



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 421/SIT 408: DECISION SUPPORT SYSTEMS

DATE: 26/7/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer **question ONE** and any other **TWO** questions.

QUESTION ONE (COMPULSORY, 30 MARKS)

- a) What is a model (1 mark)
- b) Explain the benefits of using models in decision making (4 marks)
- c) List down FOUR tools used in data mining (4 marks)
- d) Describe the process of decision making (4 marks)
- e) What is Simulation (1 mark)
- f) What are the advantages of using simulation? (5 marks)
- g) Describe the components of a DSS (6 marks)
- h) Describe the general Structure of a Mathematical Model for Decision Support (5 marks)

QUESTION TWO (20 MARKS)

- a) Distinguish between Data and Knowledge (2 marks)
- b) Explain the following terms:
 - i. Decision support systems (DSS) (2 marks)
 - ii. Automated decision systems (ADS) (2 marks)
 - iii. Business intelligence (BI) (2 marks)
 - iv. Expert system (2 marks)

- c) Use a diagram to explain the phases in Knowledge Management System Cycle (6 marks)
- d) Compare Blind search to Heuristic search (4 marks)

QUESTION THREE (20 MARKS)

- a) Describe how to use the following in decision making:
- Goal-seek (3 marks)
 - What if Analysis (3 marks)
- b) What are the benefits of using models in decision making? (5 marks)
- c) Smith industries must decide whether to manufacture a new component at its factory or purchase the component from a supplier. If demand is high, it will be more profitable to manufacture the component in-house rather than purchase it. However the make-or-buy decision must be made before the demand level is known. The projected profits in thousand dollars is given below

	States of Nature(Chance Events)		
Alternatives	High Demand(H)	Medium Demand(M)	Low Demand(L)
Manufacture	100	40	-20
Purchase	120	90	30
Probabilities	0.2	0.3	0.4

- d) Construct a decision tree for this problem showing all your computations (8 marks)
- e) Suggest the best course of action (1 mark)

QUESTION FOUR (20 MARKS)

- a) Describe the ID3 Algorithm (5 marks)
- b) Use diagrams to describe the main database models (5 marks)
- c) Suppose you want to choose between two business projects: Investment in Mangoes sales or investment in Pineapple sales in Machakos town. What if the Mangoes business has a 50% chance of success and a 50% chance of failure? If it is a success, the Mangoes business can earn you upto Ksh 100000 and if it fails you lose Ksh30000. And if you choose to invest in Pineapple business, you have a 50% chance of success and a 50% chance of failure. If the Pineapple business succeeds you earn Ksh 90000 and if it fails you lose Ksh 10000. Suggest the business type that you will prefer to invest in. Show how you arrive to the answer using a decision tree. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Describe the importance of using Prototyping technique in Decision Support Systems (DSS)? (7 marks)
- b) What are the phases of decision making process (4 marks)
- c) 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.

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

- i. What is the entropy $H(\text{Passed})$? (3 marks)
- ii. What is the entropy $H(\text{Passed} \mid \text{GPA})$? (3 marks)
- iii. Draw the full decision tree that would be learned for this dataset. You need to show all the calculations. (3 marks)