



Department	: Chemistry
Level	: 3
Name of the Examination	: Final Examination
Course Title and Code	: Fundamentals of Chemistry & Biology for Food Science (CYD3310)
Academic Year	: 2024-2025
Date	: 11 th January 2025
Time	: 9.30 a.m. – 11.30 a.m.
Duration	: 2 hr

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of (4) essay questions in (4) pages.
3. **Answer all (4) questions. All questions carry a total of 300 marks.**
4. Use a blue or black pen not a pencil. Use the given book to write down answers for (4) essay questions.
5. **Answer for each question should commence from a new page.**
6. Draw fully labelled diagrams where necessary.
7. The use of a non-programmable electronic calculator is permitted.
8. Involvement in any activity that is considered as an exam offense **will lead to punishment.**

Atomic Mass

C - 12, Cl - 35.5, H - 1, N - 14, O - 16, Na - 23, Ag - 108

01. (a) (i) Consider the following list of physical quantities. From the list, identify the four (04) Basic physical quantities. For each of these basic quantities, state the **symbol** and name of the corresponding **SI** unit.

Molar mass, Density, Time, Electric current, Pressure, Electric charge, Amount of substance, Acceleration, Temperature, and Molality

- (ii) Write down the equation which define each of the following derived physical quantities. Give the symbol, SI unit of each quantity.

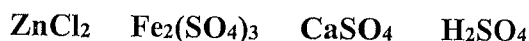
Pressure and Electric charge

(25 marks)

- (b) Currently the population in Sri Lanka is estimated as 22 million. If one mole of ten-rupee coins is divided among them, how many ten-rupee coins will each person get?

(12 marks)

(c) (i) Write the chemical **name** of each of the following ionic compounds.



(ii) Write the **chemical formula** of the following compounds.

Aluminium Sulphate, Magnesium Chloride, Methanol, Acetic Acid

(24 marks)

(d) (i) Carbon tetrachloride, CCl_4 is a liquid chemical with a density of 2.31 g cm^{-3} . How many litres of CCl_4 must be measured out to contain 2.01×10^{26} CCl_4 molecules?

(ii) Calculate the pH of a $0.0006 \text{ mol dm}^{-3}$ Nitric acid solution.

(iii) Complete the following nuclear reaction.

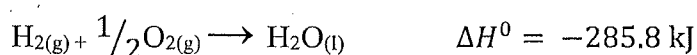
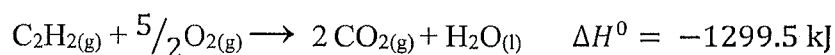


(24 marks)

02. (a) (i) The food flavour enhancer **monosodium glutamate (MSG)**, composition is 13.6% of Sodium, 35.5% Carbon, 4.8 % Hydrogen, 8.3 % Nitrogen and 37.8 % Oxygen.

What is the empirical formula for **MSG**, If the molar mass of the **MSG** is 340 g mol^{-1} deduce the structure of **MSG**.

(ii) Consider the following data given,



Calculate the enthalpy change (ΔH^0) for this reaction.



(28 marks)

(b) Write the balanced half equations and the final equation for the following reaction in aqueous acidic medium.

(i) The oxidation of Fe^{2+} to Fe^{3+} in acidic medium where $\text{Cr}_2\text{O}_7^{2-}$ is reduced to Cr^{3+} .

(12 marks)

(c) (i) Calculate the molarity (concentration) of an AgNO_3 solution prepared by dissolving 21.25 grams of silver nitrate (AgNO_3) in 150 mL of water.

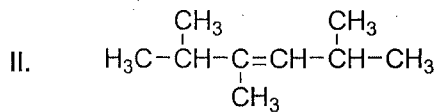
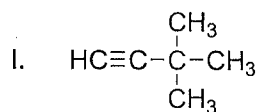
(ii) 200 cm^3 of 4.0 M Na_2SO_4 is added to 300 cm^3 of 3.0 M BaSO_4 solution.

Calculate the concentration of sulphate ions (SO_4^{2-}) in the resulting solution in mol dm^{-3} .

(20 marks)

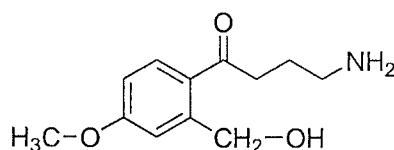
03. (a) (i) The molecular formula of a compound is $C_4H_{10}O$. Draw **only** the straight chain structures possible for this compound.

(ii) Give the IUPAC names of the following compounds.

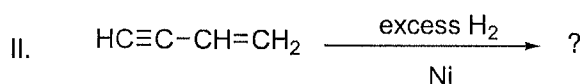
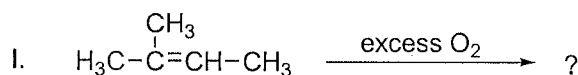


(26 marks)

(b) (i) Copy the structure given below in your answer script. Circle all the functional groups in it and give the name of the functional group beside each circle.



(ii) Write the products of the following two reactions.



(29 marks)

04. (a) (i) Name the prime energy source on Earth and explain the energy conversion within plants.

(ii) Explain how a bird can utilize a source of energy for its metabolic activities.

(iii) State the hierarchical order on a scale from small to large until the smallest fundamental unit of structure and function in living organisms.

(20 Marks)

(b) (i) What are organelles?

(ii) Differentiate between Prokaryotic and eukaryotic organisms.

(iii) Name **five (05)** membrane-bound compartments in eukaryotic (plant or animal) cells.

(iv) Draw the table below in your answer script and fill the rest of the columns with the information for cell components (1 to 4).

No.	Cell Component	Function	Present in Prokaryotes?	Present in Animal Cells?	Present in Plant Cells?
1.	Nucleus				
2.	Ribosomes				
3.	Mitochondria				
4.	Chloroplasts				

(35 Marks)

(c) (i) What is the general form of Carbohydrates?

(ii) What are Disaccharides and explain the type of reaction happening during the formation of Disaccharides.

(iii) Give **three (03) examples** of Disaccharides and write down the monosaccharides units consisting of each Disaccharides you mentioned.

(30 Marks)

(d) (i) Draw a diagram to represent the steps involved in the process of Glycolysis during the breakdown of glucose to extract energy for cell metabolism.

(15 Marks)

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