



MACHAKOS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND SEMESTER, 2019/2020 ACADEMIC YEAR

**FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN COMPUTER SCIENCE AND BSC. INFORMATION
TECHNOLOGY**

SCO 421/SIT 408: DECISION SUPPORT SYSTEMS

DATE_____

TIME: 2 HRS

EXAMINATION SESSION: APRIL

YEAR 2020



INSTRUCTIONS

- i) **Answer question ONE and other TWO questions**
- ii) **Begin each new answer on a separate page of the answer sheet**
- iii) **Write on both sides of the answer sheet**

QUESTION ONE (Compulsory, 30 marks)

- a) Compare the following
 - i. Knowledge and Information **(4 marks)**
 - ii. Decision Support System (DSS) and Expert System **(4 marks)**
 - iii. Business Intelligence and Business Analytics **(4 marks)**
- b) Using an example describe the general structure of a mathematical model used for decision making **(6 marks)**
- c) In order to login, a user must provide correct username, password and domain. If any of the input is wrong, an error message will be displayed.
 - i) Create a Decision Table for the Problem above **(6 marks)**

- ii) Analyse the problem in terms of test scenarios and interpretation (6 marks)

Question TWO (20 marks)

A store has requested a manufacturer to produce pants and sports jackets. For materials, the manufacturer has 550 m² of cotton textile and 800 m² of polyester. Every pair of pants (1 unit) needs 2 m² of cotton and 3 m² of polyester. Every jacket needs 2 m² of cotton and 1 m² of polyester. The price of the pants is fixed at 50.

- a) Which variables do you choose as your unknowns? (2 marks)
- b) Create the objective function for the problem statement (5 marks)
- c) Design the constraints as a system of inequalities. (5 marks)
- d) What is the number of pants and jackets that the manufacturer must give to the stores so that these items obtain a maximum sale? (8 marks)

Question THREE (20 marks)

Use the dataset below to learn a decision tree which predicts if people pass machine learning (Yes or No), based on their previous GPA (High, Medium, or Low) and whether or not they studied. (T stands for Yes and F stands for No)

GPA	Studied	Passed
L	F	F
L	T	T
M	F	F
M	T	T
H	F	T
H	T	T

- a) What is the entropy $H(\text{Passed})$? (5 marks)
- b) What is the entropy $H(\text{Passed} \mid \text{GPA})$? (5 marks)
- c) What is the entropy $H(\text{Passed} \mid \text{Studied})$? (5 marks)
- d) Draw the full decision tree that would be learned for this dataset. You need to show all the calculations. (5 marks)

Question FOUR (20 marks)

- a) Discuss the components of knowledge management system (6 marks)
- b) Analyse the structure of a mathematical model used for decision making (8 marks)
- c) Describe the components of a Decision Support System(DSS) (6 marks)

Question FIVE (20 marks)

- a) Using an example compare Goal seek to What –if analysis (10 marks)
- b) Describe the components of a Linear Programming problem (10 marks)
