This final exam is an open book and open notes exam. You may consult and discuss idea(s) with your teammates and classmates for (1)-(3), but your final submission must be your own work. Problems (4)-(9) must be done individually. Any finding of duplicated work or an attempt to copy your classmate work will not be tolerated and an automatic zero point will be given to those that are found copying and those that let the other individual copy their work.

Each student will be selecting one of the following focus topics and implement the following step (1)-(3) shown below. No two students of the same team shall select the same topic and no student shall select topic that is similar to their team project: (You may also select any other topic that is not this list as long as you follow the same guidelines, and with Instructor approval)

Healthcare	*Smart Manufacturing*	*IOT*
Production System	*Big Data*	*General Science*
Business App & Processes	*Smart Grid*	*Blood donation*
Class Enrollment App	*Inventory Mgmt System*	*Online Retail App*
Transportation Systems	*Hospital Mgmt System*	*Supply Chain Mgmt*

Submission: For each set below, you must submit SQL-script, and power point slide explaining the code and result with screen snapshots. Also, reference you sources in case you got information from the web, and/or books. Create a Dropbox folder and send me a link. I will retrieve your files for grading.
Due Date for this exam is (Thursday) December 17th, 2015 at 11:59pm.
Good luck!

1) Create 4-6 Tables each with 25-50 records for the following demonstration. (You may use website that generate random data sample as needed)
2) Create a simple ER diagram showing mapping and relationship of these tables.
3) For each of the following topics, create a SQL-script (in MySQL or MS SQL) and a power point slide (1-5 slides for each of the set below) explaining what the code does and its outcome. *(Hint: Imagine you are a TA for INFO6210 and you are conducting a code demo for a new set of INFO6210 students, these would be what you provide to the students and demonstrate during class)*

- Set 1: Create DB, creates tables, create sample records/values/tuples, USE, and Drop DB
- Set 2: Use DB, create tables with table options (NULL, Key, etc.), data types, insert, index and set
- Set 3: Select – From – Where – Group By – Having - Order By - Limit
- Set 4: Select 10 functions in SQL statement of your choice (including but not limited to Comparison, control flow, cast, string, numeric, date/time manipulation, calculation, conversion, aggregate functions, etc.)
- Set 5: Perform JOIN operation including INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN, CROSS JOIN operations and display the sample result using SELECT statement
- Set 6: Perform Queries and Sub-queries operations and display the result using SELECT statement
- Set 7: Create four different users (Admin, Tester, Developer and User) with different privilege settings and display access differentiation among four users. Use GRANT and REVOKE command to give/remove additional access/rights to DB.
- Set 8: Create two examples of STORED PROCEDURE and display the results.
- Set 9: Perform COMMIT and ROLLBACK operations with SAVEPOINT/ROLLBACK TO SAVEPOINT. Include the use of LOCK/UNLOCK Table operations. Display result of each operations
- Set 10: Perform Triggers operations using INSERT, UPDATE, DELETE and display result
- Set 11: Perform three examples of VIEW operation (1. Simple, 2) and 3) with increasing complexities) Create a backup plan of your choice, state your assumptions/constraints and explain your reasoning. Print your selection on a sample monthly calendar (say 30 day) with FB for Full Backup and IB for Incremental Backup

Additional Problems:

4) What are Data Warehousing (DW) and Business Intelligence? Describe its components and its uses. How does DW the same or different with respect to Business Intelligence? Define and explain ETL operations.

5) What is unstructured database (like Hadoop, Casandra, No-SQL) and how is it different from the traditional DB and its application?

6) What is the mechanism behind secure delete in DB? Describe the steps/method to securely delete data from MySQL and/or MS SQL SERVER DB? How is the process any different from a DELETE call in SQL?

7) Suppose we are commissioned to design a schema for a new map and direction-finding site, Mondo Maps. Like MapQuest and Google Maps, our site needs to display route and map information. Underneath it lies a database of cities, states, roads, and landmarks, in a two-dimensional plane (with longitude and latitude specifying a coordinate).

> • States have abbreviations (unique) and names, and each state has a unique boundary.
> • Cities are unique within states and have names, and each city has a single boundary.
> • A boundary corresponds to a city or state, and it has an ID and a polygon. (Assume there is a special polygon data type.)
> • Roads have IDs and names, and are made up of multiple segments. Assume that a road is associated with a single city.
> • A road segment has a start and an end coordinates, as well as directionality (one-way or two-way).
> • A landmark has a single coordinate, a name, and a type. Assume landmarks are associated with cities, and that landmark names are globally unique.

7a) Draw an ER diagram for this domain. Include participation constraints. You may need to add relationship sets that weren't explicitly specified. Many options were acceptable here. However, it is important to note that cities are weak entity sets as defined.

8) Provide definition and example of the following normal forms: 1NF, 2NF, 3NF and 3.5NF. Give two examples of each, a) when would you want to use normalization; b) when not to use normalization

9) Describe the process and implementation of a database performance tuning