



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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University Examinations 2018/2019

THIRD YEAR, SPECIAL / SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN COMPUTER SCIENCE, BACHELOR OF SCIENCE IN
COMPUTER TECHNOLOGY, BACHELOR OF SCIENCE IN INFORMATION
TECHNOLOGY AND BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER
SCIENCE

AND

FOURTH YEAR, SPECIAL / SUPPLEMENTARY EXAMINATION FOR THE DEGREE
OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND BACHELOR OF
COMPUTER TECHNOLOGY

CCS 3400: KNOWLEDGE BASED SYSTEMS

DATE: SEPTEMBER 2019

TIME: 2 HOURS

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

QUESTION ONE (30 MARKS)

- a) Using suitable examples to illustrate your answer explain the difference between the following.
- (i) Data (2 Marks)
 - (ii) Information (2 Marks)
 - (iii) Inference (2 Marks)
 - (iv) Knowledge (2 Marks)
- b) Compare the software lifecycles for the following systems. Highlight the main differences and use diagrams to illustrate your answer. (4 Marks)
- (i) “traditional “ software
 - (ii) Knowledge-based systems

- c) Describe the knowledge acquisition process in knowledge engineering, including the main steps involved. Use diagrams to illustrate your answer. (6 Marks)
- d) Discuss the problems that large data sets (Big Data) pose for knowledge based data analytics applications and give examples to illustrate your answer. (6 Marks)
- e) Distinguish between brute-force and heuristic methods for problem solving. Discuss the advantages and disadvantages of each of the two approaches, using examples to illustrate your answer. (6 Marks)

QUESTION TWO (20 MARKS)

- a) There are a number of fundamental differences between knowledge based systems and conventional systems. Describe, with examples the differences and similarities between knowledge based systems and conventional information systems, include any claimed advantages of KBSs over conventional information systems. (6 Marks)
- b) Describe one example of how KBS technology is used in online data analytics. (4 Marks)
- c) Why is multiple fault diagnosis an appropriate domain for applying knowledge based system. Include examples of major KBS's to support your answer. (6 Marks)
- d) You have been contracted to develop a finance KBS for MUST. What measures will you put in place to increase the reliability of decision making of the system. (4 Marks)

QUESTION THREE (20 MARKS)

- a) Discuss any four aspects of human intelligence that could be used to characterize intelligence knowledge based systems. (4 Marks)
- b) Mr. Farmer is a man who has a special interest in birds. He keeps fowls pigeon, hens and doves. The doves are white and all have sharp beaks. Each pigeon is multicolored and takes a lot of water from the well dug in the compound. The fowls mostly feed by themselves but are very particular on where they spend this being the smart wooden structure behind the main building. Draw a semantic network for this scenario. (6 Marks)
- c) Both a knowledge engineer and system engineer are responsible for maintaining a knowledge base with the current and relevant knowledge for the specific domain. Describe any three methods they can employ to make sure that the knowledge base is up-to-date. (6 Marks)
- d) Describe briefly general methods that could be applied to elicit the knowledge needed to solve a small complex problem. (4 Marks)

QUESTION FOUR (20 MARKS)

- a) Select one application domain for which a knowledge base might be created. Outline three techniques which could be used for knowledge elicitation in your chosen application domain, highlighting the advantages and disadvantages of each technique. (6 Marks)
- b) Identify and define four main types of knowledge available to the engineer for presentation. (4 Marks)
- c) Using relevant examples, discuss the difficulties facing the developer of knowledge based systems when processing natural language. (4 Marks)
- d) There is currently much concern about data security and the emergence of cybercrime. Some researchers believe that knowledge based systems and artificial intelligence may offer possible cyber security solutions and help us to combat cybercrime. Discuss which knowledge based systems techniques might be applicable and how they might be used in the development of systems for cybersecurity. (6 Marks)

QUESTION FIVE (20 MARKS)

- a) Describe the advantages and disadvantages of Goal Based Reasoning when compared to Data Based Reasoning. (4 Marks)
- b) Assume that the Kenya Government has sought your advice on how to design, implement and install a KBS to control traffic on major round-a-bouts in Nairobi city. Provide this guideline. (6 Marks)
- c) There are increasing numbers of artificial intelligent knowledge based systems being developed which raises concerns for possible societal risks. Discuss the ethical issues and challenges raised by different types of these intelligent machines and their impact on people and society. (6 Marks)
- d) A good example of a knowledge based system is neural network. These systems offer powerful approaches which can be applied to the solution of problems in many different application domains. Explain the basis on which neural networks operate. (4 Marks)