



School of Computer Science and Engineering

Fall Semester 2024-25

CAT I

SLOT: A1+TA1

Programme Name & Branch: B.Tech CSE and CSE Specializations

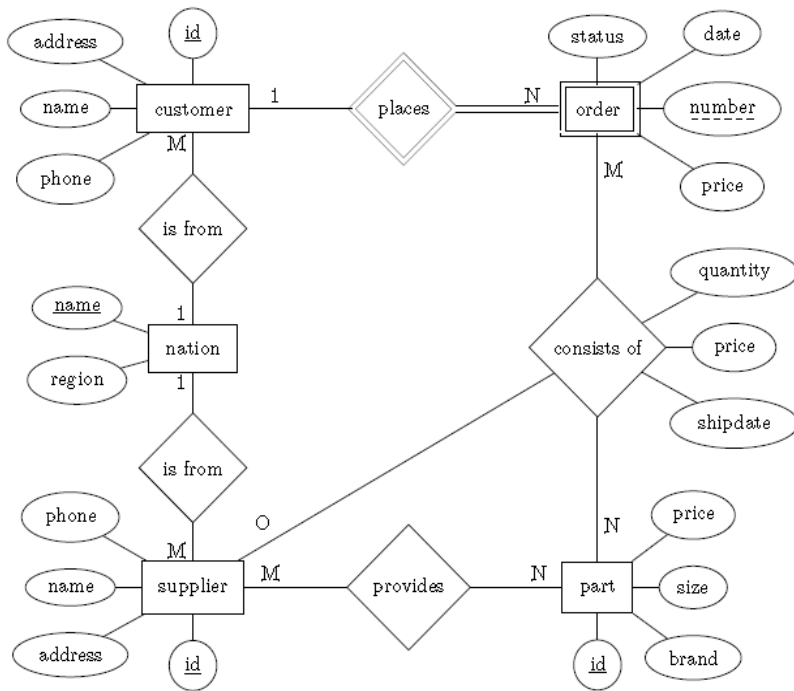
Course Name & Code: Database Systems - BCSE302L

Exam Duration: 90 Min.

Maximum Marks: 50

Q. No.	Question	Max Marks	CO	BL
1.	<p>Present the various users of the DBMS environment and their interactions with the components of the DBMS modules with a neat diagram.</p> <p>Solution:</p> <p>Diagram carries 4 marks For description – 6 Marks</p>	10	CO1	BL2
2.	<p>a. How do different schema languages support the architecture? What kind of architecture is followed to support the present DBMS requirements? Explain each level with an example. [6 Mark]</p> <p>b. Compare: Physical data independence and logical data independence. [4 Mark]</p> <p>Solution:</p> <p>a.</p>	10	CO1	BL2

	<div style="text-align: center;"> <p>The diagram illustrates the three levels of DBMS schemas. At the top, two boxes labeled 'External View' are connected by arrows pointing to a central box labeled 'Conceptual Schema'. Below the 'Conceptual Schema' is a box labeled 'Internal Schema', connected by a double-headed arrow. At the bottom, three cylinder icons represent the 'Stored Database', connected to the 'Internal Schema' by a vertical line.</p> </div> <p>Defines DBMS schemas at <i>three levels</i>:</p> <ul style="list-style-type: none"> • Internal schema at the internal level to describe physical storage structures and access paths. Typically uses a <i>physical</i> data model. • Conceptual schema at the conceptual level to describe the structure and constraints for the <i>whole</i> database for a community of users. Uses a <i>conceptual</i> or an <i>implementation</i> data model. • External schemas at the external level to describe the various user views. Usually uses the same data model as the conceptual level. <p>b.</p> <p>Logical Data Independence: The capacity to change the conceptual schema without having to change the external schemas and their application programs. Examples of changes under Logical Data Independence: To Add/Modify/Delete a new attribute, entity or relationship is possible without a rewrite of existing application programs</p> <p>Physical Data Independence: The capacity to change the internal schema without having to change the conceptual schema. Examples of changes under Physical Data Independence:</p> <ul style="list-style-type: none"> • Modifying the file organization technique in the Database • Switching to different data structures. • Changing the access method. • Modifying indexes. • To change the compression techniques or hashing algorithms. • To change the Location of Database from say C drive to D Drive. 			
3.	Convert the following ER to Relational Model	10	CO2	BL3



Solution:

Customer (cid, name, address, phone, nation_name)

Nation(nation_name, region)

Supplier (sid, name, address, phone, nation_name)

Part(pid, brand, size, price)

Order(ono, cid, date, status, price)

Provides(sid, pid)

Consists_of(ono, cid, sid, pid, quantity, price, shipdate)

4. a. Consider the following data values for the relation 'Product' and 'Purchase_order'.

Product

<u>P_id</u>	Description
1	Dell USB drive 8GB
	iphone 6 plus 128GB
2	Windows 10
3	Wireless Keyboard

Purchase_order

<u>Purchase_id</u>	Purchase_date	P_id	Quantity
P101	30-Aug-2017	1	2
P104	01-Aug-2015	4	7
P106	28-Jul-2015	3	6

Do these relations satisfy all the constraints? If not discuss the constraint violations in detail. [5 Mark]

10

CO2

BL4

	<p>b. Consider the state mentioned below and identify whether disjoint or overlapping constraint will be used. Justify your answer. [5 Mark]</p> <p>i. Consider a super class 'account' with sub classes 'Savings Account' and 'Current Account'. The account can either be Savings or Current. It can't be both at the same time.</p> <p>ii. Consider a super class 'Person' and subclasses 'Customer' and 'Employee'. In this case, a person can be Customer and Employee both.</p> <p>Solution:</p> <p>a. Entity integrity constraint violation – Pid which is a primary key in Product has null values Referential Integrity constraint violation – PID in Purchase_order has a value '4' which is not available in PID of Product.</p> <p>b.</p> <p>i. Disjoint constraint</p> <ul style="list-style-type: none"> ■ Specifies that the subclasses of the specialization must be <i>disjoint</i>: <ul style="list-style-type: none"> ■ an entity can be a member of at most one of the subclasses of the specialization ■ Specified by <i>d</i> in EER diagram <p>ii. Overlapping constraint</p> <ul style="list-style-type: none"> ■ same entity may be a member of more than one subclass of the specialization ■ Specified by <i>o</i> in EER diagram 																																							
5.	<p>Consider the restaurant management relation mentioned below. This relation is used to store data about the restaurant's employees but has few issues in design. Normalize it till 3NF.</p> <table border="1" data-bbox="296 1267 1058 1581"> <thead> <tr> <th>emp_id</th> <th>name</th> <th>job_code</th> <th>job</th> <th>state_code</th> <th>home_state</th> </tr> </thead> <tbody> <tr> <td>E001</td> <td>Arun</td> <td>J01</td> <td>Chef</td> <td>KA</td> <td>Karnataka</td> </tr> <tr> <td>E001</td> <td>Arun</td> <td>J02</td> <td>Waiter</td> <td>KA</td> <td>Karnataka</td> </tr> <tr> <td>E002</td> <td>Tej</td> <td>J02</td> <td>Waiter</td> <td>KE</td> <td>Kerala</td> </tr> <tr> <td>E002</td> <td>Tej</td> <td>J03</td> <td>Cashier</td> <td>KE</td> <td>Kerala</td> </tr> <tr> <td>E003</td> <td>Suganya</td> <td>J01</td> <td>Chef</td> <td>KE</td> <td>Kerala</td> </tr> </tbody> </table> <p>Solution:</p> <p>All the entries are atomic and there is a composite primary key (emp_id, job_code) so the table is in the first normal form (1NF).</p> <p>2 NF: Employee(emp_id, name, statecode, homestate) Emp_job(emp_id, job_code) Job(Job_code, job)</p> <p>3 NF: Employee(emp_id, name, statecode)</p>	emp_id	name	job_code	job	state_code	home_state	E001	Arun	J01	Chef	KA	Karnataka	E001	Arun	J02	Waiter	KA	Karnataka	E002	Tej	J02	Waiter	KE	Kerala	E002	Tej	J03	Cashier	KE	Kerala	E003	Suganya	J01	Chef	KE	Kerala	10	CO2	BL3
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	Emp_job(<u>emp_id</u> , job_code)			
	Job(<u>Job_code</u> , job)			
	State(statecode, <u>homestate</u>)			