



**UNIVERSITY EXAMINATIONS: 2023/2024**  
**EXAMINATION FOR BACHELORS EXAMINATION FOR THE DEGREE**  
**OF BACHELOR OF SCIENCE IN APPLIED COMPUTING / SOFTWARE**  
**DEVELOPMENT**

**BAC 3209/ BSD 3205 : EMBEDDED SYSTEMS**  
**FULLTIME/ PART-TIME/DISTANCE LEARNING**  
**ORDINARY EXAMINATION**

**DATE: AUGUST, 2024**

**TIME: 2 HOURS**

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**INSTRUCTIONS: Question One Is Compulsory, Choose Two Other Questions**

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**QUESTION ONE (20 marks) Compulsory**

- a) Compare and contrast traditional Decision Support Systems (DSS) functionalities with AI-enhanced DSS. Highlight how AI technologies transform decision support capabilities. [4 marks]
- b) Discuss the implications of deploying machine learning models within DSS for predictive analytics. Identify two potential risks and how they can be mitigated. [4 marks]
- c) Explain three ways Natural Language Processing (NLP) can enhance decision-making through improved data interpretation and user interaction. [3 marks]
- d) Describe the process of integrating AI into existing Decision Support Systems, including evaluating system performance and user feedback. [4 marks]
- e) Describe the knowledge management cycle within the context of a Decision Support System and its impact on decision quality. [5 marks]

**QUESTION TWO [15 marks]**

- a) Outline the role of Decision Support Systems (DSS) in enhancing organizational decision-making across various levels (operational, tactical, and strategic). [6 marks]
- b) Identify two key challenges organizations face when integrating Big Data analytics into their DSS and suggest measures to address them. [6 marks]
- c) Explain how DSS can leverage data visualization tools to aid in complex decision-making scenarios. Provide three examples of visualization techniques and their benefits. [3 marks]

### QUESTION THREE [15 marks]

- a) Decision tree induction is one of the machine learning techniques. Explain what decision tree induction means and how it is used for classification problems. (There is no need to explain the actual induction process.) [5 marks]
- b) Given the sample dataset below, construct a simple decision tree model to predict the target variable 'Y'. Use entropy to determine the best attribute to split at the root node. [5 marks]

X1 (Temperature)	X2 (Humidity)	Y (Play Tennis)
Hot	High	No
Hot	Normal	Yes
Mild	High	No
Cool	Normal	Yes

- c) Discuss the steps involved in pruning a decision tree. Why is pruning important in preventing overfitting in the model? [5 marks]

### QUESTION FOUR [15 marks]

- a) Define linear regression and explain its importance in predictive modelling. Discuss the assumptions underlying linear regression models. [6 marks]
- b) Given the sample dataset below, calculate the coefficients aaa and bbb in the linear regression equation  $y=ax+b$  using the least squares method. Sample data:  $x=[1,2,3,4,5]$ ,  $y=[2,3,5,7,11]$ . [4 marks]
- c) Describe the process of developing a linear regression model from data collection to model evaluation. Include steps such as data preprocessing, model training, and validation. [5 marks]