ALUPE UNIVERSITY

OFFICE OF THE DEPUTY VICE CHANCELLOR

ACADEMICS, RESEARCH AND STUDENTS AFFAIRS

UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER REGULAR MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: CHE 420E

COURSE TITLE: PHOTOCHEMISTRY

DATE: 9/12/2022 TIME: 2-5 P.M.

INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF 5 PRINTED PAGES PLEASE TURN OVER

CHE 420E

REGULAR – MAIN EXAM

CHE 420 E: PHOTOCHEMISTRY

STREAM: BED (Scie) DURATION: 3 Hours

INSTRUCTIONS TO CANDIDATES

*a) Answer **ALL** questions.*
b) Diagrams may be used whenever they serve to illustrate the answer.
c) Do not write on the question paper.

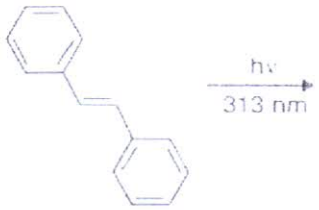
Question One

Complete the following photo induced reactions (12 Marks)

a. $[Co(NH_3)_5NO_2] + h\nu \rightarrow$

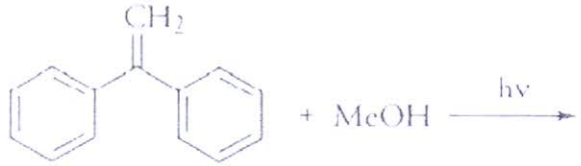
b. $Fe(CO)_5 + 1,3\text{-butadiene} \xrightarrow{h\nu}$

c. $(CO)_5Mn\text{-}Mn(CO)_5 \xrightarrow{h\nu}$

d. 

trans-stilbene

e. 

f. 

Question Two

Using relevant examples and equations, explain the principal reaction types for ketone excited states (12 Marks)

on Three

)escribe three processes where the photochemistry of carbonyl compounds plays an important part in the photochemical formation and breakdown of polymers (6 Marks)

b) Explain the three basic processes of light-matter interaction that can induce transfer of an electron between two quantized energy states (6 Marks)

Question Four

a) Describe the steps involved in the photo halogenation of a hydrocarbon (6 Marks)

b) Describe the necessary conditions for the generation of laser light (6 Marks)

Question Five

Draw a well labelled Jablonski diagram for an organic molecule illustrating excited state photo physical processes (12 Marks)

Question Six

a) Explain the following relaxation processes for a molecule in the excited state

i. Intersystem crossing (2 Marks)

ii. Fluorescence (2 Marks)

iii. Phosphorescence (2 Marks)

b) Desribe the rapid ozone loss through photohemical reactions in the stratosphere (4 Marks)

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