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University Examinations 2023/2024

FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION TECHNOLOGY IN CIVIL ENGINEERING AND BACHELOR OF EDUCATION TECHNOLOGY IN MECHANICAL ENGINEERING

AND

FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING AND BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING

SCS 3151: ORGANIC CHEMISTRY FOR ENGINEERS

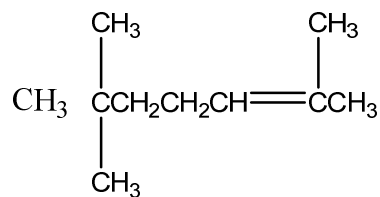
DATE: APRIL 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

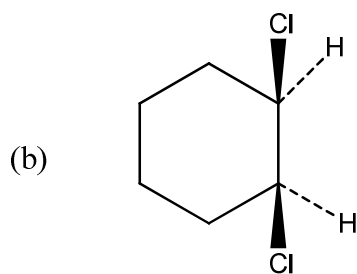
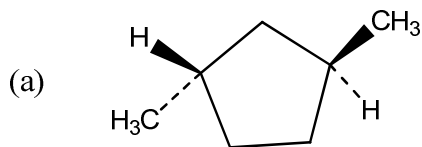
QUESTION ONE (30 MARKS)

- What are orbitals (2 marks)
- What is the electron configuration of carbon using energy level diagrams (3 marks)
- Describe two methods of representing molecular structures. Give an example for each (4 marks)
- Differentiate between saturated and unsaturated hydrocarbons giving an example for each (4 marks)
- Define functional groups (2 marks)
- What isomers do you expect from the formula C_5H_{12} (6 marks)
- Provide the IUPAC name for the following compounds (1 mark)



h) Using examples, discuss the halogenation of alkanes (4 marks)

i) Name with reasoning the following compounds (4 marks)



QUESTION TWO (20 MARKS)

a) Define the following terms (4 marks)

- (i) Kekule structure
- (ii) Sigma bonds
- (iii) Pi-bonds
- (iv) SP^3 hybrid orbitals

b) Using the structure of ethane, describe SP^3 hybridization (6 marks)

c) Using ethene, describe SP^2 hybridization (5 marks)

d) Using ethyne, describe SP hybridization (5 marks)

QUESTION THREE (20 MARKS)

a) Discuss cracking of alkanes (6 marks)

b) Discuss applications of alkane products (8 marks)

c) Explain engine knocking and its prevention mechanisms (6 marks)

QUESTION FOUR (20 MARKS)

- a) What are copolymers (3 marks)
- b) Explain two types of polymers (6 marks)
- c) Discuss the role of organic chemistry in engineering (8 marks)
- d) Explain synthetic organic compounds (3 marks)