The Open University of Sri Lanka
Faculty of Engineering
BSE Honours Degree Programme

Department	: Electrical and Computer Engineering
Level	: 3
Name of the Examination	: Final Examination
Course Title and - Code	: Information Systems and Data Management – EEI3266
Academic Year	: 2024/25
Date	: 15/08/2025
Time	: 09.30am – 12.30pm
Duration	: 3 hrs.

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **four (4)** questions in **four (4)** pages.
3. Answer all **four (4)** questions. Each question carries equal marks.
4. Answer for each question should commence from a new page.
5. Draw fully labelled diagrams where necessary.
6. Write answers in clear and concise format appropriately in points/bullet form.
7. Involvement in any activity that is considered as an exam offense will lead to punishment.
8. Use blue or black ink pen to answer the questions.
9. Clearly state your index number in your answer script on every page.

Question 01)

Campus Connect University is developing an integrated digital system to manage its operations. The university handles student enrollments, fee payments, academic records, faculty management, and departmental decision-making. Currently, different departments use disconnected systems, leading to delays, duplication, and inefficiency.

To address these challenges, the university is implementing a centralized Enterprise Resource Planning (ERP) system and revamping its database architecture. The IT team must make choices about the type of information systems, database models, and architectures to adopt. They also aim to ensure data independence, so changes don't disrupt users or developers unnecessarily.

Based on the above information, answer the following questions.

a) What are the four types of data models in DBMS? Give one example of each. **(04 Marks)**

b) Explain the three-level database architecture in DBMS and describe advantages of each. **(06 Marks)**

c) What is the difference between logical and physical data independence in a database? Why is it important? **(03 Marks)**

d) How does the ERP system supports University to improve day-to-day operations and student services? **(04 Marks)**

e) Compare and contrast client-server and centralized DBMS architectures in terms of performance and scalability. **(04 Marks)**

f) Evaluate the effectiveness of Transaction Processing Systems (TPS) versus Decision Support Systems (DSS) in an educational institution. Which would you prioritize and why? **(04 Marks)**

Question 02)

The Freelance Project Marketplace System is an online platform designed to connect freelancers with clients seeking project-based work. Clients can register on the platform and post various projects specifying details such as title, description, budget, and deadlines. Freelancers, after registering, can browse through the available projects and submit proposals that include their bid amount and a brief pitch. Each proposal is linked to both the freelancer and the corresponding project, and it may have a status indicating whether it is accepted, rejected, or under review. Once a project is awarded and completed, the system facilitates payments from the client to the freelancer, tracking payment status and transaction details. Additionally, freelancers have profiles that include skill sets and performance ratings based on previous work. This system ensures a structured and traceable workflow between clients and freelancers, involving key entities such as Client, Freelancer, Project, Proposal, and Payment, all interconnected through well-defined relationships.

Based on the above information, answer the following questions.

a) Identify the entities related to the above scenario and classify them as strong and weak entities. **(03 marks)**

b) Identify any primary key attributes, derived attributes, multivalued attributes and composite attributes. **(05 marks)**

c) Draw a suitable Entity Relationship (ER) diagram for the above scenario. Indicate the cardinality and participation for each relationship. State any assumptions you make. **(07 marks)**

d) Draw the relational schema for the above ER diagram. **(10 Marks)**

Question 03)

A digital platform is designed to store and manage research papers uploaded by users. Each paper can have multiple authors and belong to multiple topics. Users can follow authors, search

by topics, and view citation relationships between papers. Key elements include user-uploaded papers, authorship, topics, and citations.

PaperID	Title	Authors	Topics	UploadedBy	CitingPapers
101	AI in Education	A.Kumar, S.Roy	AI, Education	User001	102, 104
102	Blockchain Privacy	L.Mohan	Blockchain, Privacy	User002	105
103	NLP in Healthcare	S.Roy, P.Mehta	NLP, Healthcare	User003	-

a) Are there atomic values in each field of all records in this relation? **(03 marks)**
b) Can you identify the partial, transitive dependencies in this relation? **(04 marks)**
c) Convert the above table into Second Normalized Form(2NF). **(12 marks)**
d) Use the answer derived in question (c) and further bring it to Third Normalized Form (3NF). **(06 marks)**

Question 04)

The National Event Participation Portal is a platform that allows students from various institutions across the country to register, participate, and track their involvement in national-level events (like competitions, workshops, hackathons, etc.).
Event - National event organized by an institution.
Participant - Student who can participate in events.
Institution - Educational institution hosting events or sending participants.
Registration - Linking table between participants and events. Stores' participation status.

Each event has a title, type, date, location and a host institution organizing it. Participants (students) must register with their name, institution, and email and can register for multiple events. Each registration stores the participant's status (e.g., *Pending*, *Approved*, *Attended*) and registration date.

Institution table

InstitutionID	Name	City
I001	National Tech University	Delhi
I002	Central Science College	Mumbai
I003	East Engineering Institute	Kolkata

Event Table

EventID	Title	Type	EventDate	Location	HostedBy
E001	National AI Challenge	Hackathon	8/10/2025	Delhi	I001
E002	Renewable Energy Summit	Seminar	9/5/2025	Mumbai	I002
E003	Cybersecurity Workshop	Workshop	8/20/2025	Kolkata	I003

Participant

ParticipantID	Name	Email	InstitutionID
P001	Anjali Sharma	anjali@gmail.com	I002
P002	Rohan Das	rohandas@yahoo.com	I001
P003	Sneha Patel	sneha123@edu.in	I003

Registration Table

RegID	ParticipantID	EventID	RegDate	Status
R001	P001	E001	7/20/2025	Approved
R002	P001	E002	7/22/2025	Pending
R003	P002	E001	7/21/2025	Attended
R004	P003	E003	7/25/2025	Approved

Write SQL queries for the following: based on the above scenario.

a) Create a database named **"Events Portal".** **(01 Marks)**

b) Create relations (tables) with SQL. Use suitable data types to define attributes in each of the relations. Define Primary key/foreign key constraints and other integrity constraints at the creation of relations. **(08 Marks)**

c) Write a SQL query to insert a data point into the relations created. You may use sample data for a relation created in part. **(08 Marks)**

d) Get all registrations with status 'Pending'. **(02 Marks)**

e) List the events happening after August 15, 2025. **(03 Marks)**

f) Delete records of all registrations for a specific event. **(03 Marks)**

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