



# **KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR**

**THIRD YEAR FIRST SEMESTER  
MAIN EXAMINATIONS**

**FOR THE DEGREE OF BSC (CHEMISTRY)**

**COURSE CODE: SCH 317**

**COURSE TITLE: BIOORGANIC AND MEDICINAL CHEMISTRY**

**DATE: 19/07/2021**

**TIME: 9:00-11:00AM**

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**INSTRUCTIONS TO CANDIDATES**

Time: 2 Hours

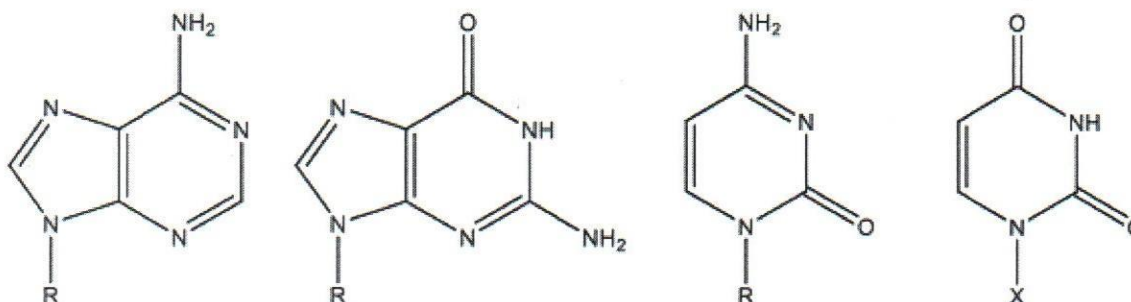
**Answer question ONE and any other TWO of the remaining**

KIBU observes ZERO tolerance to examination cheating

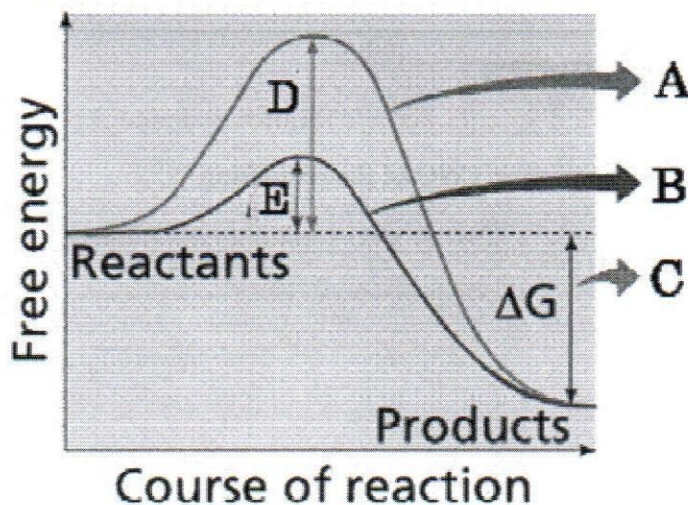
**QUESTION ONE (30 MARKS)**

- a) Define the following terms as used in medicinal chemistry (5 marks)
- i. Lead
  - ii. Absorption
  - iii. Pharmacophore
  - iv. Potency
  - v. Pharmacodynamics

- b) The following represent the four bases of DNA. The 'R and X' indicate sugar moiety covalently attached to the base to form the nucleoside. Name them (4 marks)



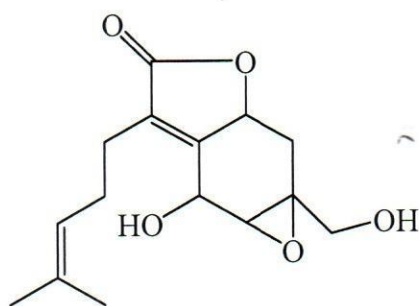
- c) Using relevant example explain Watson-Crick base pairing (3 marks)  
 d) State the difference in the structures of RNA and DNA (3 marks)  
 e) Study the graph of the energy flow of a chemical reaction below and match the letters in the graph with the appropriate description (i – v). (5 marks)



- i. Energy path of an uncatalyzed reaction
- ii. Energy released from this reaction
- iii. Activation energy of a catalyzed reaction
- iv. Activation energy of an uncatalyzed reaction
- v. Energy path of a catalyzed reaction

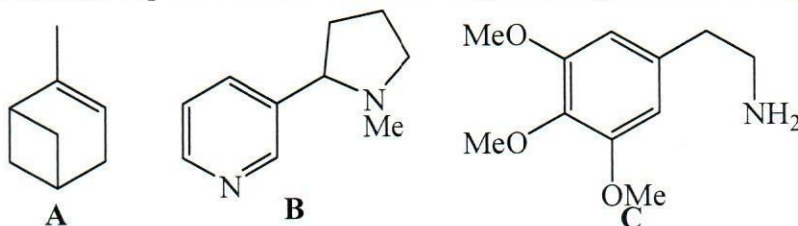
- f) List four reasons why metabolism of drugs important (4 marks)  
 g) Mention three organs responsible for drug metabolism (3 marks)

- h) Identify the isoprene units in paniculide B, a product of tissue culture from *Andrographis paniculata* (3 marks)

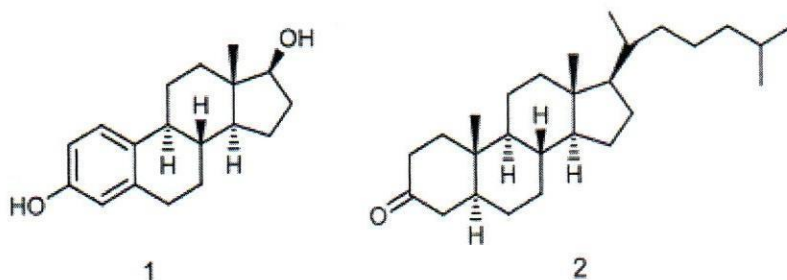


**QUESTION TWO (20 MARKS)**

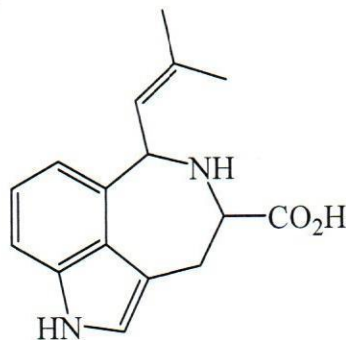
- a) In which class of natural product does the following natural products belong (3 marks)



- b) Name the following compounds using IUPAC rules (4 marks)



- c) The metabolite clavicipitic acid below is produced by the ergot fungus, *Claviceps purpurea*. Identify the building blocks (5 marks)

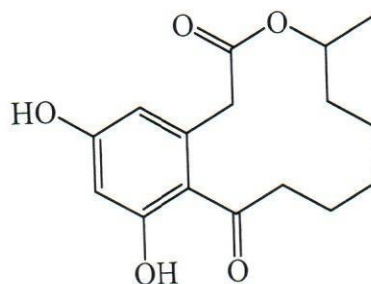


- d) Discuss the discovery of *penicillin* and *chlordiazepoxide* according to the article *The Role of Serendipity on Drug Discovery* (8 marks)

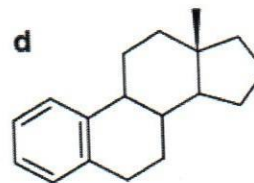
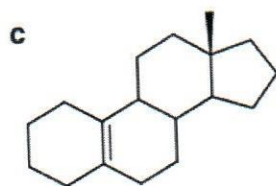
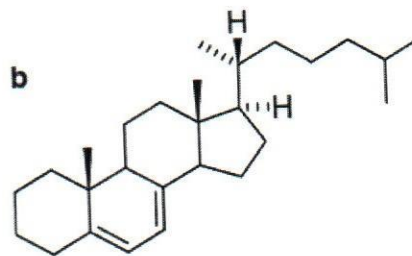
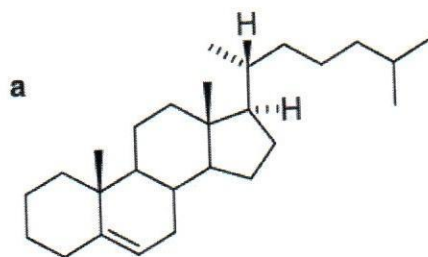
**QUESTION THREE (20 MARKS)**

a) State five advantages of combinatorial chemistry over traditional synthesis method (5 marks)

b) Indicate, using bold lines, the constituent acetate units in the natural product compound below (4 marks)



c) Name the following compounds (6 marks)



d) Discuss induced-fit model of enzyme action (5 marks)

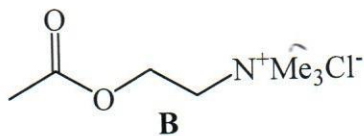
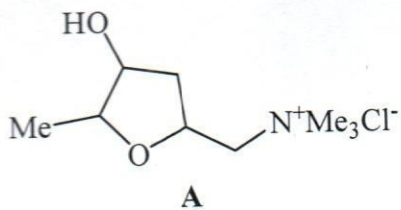
**QUESTION FOUR (20 MARKS)**

a) State and briefly discuss environmental factors that affect enzyme activity (6 marks)

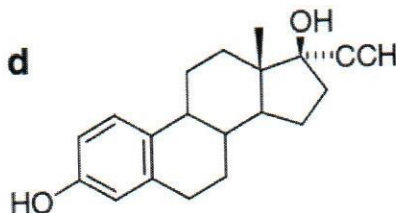
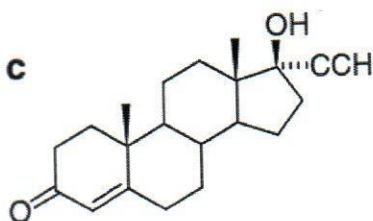
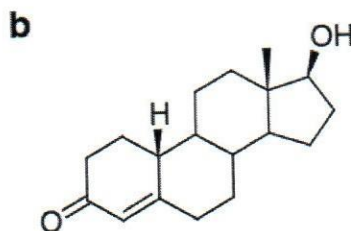
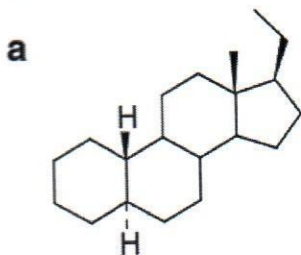
b) During phase I metabolism, majority of metabolites are generated by a common hydroxylating enzyme system known as Cytochrome P450. Name any eight of these reactions (4 marks)

c) Name classes of terpenoid (2 marks)

- d) The fungal metabolite muscarine A binds to certain receptors for the neurotransmitter acetylcholine B. Indicate, on their structures below, the structural similarity between muscarine and acetylcholine (2 marks)



- e) Name the following compounds (6 marks)



**QUESTION FIVE (20 MARKS)**

- a) Name classes of alkaloids with one example in each (8 marks)
- b) Provide description of 3D structure of DNA (3 marks)
- c) Route of drug administration is a method of drug absorption. List one advantage and three disadvantages of oral drug administration (4 marks)
- d) Indicate, using bold line, the constituent acetate units in the compound below (5 marks)

