University Examinations 2024/2025

FOURTH YEAR FIRST SEMESTER FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SECURITY AND FORENSICS

CDS 3401: RECOMMENDER SYSTEMS

DATE: JANUARY 2025   **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question **ONE** (Compulsory) and any other **TWO** questions*

QUESTION ONE (30 MARKS)

a) Define the following terms as used in recommendation systems

   i)   Serendipity   (2 Marks)

   ii) Diversity   (2 Marks)

b) Explain the "cold start" problem with respect to recommender systems   (3 Marks)

c) Outline the key components of a recommender system.   (3 Marks)

d) Discuss two limitations of content-based filtering.   (4 Marks)

e) Discuss two distance metrics that commonly used for measuring similarity in collaborative filtering.   (4 Marks)

f) Explain the purpose of dimensionality reduction in recommender systems.   (4 Marks)

g) Distinguish between online and offline recommendations   (4 Marks)

h) Describe how item-based collaborative filtering works and provide an example of when it might be preferred over user-based collaborative filtering.   (4 Marks)

QUESTION TWO (20 MARKS)

   a) You are provided with a dataset containing user ratings for movies. Describe the steps you would take to analyze this dataset to extract insights about user preferences. Include any specific libraries or tools you would use. (10 marks)

   b) Using relevant examples distinguish between explicit and implicit user feedback in recommender systems. (4 Marks)

   c) Discuss how recommender systems can account for individual preferences while also promoting diversity of recommendations provided to user. (6 Marks)

QUESTION THREE (20 MARKS)

   a) Using examples, discuss the potential ethical issues that might arise while developing and deploying recommender systems. (8 Marks)

   b) Discuss the three main challenges that are encountered while using collaborative filtering techniques to provide users with accurate recommendations (6 Marks)

   c) Outline the challenges of incorporating contextual information into recommender systems. (6 Marks)

QUESTION FOUR (20 MARKS)

   a) Discuss how recommender systems can benefit businesses and enhance the user experience on e-commerce platforms. (10 Marks)

   b) Explain how context-aware recommendations can enhance user experiences. (6 Marks)

   c) Use a diagram to illustrate the "short-head and long tail" phenomena in the context of recommender systems and its significance for e-commerce platforms (4 Marks)

QUESTION FIVE (20 MARKS)

   a) Distinguish between memory-based and model-based collaborative filtering techniques, providing examples of scenarios where one approach might be preferred over the other. (10 Marks)

   b) List and explain five metrics commonly used to evaluate recommender systems. For each metric, briefly describe a scenario where it would be particularly useful. (10 Marks)