SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION
(Established in the Ministry of Higher Education vide in Act No 29 of 1995)

Higher National Diploma in Information Technology

Second Year, First Semester Examination – 2017

HNDIT2321 / **IT3201: Advanced Database Management System**

Instructions to Candidates:
Answer five (05) questions only.
All Questions carry equal marks.

Time: Three Hours (03)
No. of Pages : 06
No of Question : 06

Question 1 **(Total 20 marks)**

I. The three-tier architecture is commonly used to implement a database driven web application.

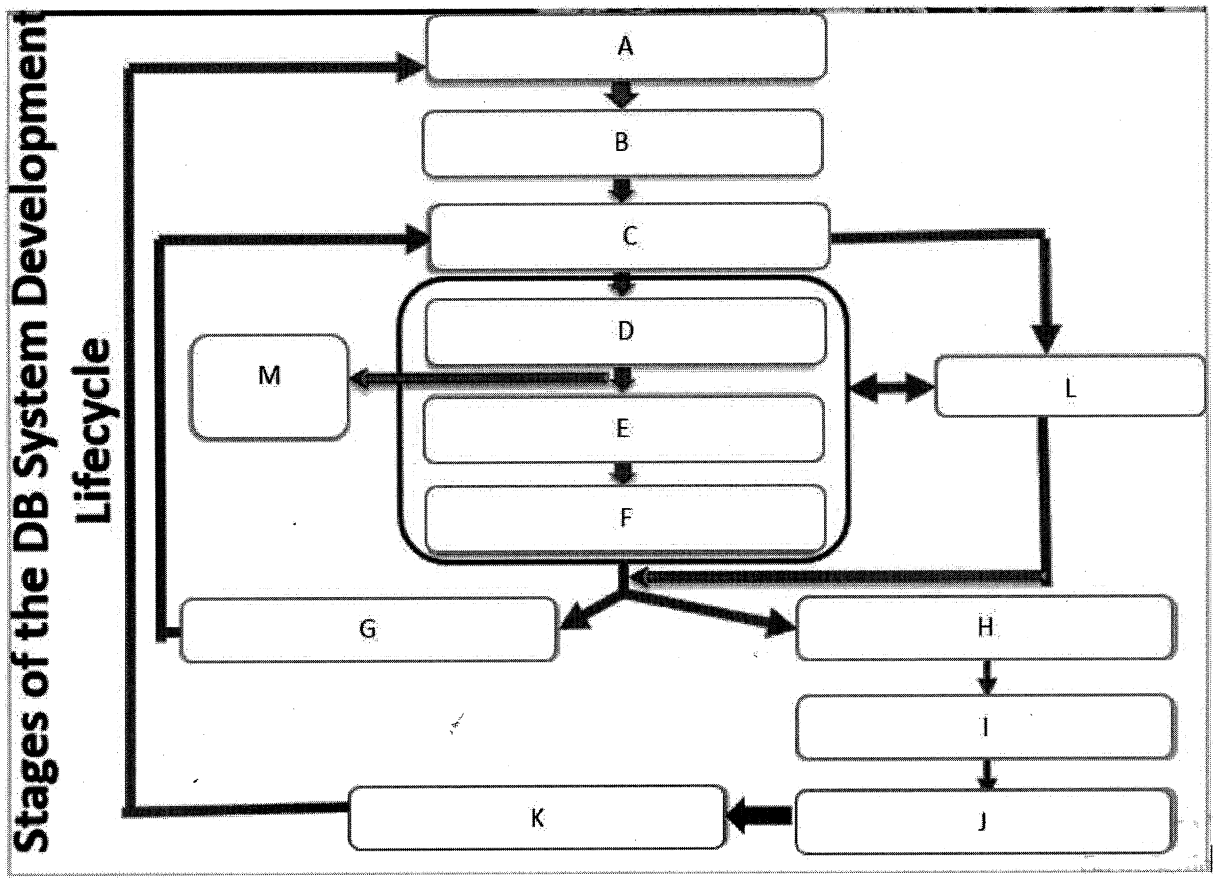
a. Draw a diagram to illustrate this architecture. (4 marks)

b. Describe the role of each tier. (3 marks)

II. Database development life cycle contains following thirteen main stages.

i. Conceptual Database design
ii. Physical Database design
iii. DBMS selection (optional)
iv. Implementation
v. Database planning
vi. System definition
vii. Requirements collection and analysis
viii. Data conversion and loading
ix. Testing
x. Logical Database design
xi. Operational maintenance
xii. Application design
xiii. Prototyping (optional)

Name A to M in the Diagram below from the given list. (13 Marks)



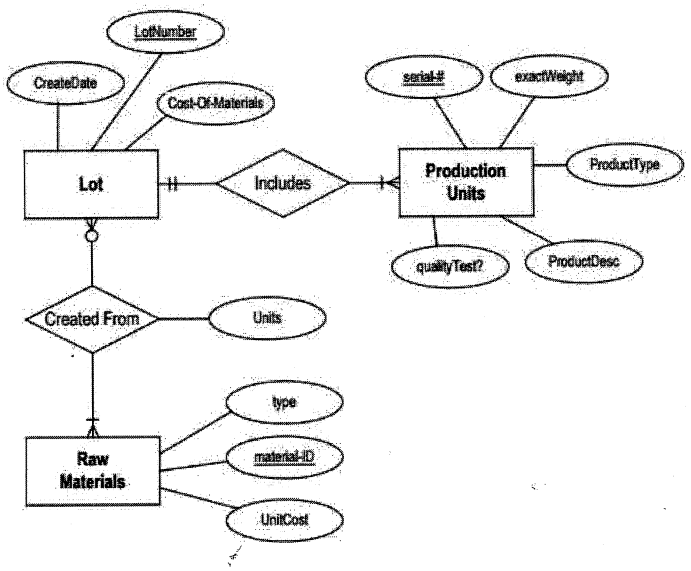
Question 2 **(Total 20 marks)**

XYZ is a courier service provider that operates worldwide. It provides up to date information of each shipped item such as current location and the processing status. To achieve this, XYZ depends on its company wide information system. Shipped items are the keys of the XYZ package tracking information system. Those shipped items can be identified by item number (Unique), weight, dimensions, insurance amount, destination, and final delivery date.

Shipped items are received into the XYZ system at a single retail center. Retail centers are characterized by their type, unique ID, and address. Shipped items make their way to their destination via one or more standard XYZ transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique schedule Number, a type (e.g. flight, truck), and a delivery Route.

I. Create an Entity Relationship diagram that captures the information about the XYZ. Be sure to indicate identifiers and cardinality constraints. (12 Marks)

Production tracking is important in many manufacturing environments (e.g. the pharmaceuticals industry, children's toys, etc.). The following ER diagram captures important information in the tracking of production. Specifically, the ER diagram captures relationships between production lots (or batches), individual production units, and raw materials.



II. Convert the ER diagram into a relational database schema. Be certain to indicate primary keys and referential integrity constraints. (8 Marks)

Question 3 **(Total 20 marks)**

I. Explain four (4) different DML operations with examples. (8 Marks)

II. Consider the following schema:

Suppliers (sid, sname, address)

Parts (pid, pname, color)

Catalog (sid, pid, cost)

Write the relational algebraic queries for the following:

i) Find the pnames of parts for which there are some suppliers.

ii) Find the distinct pnames of all parts for which, there are some suppliers.

iii) Find the sids of suppliers who supply a red part and a green part.

iv) Find the sname of suppliers who supply red part (12 Marks)

Question 4 **(Total 20 marks)**

I. The table below stores details of students and the overall grade each student obtained in different modules. The table has a composite primary key (StudentID, ModuleID).

Results

StudentID	StudentName	ModuleID	ModuleName	Grade
S001	Smith	M01	Java	A
S001	Smith	M02	Databases	B
S002	Ford	M01	Java	B

i) Which Normal Form does the above table violate and why? (3 marks)

ii) Normalize the table up to the normal form identified in question i). (5 marks)

II. The following table called Employees records employees membership of a particular team.

employeeID	membership
E1	AshForce
E2	Vallance
E3	Bass
E4	Mission
E5	Bass
E6	NULL

The following table called Teams records the budget of each team

mname	budget
Bass	675.00
Vallance	348.00
Mission	250.00
Ashforce	NULL

a) Determine what output is produced by each of the following queries:-

Query1:

```
SELECT distinct t.*
FROM employees as e
RIGHT JOIN teams as t
ON e.membership = t.mname
```

(4 marks)

Query2:

```
SELECT SUM(budget) as totalbudget, Mname
FROM employees as e
INNER JOIN teams as t
ON e.membership = t.mname GROUP BY Mname
```

(4 marks)

Query3:

```
SELECT F.EmployeeID, S.EmployeeID, F.membership
FROM Employees F
JOIN Employees S ON F.Membership = S.membership
WHERE F.EmployeeID < S.EmployeeID
ORDER BY F.EmployeeID, S.EmployeeID;
```

(4 marks)

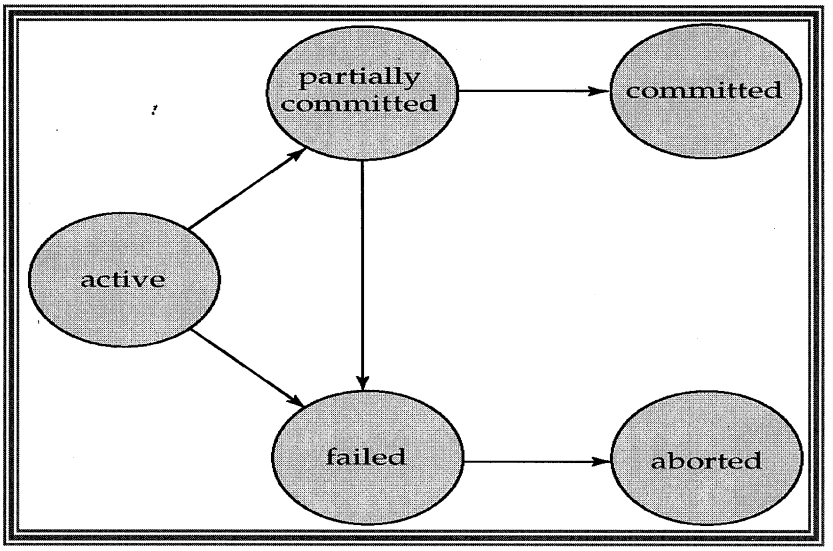
Question 5 **(Total 20 marks)**

Ensuring data integrity and consistency is of vital importance to a DBMS during the application of transactions to the database, particularly concurrent transactions. Explain and discuss the following transaction-related concepts.

(i) What is a transaction in a database? (2 marks)

(ii) Explain ACID Property of transaction (8 marks)

(iii) Briefly explain the following transaction states (10 marks)



Question 6 **(Total 20 marks)**

I. What is XML DOM? (2 marks)

II. Briefly explain the importance of validating an XML document. (4 marks)

III. What is XML DTD? (4 marks)

IV. Draw the XML tree structure for the following XML document. (10 marks)

```
<?xml version="1.0" encoding="UTF-8"?>
<bookstore>
  <book category="cooking">
    <title lang="en">Everyday Italian</title>
    <author>Giada De Laurentiis</author>
    <year>2005</year>
    <price>30.00</price>
  </book>
  <book category="children">
    <title lang="en">Harry Potter</title>
    <author>J K. Rowling</author>
    <year>2005</year>
    <price>29.99</price>
  </book>
  <book category="web">
    <title lang="en">Learning XML</title>
    <author>Erik T. Ray</author>
    <year>2003</year>
    <price>39.95</price>
  </book>
</bookstore>
```