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The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical Engineering

Study Programme	:	Bachelor of Science Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**EEX3266 - Information Systems and Data Management**
Academic Year	:	2023/2024
Date	:	5th March 2025
Time	:	9.30 am - 12.30 pm
Duration	:	3 hours

General instructions

1. This question paper contains four (04) questions. Answer all questions.
2. Closed book Exam.
3. It is **EXTREMELY IMPORTANT that** you **do not remove** the question paper attached to this sheet or any part of the paper from the examination hall.
4. Please remember to write your registration number in the space provided above and in the answer script. **Do not write your name**.
5. In case of doubt, consult the supervisor or an invigilator conducting the examination.

Registration No:

Question 01 [26 marks]

The college bookstore is rearranging its process to stay competitive against online retailers like Amazon. Their advantage lies in having access to student data, allowing them to know exactly which books students need after they register for classes. The bookstore's new process involves emailing students a list of required books. Students can then click a link, confirm their selections, and purchase the books, which will be delivered to them. This redesign aims to make the bookstore more convenient and appealing to students, increasing their customer base.

a) What role does Information Technology play in the redesigned process for the college bookstore? [2 Marks]

b) Which type of database model would be most suitable for storing information about students, their registered courses, and the required textbooks? [2 Marks]

c) What are the three levels of data abstraction in a database system? [2 Marks]

d) How does data abstraction relate to data modeling in this project? [2 Marks]

e) What type of visual representation assist in data modeling for the big view of the bookstore? Explain with an example from the above scenario. [3 Marks]

f) How can the planning phase of the SDLC benefit the bookstore redesign project? [4 Marks]

g) What role does System Analysis play in improving the bookstore's process? [3 Marks]

h) Why is student feedback important in the System Development Life Cycle? Describe with an Example. [4 Marks]

i) In a university database system, if the storage format of student records is changed to improve performance, but the application software remains unaffected, which type of data independence is being demonstrated? [4 Marks]

Question 02 [24 marks]

UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the UPS system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute.

Create an Entity Relationship diagram that captures this information about the UPS system. Be certain to indicate identifiers (keys) and cardinality constraints.
(1 mark for each correctly identified entity/relationship/attribute/key/cardinality)

Question 03 [25 marks]

Consider the relation (table) Membership for a library database as follows.

Membership (MID, Name, Address, PhoneNum, ParentMID, ISBN, Title, Authors, BorrowDate, ReturnedDate, FineDue, FinePaid).

Here, ParentMID may have the values Null, Father_Name, Mother_Name or both. The following is the set of functional dependencies that hold in Membership table.

Given set of FDs;

FD 1: MID → Name, Address, PhoneNum, ParentMID

FD 2: (MID, ISBN, BorrowDate) → ReturnedDate, FinePaid, FineDue

FD 3: ISBN → Title, Authors

a) What is/are the key attribute(s) of the Membership relation? [2 Marks]

b) Identify the reasons as to why the given table is not in 1NF? [2 Marks]

c) How do you make it 1NF? [4 Marks]

d) What are the two requirements for a relation to be in a 2NF? [2 Marks]

e) Identify the functional dependencies and explain if the Membership is in 2NF? If not make it to 2NF. [9 Marks]

f) What is 3NF about? [2 Marks]

g) Check the relations (tables) for 3NF. [4 Marks]

Question 04 [25 marks]

VISITORS, EVENTS and BOOKINGS tables could be found on an event booking system.

VISITORS (Visitor Id, Name, Age, Gender, Address, Contact_no, Email, Entry_time, Exit_time, Date_of_visit, Mode_of_Transport)

EVENTS (Event_ID, Event_Name, Capacity, Timings, Category)

BOOKINGS (Ticket_No, Payment_Mode, Card_type, Price_Before_discount, Price_After_Discount, No_of_visitors, Visitor_Id, Event_Id)

Write SQL statements for the questions given below.

a) Select the event names and timings. [2 Marks]

b) List the Categories ensuring uniqueness. [2 Marks]

c) Show the Ticket_Nos with more than 5 No_of_Visitors. [2 Marks]

d) Get the count of number of visitors for all the bookings. [2 Marks]

e) Get the count of visitor count for each event_ID. [2 Marks]

f) Show the event names with the number of visitors for each show (timing). [2 Marks]

g) Add a column named "Status" to the EVENTS table with the ability to hold NULL values. [4 Marks]

h) Add a new event in a Drama category with 100 capacities and timing tomorrow 10.30 am. [4 Marks]

i) Change the Status of the shows to cancel, where the visitor count is less than half the capacity. [5 Marks]