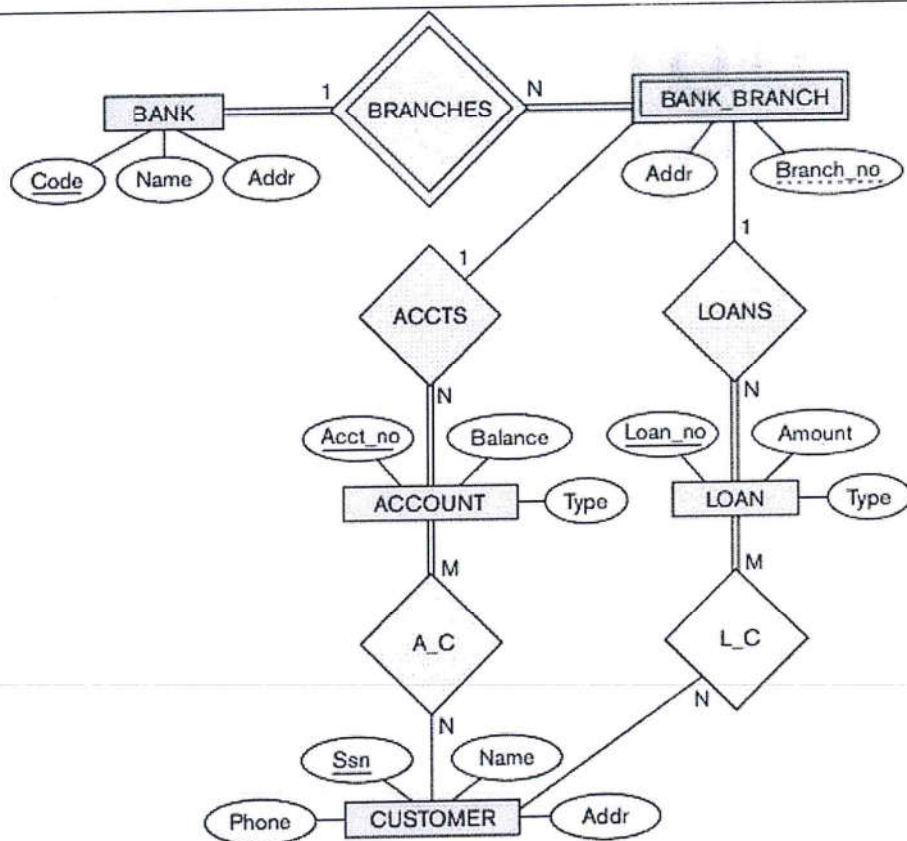


DECEMBER 2020: END SEMESTER ASSESSMENT
B Tech 5th SEMESTER
UE18CS315 (4 credits) - Database Technologies

Time: 3 Hours	Answer All Questions	Max Marks: 100
---------------	----------------------	----------------

1.	a)	List the characteristics, advantages and disadvantages of RAID level 5	5
	b)	Estimate the secondary storage required in KB for storing 10,000 tuples in the Employee table. Consider fixed length record format, records do not span blocks, Block size = 8kb, block header = 12 bytes and record header = 12 bytes. Estimate the number of bytes wasted in each block. CREATE TABLE Employee(Fname varchar(20) not null, Minit char(1) null, Lname varchar(20) not null, SSN varchar(9) CHECK (SSN like replicate('[0-9]',9)), BirthDate date not null CHECK (Bdate < getdate()), Address varchar(50) not null, Gender varchar(1) null, Salary int not null, Super_ssn varchar(9) null CHECK (Super_ssn like replicate('[0-9]',9)), Dno int null, constraint Employee_PK primary key (SSN));	5
	c)	Insert 18, 15, 1, 7, 13, 12, 9, 6 into a Btree with the number of keys in each node being 3	5
	d)	Insert a record whose key hashes to the sequence 1011 into the below linear hash table <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <i>i</i>=2 <i>m</i>=3 <i>r</i>=5 </div> <div style="display: flex; flex-direction: column;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="margin-right: 10px;">00</div> <div style="border: 1px solid black; padding: 5px; flex-grow: 1;"> 0000 </div> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="margin-right: 10px;">01</div> <div style="border: 1px solid black; padding: 5px; flex-grow: 1;"> 0001 0101 </div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">10</div> <div style="border: 1px solid black; padding: 5px; flex-grow: 1;"> 1010 </div> </div> </div> <div style="margin-left: 20px; align-self: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">1111</div> </div> </div>	5
	a)	Explain the steps taken by the query processor for executing a query	5
	b)	Consider two relations R and S with the below attributes. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $R(a, b)$ $T(R) = 5000$ $V(R, a) = 50$ $V(R, b) = 100$ </div> <div style="text-align: center;"> $S(b, c)$ $T(S) = 2000$ $V(S, b) = 200$ $V(S, c) = 100$ </div> </div> <p>Using heuristics approach, write an optimal logical query plan for the query</p>	5

		Select distinct R.a, R.b, S.c From R, S Where R.b = S.b and R.a = 10	
	c)	If B(S) = B(R) = 10,000 and M = 1000, what is the number of disk I/O's required for a hybrid hash join?	4
	d)	How much memory do we need to use a two-pass, sort-based algorithm for relations of 10,000 blocks each, if the operation is: (a) δ (b) γ (c) a binary operation such as join or union.	6
3.	a)	Explain the models of parallel databases	6
	b)	What are the advantages of a distributed database management system?	4
	c)	Explain two phase commit protocol	5
	d)	Explain peer-to-peer database network	5
4.	a)	Explain the architecture of in-memory database	5
	b)	For the below ER diagram of a Ship Tracking application, recommend an appropriate data storage model for each Entity/Relation in a multi-model database. Justify your recommendation.	10
	c)	Explain data processing framework of Apache Spark	5
5.	a)	Explain "Page Rank" algorithm	5
	b)	Design a multi-dimensional data model for the below ER diagram	10



c) What is "Event Streaming"? Explain approaches to manage "Event Streaming" data

5