



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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## University Examinations 2022/2023

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF  
BACHELOR OF SCIENCE IN BIOCHEMISTRY

### SCS 3300: PHYTOCHEMISTRY

DATE: AUGUST 2023

TIME: 2 HOURS

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

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#### QUESTION ONE (30 MARKS)

- a) Define the following terms
- i) Chemosystematics
  - ii) Pharmacognosy
  - iii) Docking program (3 marks)
- b) State four reasons for increased interest in demand for phytochemicals world over (4 marks)
- c) i) Define the term metabolites (1 mark)
- ii) With suitable examples, distinguish between primary and secondary metabolites (3 marks)
- d) Discuss the methods used to investigate plant materials to guarantee their therapeutic value. (5 marks)
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MUST is ISO 9001:2015 and



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- e) Describe two spectroscopic techniques used in structural elucidation (4 marks)
- f) Briefly explain the applications of computer-aided phytochemicals studies (5 marks)
- g) (i) Define the term metabolic pathway (1 mark)
- (ii) With suitable examples, state the various metabolic pathways for different phytochemicals (4 marks)

### QUESTION TWO (20 MARKS)

- a) Define the following terms as used in bioassay in vivo, ex vivo and in vitro (3 marks)
- b) Discuss three disciplines or activities used to conduct search of phytochemicals for novel bioactive molecules (3 marks)
- c) I. State two properties of flavonoids (2 marks)
- II. Draw the structure of the following flavonoids
- i) Chalcone
- ii) isoflavone
- iii) flavanone (3 marks)
- d) Illustrate the classification of terpenoids and state two uses of terpenoids (4 marks)
- e) State two advantages the natural bioactive compounds may have over synthetic derivatives in drug design field. (3 marks)
- f) Explain why should secondary metabolites have biological activity in animals? (2 marks)

### QUESTION THREE (20 MARKS)

- a) Discuss how the following methods are used in evaluation of plant material
- i. Macroscopic investigations (2 marks)
- ii. Microscopic investigation (2 marks)



- b) State two ideal properties of solvent for extraction (2 marks)
- c) Briefly, explain the post-chromatographic mode for localization of the separated phytochemical components (3 marks)
- d) With examples, illustrate the classification of chromatography (5 marks)
- e) Discuss nicotine under the following subheadings
- iii. Its structure (1 marks)
- iv. biological activity and its effects (2 marks)
- v. isolation (3 marks)

#### **QUESTION FOUR (20 MARKS)**

- a) Describe the considerations made when collecting plants material for phytochemical analysis (5 marks)
- b) Discuss phytochemistry under the following subheading
- i. define phytochemistry (1 mark)
- ii. outline two aspects included in Phytochemical research of a plant (2 marks)
- iii. state three functions of phytochemicals in living organisms (2 marks)
- c) I Briefly, explain the following extraction techniques
- i) Microwave assisted extraction (MAE) (2 marks)
- ii) Super critical fluid extraction (SFE) (2 marks)
- iii) Ultrasound-assisted extraction (UAE) (2 marks)
- II. State three advantages of the modern extraction techniques over the conventional solvent extraction methods (3 marks)
- d) State two parameters of stability of herbal formulation (1 mark)
- a) Use a scheme to illustrate modern drug discovery processes involving natural products (8 marks)
- b) Discuss four parameters used to determine the quality of natural products (8 marks)

