, restrict the view to residues 230-250 in red color and display the possible disulfide bridges. (25 marks)

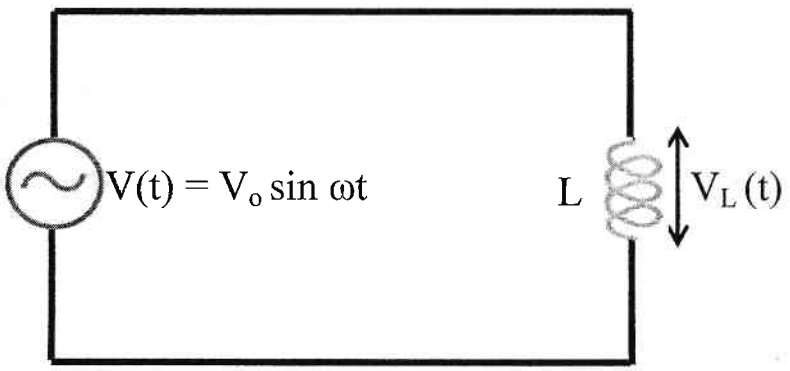
c) Explain the following rasmol commands

i. set picking label
ii. spacefill temperature
iii. zap (30 marks)

3.

Part I

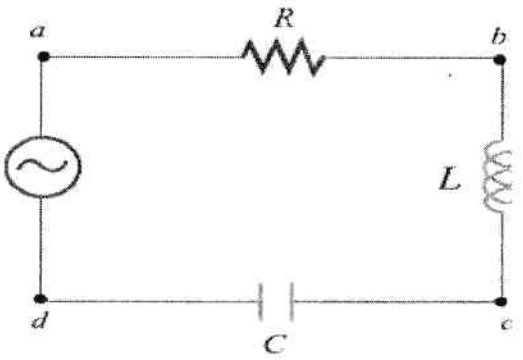
Following circuit shows a purely inductive circuit with inductance L connected to an AC generator.



a) Using Kirchhoff's rule show that the instantaneous current in the inductor is given by, $I_L(t) = (\frac{V_{LO}}{\omega L}) \sin(\omega t - \frac{\pi}{2})$, where terms have their usual meaning.
b) Sketch the time dependence of the current and the voltage across the inductor.
c) Draw the Phasor diagram of the above circuit and comment on the phase difference between the current and the voltage.

Part II

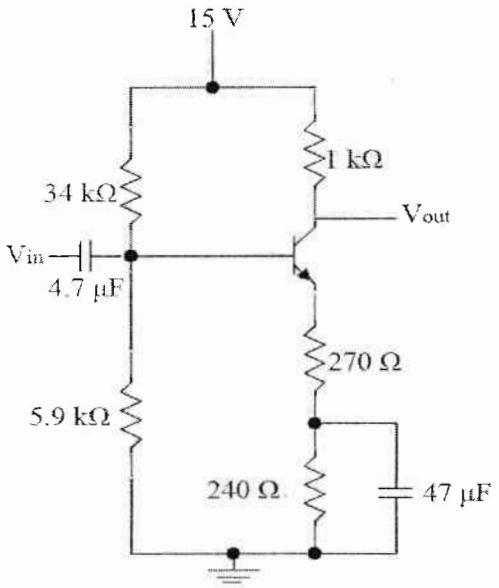
Following diagram shows an LCR circuit with $R = 40\ \Omega, L = 80\ mH, C = 50\ \mu F$ and an AC generator of $V_C = (150\ \text{V}) \sin 100\ t$.



a) Find the impedance of the circuit.
b) Calculate the resonance frequency and the Q factor of the circuit.
c) Calculate the maximum potential difference across points *b* and *d*. (100 marks)

4.

Part I



a) Find the values of Thevenin's voltage (V_{TH}) and resistance (R_{TH}), so that the circuit could be simplified to have a separate voltage source to the base terminal and a single base resistance.
b) Sketch the load line of the circuit with short circuit current and open circuit voltage values.
c) Find the Q – point of the circuit.

$\beta = 200$

Part II

a) Construct a truth table for the following sum of product expression.

$A = xy\bar{z}t + xy'zt + xy'z't + x'yzt + x'yz't + x'yzt' + x'y'z't'$

9 replace by 1

b) Find the minimal form of the above expression using Karnaugh maps.
c) Draw the logic circuit.

(100 marks)

-End-