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OFFICE OF THE DEPUTY PRINCIPAL ACADEMICS, STUDENT AFFAIRS AND RESEARCH

# UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER REGULAR EXAMINATION

## FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

**COURSE CODE:** 

**CHE 420E** 

**COURSE TITLE:** 

**PHOTOCHEMISTRY** 

DATE: 26/1/2022

TIME: 2-5PM

#### **INSTRUCTION TO CANDIDATES**

SEE INSIDE

THIS PAPER CONSISTS OF PRINTED PAGES 3

PLEASE TURN OVER

#### CHE 420 E

### REGULAR – MAIN EXAM CHE 420 E: PHOTOCHEMISTRY

STREAM: BED (Scie)

#### **DURATION: 3 Hours**

#### **INSTRUCTIONS TO CANDIDATES**

- i. Answer ALL questions.
- ii. Diagrams may be used whenever they serve to illustrate the answer.
- iii. Do not write on the question paper.

#### **Question One**

Explain the following concepts

- a. Photochemistry (2 Marks)
- b. Quantization of light (2 Marks)
- c. Grotthuss-Draper law (2 Marks)
- d. The Stark-Einstein law (2 Marks)
- e. Overall Quantum Yield (2 Marks)
- f. Photolysis (2 Marks)

#### **Question Two**

Discuss the principal reaction types for ketone excited states (12 Marks)

#### **Question Three**

- a. Explain the three basic processes of light-matter interaction that can induce transfer of an electron between two quantized energy states (9 Marks)
- b. Describe the light sources used in photochemistry (3 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**

#### CHE 420 E

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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