PES UNIVERSITY

# PES University, Bengaluru

(Established under Karnataka Act No. 16 of 2013)

UE19CS301

## DECEMBER 2021: END SEMESTER ASSESSMENT (ESA) B TECH 5th SEMESTER

## UE19CS301 – DATABASE MANAGEMENT SYSTEM

| Time: 3 Hrs | Answer All Questions | Max Marks: 100 |
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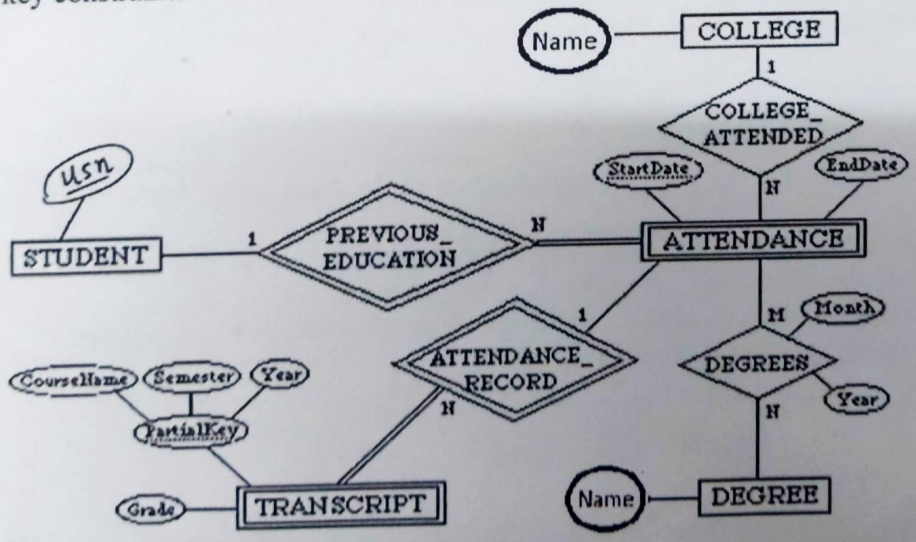
| 1 | a) | Mr. Girish has started a new café at Banashankari. Due to space constraint, there can only be small crowd served at any time. So, to make it cost efficient Girish works at the counter keeping the database updated, without any accountant or manager help. Given this application scenario, what features of DBMS are not necessary? Justify with proper reasons. As well list out the useful features of DBMS with your reasons stating why they are needed. (Restrict your list to total 5 features including required/not required types) | 5 |
| | b) | Draw a neat diagram to illustrate three-schema architecture. Explain the different levels involved in this architecture. | 5 |
| | c) | For a travel agency database, we want to capture the details of customer who wants to visit multiple places and we want to maintain customer details such as adhar_no, name, address, phone number(s) and emergency contact no.<br>Considering this scenario, show what different types of attributes could be mapped to customer in the ER diagram to capture the given details. | 5 |
| | d) | What information is illustrated by participation constraint and cardinality ratio in ER diagram? Illustrate with proper examples. | 5 |
| 2 | a) | Apply the steps for relational database schema mapping from ER diagram to the given example ER diagram and write the resulting relational schema indicating the key constraint and foreign key constraints.<br>  <br><br>(Note: attendance is a weak entity set, associated with student as the strong entity set. Similarly, transcript is the weak entity, associated with attendance entity set. While mapping, first map attendance and then transcript.) | 8 |

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| | b) | Considering the given database, write the following queries in **Relational Algebra**.<br>Employee(empcode, ename, cell_no, salary, c_code)<br>Company(c_code, cname, asset)<br>Stock(stock_type ,basic_price, issu_dt, quantity, c_code)<br>Customer(cust_code, cust_name, address_part, city)<br>Takes( cust_code, stock_type, on_dt, sell_price, qty)<br>• List out the customer details who have purchased a stock_type 'mutual fund' of Raymonds Company.<br>• List the customer names who have purchased 100 stocks of Sobha builders. | 3+3 |
| | c) | With a suitable example explain the referential integrity constraint with respect to relational model. Illustrate the operations that get affected by this constraint. | 6 |
| 3 | a) | What advantages could be achieved by creating virtual tables in a database? Bring out any 4. | 5 |
| | b) | Explain the working of group by and having clause in SQL statement considering the schema given here, writing an appropriate example query.<br>**Carsale( regno, company,model,price,color)** | 5 |
| | c) | What are aggregate operators in SQL? List them and write sample query examples for any THREE. | 2+3 |
| | d) | What do we need to store the pictures of the products along with other details as product name and cost in a database, as seen in any shopping portal? Suggest a suitable relational schema for this requirement. | 5 |
| 4 | a) | Consider a relation R (A, B, C, D). For which of the following FD's is R in BCNF? Show the steps clearly. Give justification for each of the FD sets.<br>F1: A->D, C->A, D->B, AC->B<br>F2: C->D, CD->A, AB->C, BD->A<br>F3: A->C, B->A, A->D, AD->C<br>F4: AD->D, D->A, D->C, D->B | 8 |
| | b) | For each of the following sets of functional dependencies on a schema R(A, B, C, D, E) . Find a candidate key for this schema. Show the method of arriving at candidate key.<br>• AB --> C, D --> E, B --> E<br>• A --> CD, B --> DE | 6 |
| | c) | Explain the problems of having duplicate information in the same table. Show an appropriate example. | 6 |
| 5 | a) | Consider the three transactions $T1$, $T2$, and $T3$, and the schedules $S1$ and $S2$ given below. Draw the serializability (precedence) graphs for $S1$ and $S2$, and state whether each schedule is (conflict) serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).<br>$T_1$: $r_1(X)$; $r_1(Z)$; $w_1(X)$;<br>$T_2$: $r_2(Z)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;<br>$T_3$: $r_3(X)$; $r_3(Y)$; $w_3(Y)$;<br>$S_1$: $r_1(X)$; $r_2(Z)$; $r_1(Z)$; $r_3(X)$; $r_3(Y)$; $w_1(X)$; $w_3(Y)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;<br>$S_2$: $r_1(X)$; $r_2(Z)$; $r_3(X)$; $r_1(Z)$; $r_2(Y)$; $r_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_3(Y)$; $w_2(Y)$; | 6 |
| | b) | What are ACID properties in transactions? Why are they required? | 4 |
| | c) | What are the different varieties of NoSQL databases? Quote any one example implementation for each of these categories. | 4 |
| | d) | Name any three features of MongoDB that are different than that of RDBMS.<br>Write a MongoDB query for the following, (Assume Emp is the collection.)<br>**Return all the employees skilled in networking and having salary of 90000** | 6 |