

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)  
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF BUSINESS AND TECHNOLOGY MANAGEMENT

Semester Final Examination

Summer Semester, A. Y. 2022-2023

Course No: BTM 4869

Time : 3 hours

Course Title: Decision Support Systems

Full Marks : 150

Answer all 6 (six) questions. All questions carry equal marks. Marks of each question and corresponding CO and PO are written in the right margin within brackets.

1. a) SuperMart, a large chain of grocery stores, is struggling to manage its inventory effectively, leading to frequent stockouts, excess inventory, and lost sales opportunities. To address these challenges, the company is looking to implement a more structured approach to inventory management. 12 (CO3)  
(PO3)  
As a consultant tasked with improving inventory management at SuperMart, analyze the challenges faced by the company and propose a solution using Simon's four-phase model of decision-making.
- b) SuperMart also recognizes that consumer behavior plays a significant role in inventory management. However, capturing and incorporating behavioral patterns into computerized systems adds another layer of complexity. 05 (CO3)  
(PO3)  
Evaluate the challenges involved in integrating behavioral patterns into computerized systems and provide a solution.
- c) GlobalTech Corporation, a multinational technology company, is facing a critical decision regarding the expansion of its product line into emerging markets. As the company evaluates various strategic options, including new product development, partnerships, and acquisitions, executives are tasked with making informed decisions to drive growth and profitability. However, they realize that the complexity of the decision-making process requires a structured approach and the utilization of Decision Support Systems (DSS). With limited understanding of DSS classifications, executives seek guidance on how to categorize and select the most appropriate DSS for their strategic decision-making needs. As consultants tasked with advising GlobalTech, students are challenged to analyze the company's requirements. 08 (CO3)  
(PO3)  
Discuss the classifications of DSS according to the AIS SIGDSS framework and recommend a suitable DSS solution to support the decision-making process.
2. a) What is sentiment analysis? How does it relate to text mining? Explain it with examples. 05 (CO1)  
(PO1)
- b) What is the role of natural language processing in text mining? Discuss the capabilities and limitations of NLP in the context of text mining. 07 (CO1)  
(PO1)
- c) What are the most popular application areas for sentiment analysis? Explain the sentiment analysis process. 13 (CO1)  
(PO1)

3. a) **Scenario 1:** TechX, an e-commerce platform, wants to analyze its customer data to identify groups of customers with similar purchasing behavior. By examining patterns in customer demographics, browsing history, and purchase frequency, TechX aims to segment its customer base into distinct groups. This segmentation will enable TechX to tailor marketing strategies, recommend products more effectively, and enhance customer satisfaction.

**Scenario 2:** HealthCareNow, a healthcare provider, seeks to develop a predictive model to identify patients at risk of developing a particular medical condition. By analyzing patient data, including medical history, diagnostic tests, and lifestyle factors, HealthCareNow aims to categorize patients into different risk categories. This predictive modeling will help HealthCareNow intervene early with preventive measures, improve patient outcomes, and optimize resource allocation within the healthcare system.

Based on the above two scenarios, identify the underlying data mining problems, and provide explanations for each. Write the specific algorithm for each scenario to address the identified problem.

b) Why do we need a standardized data mining process? Explain CRISP-DM data mining process. 10 (CO2) (PO2)

4. a) TechCorp, a leading technology company, has been dominating the market for years with its innovative products and services. However, in recent times, the company has been facing unexpected business pressures that threaten its market position and profitability. Responses should be taken by the companies to counter the pressures. Therefore, the company is planning to follow a model to handle challenges. In addressing these unforeseen challenges, which model would TechCorp utilize and how would it be applied? 10 (CO3) (PO3)

b) What is data mining and why is it classified under predictive analytics? Search the Web for an example of data mining in an organization of your choice and illustrate the way it is currently in use. 08 (CO3) (PO3)

c) In response to declining sales performance and customer satisfaction ratings, TechMart Electronics is exploring ways to leverage data-driven insights to optimize its operations and enhance sales performance. As a consultant tasked with advising TechMart on implementing a Business Intelligence solution, analyze the challenges faced by the company and propose a comprehensive architecture for a Business Intelligence system. Your analysis should address issues such as data fragmentation, complexity, reporting bottlenecks, lack of integration, and the need for predictive analytics.

Explain the key components and functionalities of the BI architecture and how it can help TechMart overcome its challenges and achieve its business objectives. 07 (CO3) (PO3)

5. Auscultation is the science of listening to the sounds of internal body organs, in this case the heart. Skilled experts can make diagnoses using this technique. It is a noninvasive screening method of providing valuable information about the conditions of the heart and its valves, but it is highly subjective and depends on the skills and experience of the listener. Researchers from the Department of Electrical & Electronic Engineering at Universiti Teknologi Petronas have developed an Exsys Covid expert system, SIPMES (Signal Processing Module Integrated Expert System) to analyze digitally processed heart sound.

The system utilizes digitized heart sound algorithms to diagnose various conditions of the heart. Heart sounds are effectively acquired using a digital electronic stethoscope. The heart sounds were collected from the Institute Jantung Negara (National Heart Institute) in Kuala Lumpur and the Fatimah Ipoh Hospital in Malaysia. A total of 40 patients aged 16 to 79 years old with various pathologies were used as the control group, and to test the validity of the system using their abnormal heart sound samples and other patient medical data.

The heart sounds are transmitted using a wireless link to a nearby workstation that hosts the Signal Processing Module (SPM). The SPM has the capability to segment the stored heart sounds into individual cycles and identifies the important cardiac events.

The SPM data was then integrated with the Exsys Covid knowledge automation expert system. The rules in the system use expert physician reasoning knowledge, combined with information acquired from medical journals, medical textbooks, and other noted publications on cardiovascular diseases (CVD). The system provides the diagnosis and generates a list of diseases arranged in descending order of their probability of occurrence.

SIPMES was designed to diagnose all types of cardiovascular heart diseases. The system can help general physicians diagnose heart diseases at the earliest possible stages under emergency situations where expert cardiologists and advanced medical facilities are not readily available.

The diagnosis made by the system has been counterchecked by senior cardiologists, and the results coincide with these heart experts. A high coincidence factor of 74 percent has been achieved using SIPMES.

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| a) Explain the major components involved in building SIPMES.   | 13 | (CO2)<br>(PO2) |
| b) Do expert systems like SIPMES eliminate the need for human decision making? Justify your opinion. | 07 | (CO2)<br>(PO2) |
| c) What do you think that the existing expert systems, once built, should be changed? Explain it.    | 05 | (CO2)<br>(PO2) |

6. a) RetailX Corporation, a leading retail chain, is committed to enhancing its data management practices, gaining insights into customer behavior, optimize inventory levels, and improve decision making. As part of this initiative, the company has implemented a centralized data repository to store and analyze vast amounts of transactional data, sales reports, and customer demographics. However, as RetailX expands its operations and diversifies its product offerings, executives realize the need for more specialized data repositories tailored to specific business units and departments. In this situation which development approach do you suggest for this company and why? Differentiate Between Inmon's and Kimball's Approaches. 10 (CO2) (PO2)
- b) Explain ETL Processes in modern data management systems with example of how organization utilize this process to consolidate data. 07 (CO2) (PO2)
- c) How does a data warehouse differ from a database? What issues should be considered when deciding which architecture to use in developing a data warehouse? 08 (CO2) (PO2)