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PES UNIVERSITY

PES University, Bangalore

(Established under Karnataka Act 16 of 2013)

UE17CS312

END SEMESTER ASSESSMENT (ESA)
B. TECH. 5TH SEMESTER – December 2019
UE17CS312 - Database Technologies

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

Make suitable assumptions when necessary and state them

1.	a	What is OLAP? List the three types of OLAP. Explain the following OLAP operations: i. Drill Through ii. Drill Across Compare OLAP and OLTP for the following four characteristics: I. Number of Users ii. Database Design Iii. Data iv. Usage	(2 + 2 + 4)	8
	b	For the given Entity-Relationship model, **design a star schema.** City(city_id, city, state_id) State(state_id, state, country_id) Country(country_id, country, telephone_code, area, population, continent_name) Product(product_id, product_name, size, weight, category_id) Category(category_id, category_name) Store(store_id, city_id, address_building_no, address_street_name, address_locality) Sales_bill(bill_number, store_id, bill_date, customer_phone) Sales_products(bill_number, line_no, product_id, quantity, unit_price, amount) Write the SQL statements to populate the dimension tables (other than time dimension). Write the SQL statements to populate the FACT table. (use bill_date instead of time dimension)	(4 + 2 + 2)	8
	c	Give the format and provide an example for the SQL window queries using column values and using relative position of rows. Use the schema for question 1b for SQL statements.		4
2.	a	Explain the shared memory and shared nothing architectures for parallel databases.		4
	B	Explain Distributed Databases and homogeneous and heterogeneous distributed databases.		4
	c	Write short notes on the following topics: i. The Two Phase Commit protocol. ii. Fragmentation and Replication - including the types. iii. I/O Parallelism and Pipelined parallelism.	(4 + 4 + 4)	12
3.	a	Explain the following concepts: in brief. i. Impedance mismatch ii. Aggregate iii. Modeling for data access	(2 + 2 + 2)	6
	b	Give two use cases each for Document databases and Key-Value stores		4

	c	i. What is the output for the following MongoDB code? What is "db", "test1", "test2" in the query?
		`use test1`
		`db.test2.insert({"_id":"001","name":"Rajesh Kumar","dob":"1991/11/15"});`
		i. Write a query in MongoDB that will update/replace a document, and if the document does not exist, insert a new document.
				4

	d	Compare the the two Documents in json format for their uses. Is it OK for a MongoDB database to have both these document formats with the redundant data? Justify.		6

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Document-1	Document-2
{"author": "Ramez Elmasri", "books" : {"title":"Fundamentals of Database Systems", "publisher":"Pearson", "editions": ["5", "6", "7"] }, {"title":"Operating Systems: A Spiral Approach", "publisher":"Pearson", "editions": ["1"] } }	{"title":"Fundamentals of Database Systems", "publisher":"Pearson", "editions": [{"ed": "5", "qty": 0}, {"ed": "6", "qty": 50}, {"ed": "7", , "qty": 500}] , "author" { ["Elmasri Ramez", "Navathe Shamkant"]} }

4.	a	What are the equivalent terms for database instance, database and table in Cassandra? With a diagram, explain the Cassandra data model.	6
	b	Describe the graph data model with an example, and give suitable use cases.	6
	c	Give the CQL queries for UPDATE and DELETE operations. Give difference between CQL and SQL for these queries.	4
	d	Give the Cypher queries for Neo4J to **create a node**, **create a relationship**, **update the label and property of a node.**	4
5.	a	In the paper "Through the looking Glass" the authors identify the limitations of using the current RDBMS systems for in-memory operation. What are the limitations? How does VoltDB overcome these limitations?	6
	b	List and explain the different types of spatial data. With an example show how duration information can be stored and queried. (in temporal databases).	6
	c	For the following scenarios, suggest a suitable database/database model. **Choose from the following options.** A. RDBMS with ER model. B. RDBMS with Star Schema C. In-memory RDBMS – VoltDB D. MongoDB E. RIAK F. Cassandra G.Neo4J Scenarios may have one, two or more options. Suggest a maximum of two of the **best options** and give a justification in one or two sentences. A large company (multi-product and multi location) : i. would like to provide information about its products, features, configurations, availability and support-installation and maintenance to its dealers and distributors. ii. would like to provide information about its sales and inventory (stock) for the sales and marketing teams so that sales people can take orders (after checking quantities in stock) and marketing people can decide on promotions like advertisements, discounts, etc. The sales and marketing teams would like to analyze the trends in sales and inventory over time. iii. would like to perform web-analytics on all of its web sites and advertisements to track the interests of customers and others (prospective customers) about its products. iv. Develop a new application to process orders from customers directly from a mobile App. The company expects hundreds of thousands of orders to come in very short bursts. And is concerned about the scalability of the system. The company would like to use SQL and perform streaming analytics. v. Would like to make offers for short duration. After this duration, the offers must not be available.	8