

Time : 3 hours

Max. Marks: 60

**CHEMISTRY**  
(ECE, EEE & CSE (IOT))  
PART- A  
(Compulsory Question)

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1. Answer the following: (05 X 02 = 10 Marks)

- a. Mention the significance of  $\Psi$  and  $\Psi^2$
- b. What are fuel cells? Give Examples.
- c. Write the preparation of Buna-N-rubber.
- d. What is Electromagnetic radiation?
- e. List out uses of nanomaterial.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

UNIT-I

- 2 a. Discuss the concepts of Planck's quantum theory
- b. Describe the CFT of Tetrahedral complexes with example

OR

- 3 a. Explain the Molecular energy level diagram for CO.
- b. Derive the Schrodinger equation for Hydrogen atom.

UNIT-II

- 4 a. Discuss the construction and working principle of Zinc-air battery
- b. Write the working principle of glass electrode.

OR

- 5 a. What are secondary batteries and explain the working principle of lead acid batteries.
- b. Explain the construction and applications of Methanol -O<sub>2</sub> fuel cell

UNIT-III

- 6 a. Explain the Preparation of Co-Polymerization with example
- b. Explain the mechanism of chain growth polymerization with example

OR

- 7 a. Explain the preparation and applications of Nylon- 6,6 & Buna-S rubber.
- b. Discuss the mechanism of Step growth polymerization with an example.

UNIT-IV

- 8 a. Describe the applications of potentiometer,
- b. List out the applications of UV spectroscopy.

OR

- 9 a. What is chromatography? Explain the applications of Thin Layer chromatography.
- b. Explain the applications of IR spectra for the identification of organic functional groups?

UNIT-V

- 10 a. What is colloid and write their applications
- b. Explain the principle and application of Transmission electron microscope (TEM)

OR

- 11 a. What are nanomaterials? Explain the properties of Nano cluster and nanowire
- b. Describe the Micelle formation in colloidal chemistry.

G.Pullaiah College of Engineering and Technology  
:: Kurnool

I B.Tech I Sem (R 20) Regular Examinations August 2021

CHEMISTRY (A30005)  
Scheme of Evaluation

Part - A.  
(Compulsory Question)

1. Answer the following.

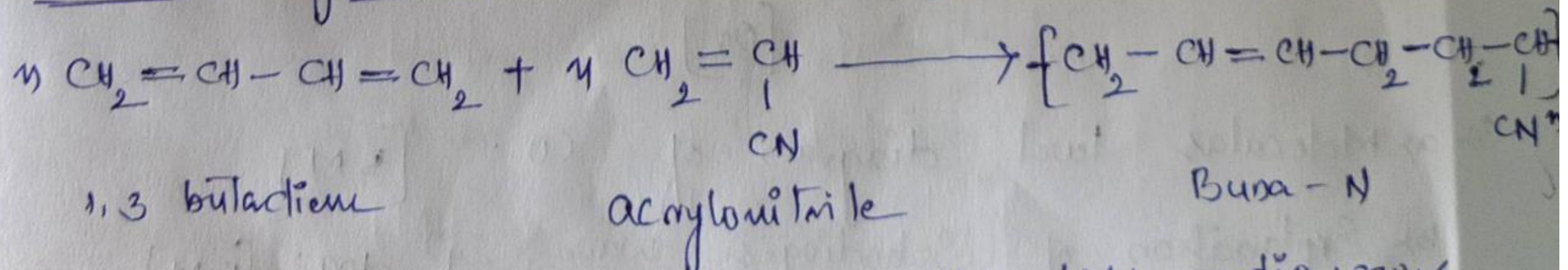
a) Mention any 4 significances of  $\psi$  &  $\psi^2$  [2M]

- ↳  $\psi$  is the amplitude of wave, hence called wave function
- ↳ It takes +ve values above the axis and -ve values below the axis and zero at intersecting the axis.
- ↳  $\psi^2$  gives the probability function, which describes the probability of finding the  $e^-$  around the nucleus.
- ↳  $\psi^2$  interprets the probability density if 'dv' is definite volume then  $\psi^2 \cdot dv$  gives the probability of finding the  $e^-$  in the region having a volume.

b) Fuel cell: - A fuel cell is an electrochemical cell in which the chemical energy of fuel-oxidant system is directly converted into electrical energy. [1M]

Ex: Methanol oxygen  
 $H_2 - O_2$  fuel cell [1M]

c) Buna-N Synthesis [2M]



d) A kind of radiations including visible light, radio waves, gamma rays and X-rays in which electric and magnetic fields vary simultaneously. [2M]

ex Applications of nanomaterials: [2M]

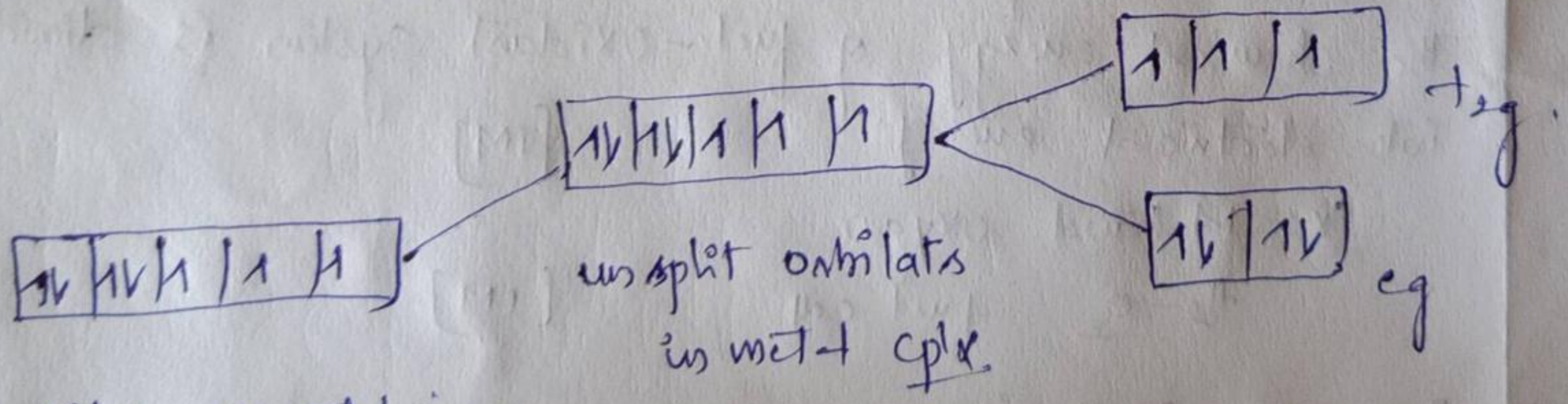
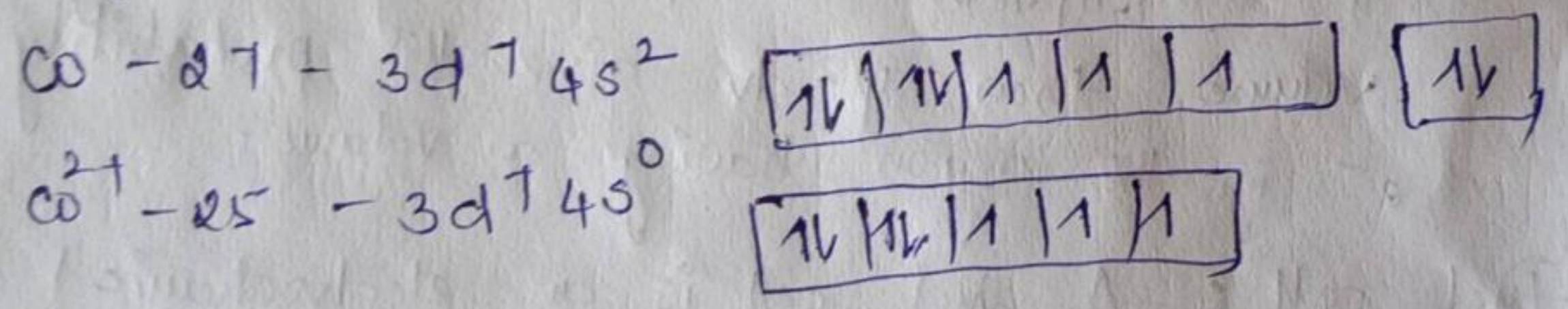
- ↳ These are used as catalyst in hydrogenation and catalysis.
- ↳ Nano particles are potential components in the generation of biomimetic and nano mech devices based on DNA
- ↳ They act as sensors of gases such as  $\text{NO}_2$  and  $\text{NH}_3$
- ↳ Nano tubes of  $\text{MoS}_2$  and  $\text{WS}_2$  used as solid lubricants

Part-B  
(Answer any 5)

a) Concepts of plank's quantum theory [5M]

b) Explanation of crystal field theory. [2.5M]  
With discussion.

Ex: any one  $[\text{CoCl}_4]^{2-}$  [2.5M]



d-orbitals of metal ion.

[0M]

3) a) Molecular level diagram of  $\text{CO}$ . [5M]

b) Explanation of Schrodinger wave Eq<sup>n</sup> for hydrogen atom. [5M]

4) a) Zinc - Air battery  $\Rightarrow$  construction [2M]

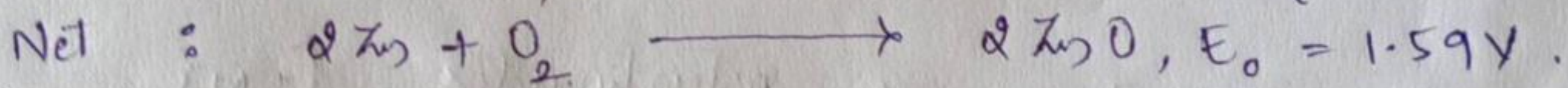
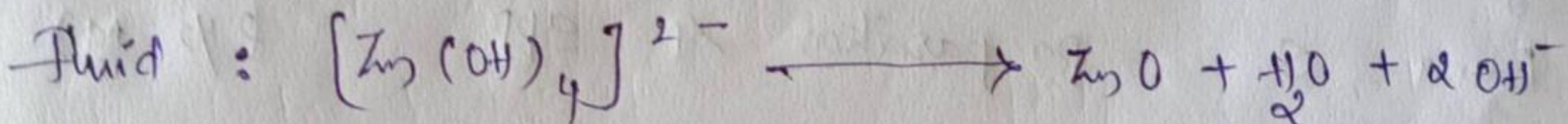
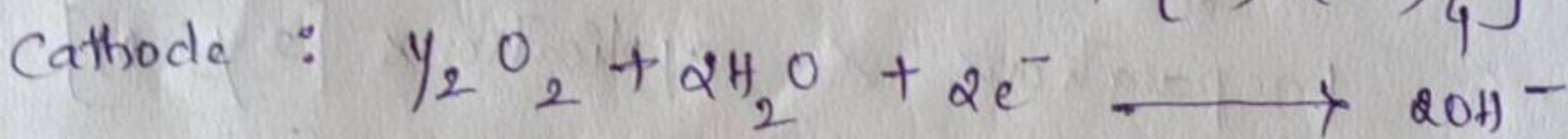
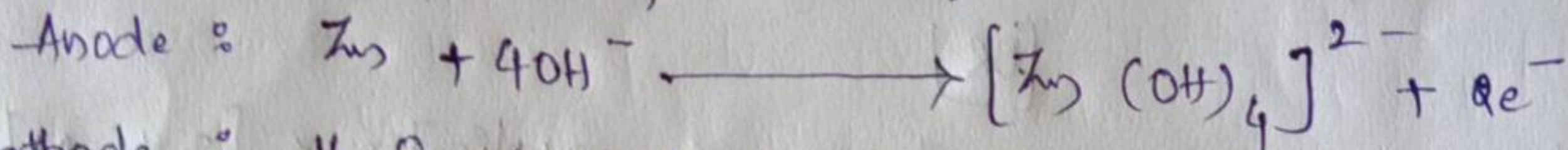
At anode - loose granulated Zn-particles mixed with KOH electrolyte

Cathode - Zn-platers.

At cathode...  $O_2$  from air forms hydroxide ions which migrate into zinc plate and form zincate  $[Zn(OH)_4]^{2-}$  releasing  $e^-$ . Zincate decays into zinc oxide and water. Water and  $OH^-$  ions are recycled. The battery produces 1.62V of energy.

$\Rightarrow$  Reactions & diagrams [3M]

Zn / KOH / air,  $O_2$ .



b) Principle & Working of glass electrode [5M]

[OR]

5) a) Secondary batteries definition. [1M]

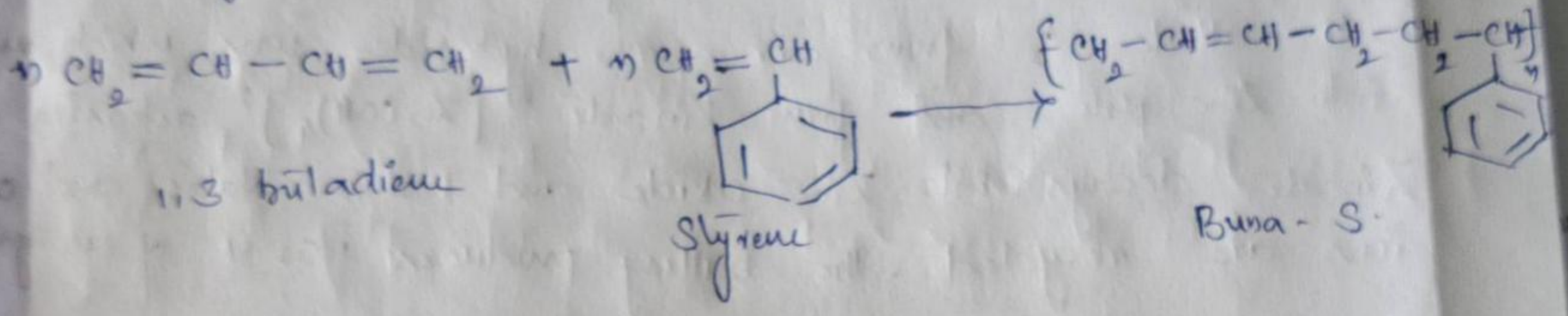
Lead acid battery construction [1M]

charging, discharging equations [2M]

Diagram of lead-acid battery [1M]

b) Construction of  $CH_3OH - O_2$  fuel cell - [2 M]  
 Equations of fuel cell - [2 M]  
 diagram - [1 M]

8) a) Co-polymerization - definition - [1 M]  
 - Any one example with eq<sup>n</sup> - [4 M]



b) Chain growth polymerisation with any one example with complete mechanism [5 M]  
 [OR]

9) a) Nylon - 6,6 preparation & applications [2 1/2 M]  
 Buna-S preparation & app [2 1/2 M]

8) a) Any 5 applications of potentiometer [5 M]  
 b) Any 5 applications of UV-spectroscopy [5 M]  
 [OR]

9) a) Define chromatography [2 M]  
 Applications of TLC [3 M]

b) Any 5 applications of IR-spectra for the identification of organic functional group. [5 M]

1) a) definition of colloids. - [2M]

Any 5 applications of colloids - [3M]

b) Principle of TEM - [2M]

Any 5 applications of TEM - [3M]

[OR]

1) a) Definition of nanomaterials. - [1M]

properties of nano clusters - [2M]

properties of nano wires - [2M]

b) Micelle formation complete discussion with  
diagram. - [5M]

Prepared by  
S. J. G.