



Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Cyber Security

Final Examination  
Year 3, Semester 2 (2019)

IE3062 – Data Security

Duration: Two Hours

October 2019

Instructions to Candidates:

- ◆ This paper has FOUR (04) questions.
- ◆ Answer all questions in the booklet given.
- ◆ The total marks for the paper is 100.
- ◆ This paper contains FIVE (05) pages, including the cover page.
- ◆ Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.
- ◆ This paper is preceded by a 10 minute reading period. The supervisor will indicate when answering may commence.

**Question 1****(25 marks)**

- a) “In the wrong hands, data can lead to the downfall of the *business*, personal and financial ruin of the client/ customer. This is *why database security is important*”. Describe the importance of database security for an organization. (6 marks)
- b) Briefly explain three advantages of “views”. (3 marks)
- c) The Branch table in HR schema has four columns named as branchNo, street, city and postcode whereas the Staff table in HR schema has eight columns named as staffNo, fName, lName, position, sex, DOB, salary and branchNo . Sample record set of Branch and Staff tables are given as follows.

**Branch**

branchNo	street	city	postcode
B005	22 Deer Rd	London	SW1 4EH
B007	16 Argyll St	Aberdeen	AB2 3SU
B003	163 Main St	Glasgow	G11 9QX
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

**Staff**

staffNo	fName	lName	position	sex	DOB	salary	branchNo
SL21	John	White	Manager	M	1-Oct-45	30000	B005
SG37	Ann	Beech	Assistant	F	10-Nov-60	12000	B003
SG14	David	Ford	Supervisor	M	24-Mar-58	18000	B003
SA9	Mary	Howe	Assistant	F	19-Feb-70	9000	B007
SG5	Susan	Brand	Manager	F	3-Jun-40	24000	B003
SL41	Julie	Lee	Assistant	F	13-Jun-65	9000	B005

Create a view named **Staff\_Salary\_View** for above tables to display records for staff members who are earning greater than 10,000 and users can use this view to insert data. This view has following attributes such as **STAFF\_NO**, **FIRST\_NAME**, **POSITION**, **BRANCH\_NO**, **AGE** and **SALARY**. Rename all the column headings with above attribute names.

(6 marks)

- d) Create another view named **Staff\_Salary\_View\_V2** based on the **Staff\_Salary\_View** view created in part (c) with **WITH CASCADED CHECK OPTION** clause. This view has following attributes such as **STAFF\_NO, FIRST\_NAME, POSITION, BRANCH\_NO, AGE** and **SALARY**. (4 marks)
- e) Explain the outcomes when you are trying to insert following data through these views.
- i. Insert into **Staff\_Salary\_View** (STAFF\_NO, FIRST\_NAME, POSITION, BRANCH\_NO, AGE, SALARY) values ('SL35', 'Zara', 'Assistant', 'B003', 35, 8000);
  - ii. Insert into **Staff\_Salary\_View\_V2** (STAFF\_NO, FIRST\_NAME, POSITION, BRANCH\_NO, AGE, SALARY) values ('SL25', 'Lucy', 'Assistant', 'B007', 27, 8500); (4 marks)
- f) Write SQL/PLSQL commands to grant Insert and Update access on **Staff\_Salary\_View\_V2** to user "**Lucy**". (2 marks)

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## **Question 2** (25 marks)

- a) What are the two general *types* of *auditing* available in *Oracle* Database? Compare and contrast the two types. (6 marks)
- b) List down three database auditing best practices. (3 marks)
- c) Briefly explain following AUDIT\_TRAIL parameters values.
- a. NONE
  - b. DB
  - c. OS
  - d. XML
  - e. DB,EXTENDED (5 marks)
- d) Compare and contrast the three types of standard audits available in Oracle databases. (6 marks)
- e) Write a SQL command that can be used to add a policy named **SALARY\_CHK\_AUDIT** on **EMPLOYEES** table **SALARY** column in **HR** schema where it check **SALARY > 50000**. (5 marks)

### Question 3

(25 marks)

- a) Fill the blanks of the following procedure to SET Hr\_Cleark role to Deeptha and Kasun if their manager id is 5340. (Note : Manager and employee details are stored in the Employees table in HR Schema ) (5 marks)

```
1. CREATE OR REPLACE procedure Role_Cleark_Auth AUTHID CURRENT_USER
2. AS
3. v_user varchar2(50);
4. v_manager_id number :=0;
5. BEGIN
6. v_user := lower((sys_context ('userenv','session_user')));
7. SELECT _____
8. INTO _____ FROM _____ WHERE lower(LOGIN_ID)=v_user;
9. IF _____
10. THEN
11. EXECUTE IMMEDIATE _____;
12. ELSE NULL;
13. END IF;
14. END;
```

- b) Pandora Pvt Ltd runs their systems using Oracle databases to store business information. Mr. Sampath is a Database Administrator (DBA) in this company and Miss Nelum is a software engineer who is working in the software development team. One day Miss Nelum wants to create two database roles for two business functions.

Account\_Cleark is a database role authorized by external sources. And it has been assigned following privileges.

- Select on General\_Ledger table in the Accounts Schema ,
- Select, update and insert on EMP\_SAL\_PROCEDURE in the Finance Schema,
- Update and delete operations on INVOICE table.

Hr\_Cleark is a database role authorized by the procedure in the System schema called Role\_Cleark\_Auth. It has following privileges assigned:

- Select and insert on EMPLOYEES table in HR database,
- Select on CUSTOMER, CUSTOMER\_ORDERS tables in Orders database,
- All operations on EMPLOYEES\_CONTACTS table.

Write the PL/SQL commands used by Mr. Sampath to do the following tasks.

- i. To create database roles. (2 marks)
- ii. To assign requested privileges. (10 marks)
- iii. To grant Account\_Cleark to Nimal and Hasitha and Hr\_Cleark to Deeptha and Kasun. (2 marks)
- iv. To set all the default roles except Hr\_Cleark to Piyumi at the time of she is log in to the system. (2 marks)
- v. To revoke the select privilege on General\_Ledger table in the Accounts Schema from Account\_Cleark. (2 marks)
- vi. To disable all roles granted to Hasitha's current session. (2 mark)

**Question 4** (25 marks)

- a) Explain following encryption deployment options.
  - i. Database Encryption
  - ii. Application layer encryption
  - iii. Transparent data encryption (TDE) (9 marks)
- b) "Encrypting all data in production database is the best way of encrypting the data". Do you agree with this statement? Justify your answer. (4 marks)
- c) Explain four advantages of transparent data encryption (TDE). (8 Marks)
- d) Explain the difference between data masking and data encryption. (4 Marks)

**--- End of the Exam Paper ---**