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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2019/2020 ACADEMIC YEAR FOUR**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: CHE 412**

**COURSE TITLE: CHEMISTRY OF NATURAL PRODUCTS**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 14/02/2020 TIME: 2.00-4.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of THREE (3) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Define the following terms: **[5 marks]**
2. Biosynthesis
3. Bioassay
4. Natural products
5. Pharmacognosy
6. Biomimetic synthesis
7. Describe any four biosynthetic pathways leading to the major classes of natural products **[4 marks]**
8. (i) What are steroids? **[1 mark]**

(ii) Give three examples of steroids. **[3 marks]**

1. Name four methods used in the isolation and purification of natural products. **[4 marks]**
2. The ease with which the active agents in natural products can be isolated and purified depends on various factors. Name at **least** three of these factors. **[3 marks]**
3. Distinguish between synergistic and antagonistic activity of isolates of natural products.  **[2 marks]**
4. State and explain two spectroscopic techniques employed in structural characterization of an isolated natural product. **[4 marks]**
5. Explain four pharmaceutical importances of carbohydrates. **[4 marks]**

**QUESTION TWO**

1. Briefly describe three basic stages of isolation of natural products from plants. **[3 marks]**
2. Give a brief discussion of **flavonoids** under the following sub headings:
3. Structure **[2 marks]**
4. Occurrence **[2 marks]**
5. Classifications **[3 marks]**
6. Stages of biosynthetic pathway **[4 marks]**
7. Tropinone, an alkaloid which is a synthetic precursor to Atropine (isolated from the plant *Atropa belladonna*) can be synthesized biomimetically as shown below:



Show the reaction mechanism of the biomimetic synthesis of Tropinone. **[6 marks]**

**QUESTION THREE**

1. Distinguish between primary metabolites and secondary metabolites. Give two examples of each. **[5 marks]**
2. State four uses of natural products. **[6 marks]**
3. State three disadvantages associated with synthetic drugs. **[3 marks]**
4. Distinguish between *in vivo* and *in vitro* evaluation. **[2 marks]**
5. State two reasons as to why separation of pure state compounds from natural sources involves laborious and elaborate processes. **[2 marks]**
6. Name the vitamins associated with the following conditions:
7. Ricket **[1 mark]**
8. Cancer **[1 mark]**

**QUESTION FOUR**

1. What are anthocyanins **[1 mark]**
2. State three roles played by primary metabolites in plant life. **[3 marks]**
3. Name any 2 examples of alkaloids. **[2 marks]**
4. Describe any two methods of biological assays. **[4 marks]**
5. Briefly discuss **cholesterol** under the following subheadings:
6. Structure **[2 marks]**
7. Occurrence **[2 marks]**
8. Human bodily function **[2 marks]**
9. Stages of biosynthetic pathway **[4 marks]**

**QUESTION FIVE**

1. What are Vitamins? **[2 marks]**
2. How are tannins classified? **[2 marks]**
3. Briefly discuss properties of tannins **[4 marks]**
4. Briefly discuss **four** chemical tests for tannins **[12 marks]**