

Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree in IT  
(Specialization: Cyber Security)

**Final Examination**

Year 3, Semester 2 (2017)

**IT347 – Data Security**

November 2017

**Duration: Three Hours**

### **Instructions to Candidates**

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1. This paper contains **FOUR (04) Questions** printed on **FIVE (05)** pages.
2. Answer all **FOUR (04)** questions.
3. Use the answer booklet provided.
4. Please write your Student ID on any additional paper you wish to attach.
5. Please write your answer in point form.
6. The entire exam is worth **100 marks** and contributes **60%** to the final grade.

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

- a.) Describe the advantage of applying data access control mechanisms in databases itself compared to implementing data access control in applications.  
(5 marks)
- b.) List three types of access control mechanisms in databases.  
(3 marks)
- c.) Compare 'View base access control' and 'query modification'.  
(2 marks)
- d.) Describe 'data integrity' using an example.  
(5 marks)
- e.) List three main goals of data integrity.  
(3 marks)
- f.) Explain how the concept of "Separation of Duties" helps an organization to protect integrity of data.  
(7 marks)

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

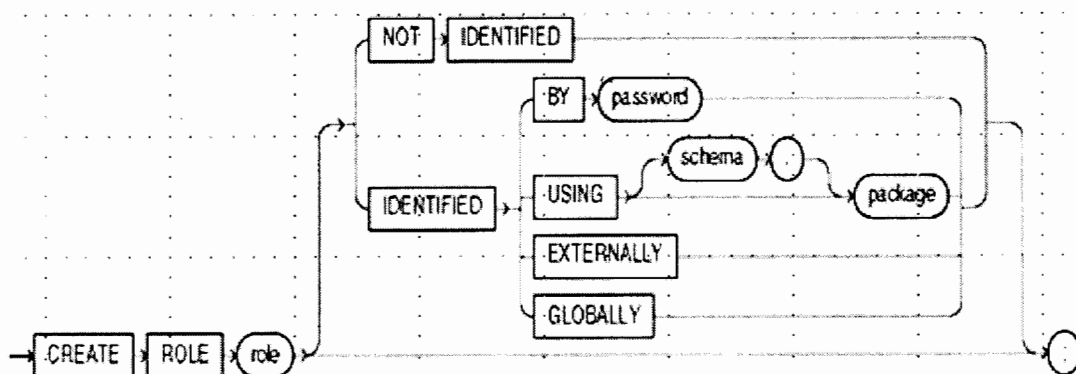
- a.) Describe the importance of audit records.  
(5 marks)
- b.) Compare the 'Standard Audit' and the 'Fine Grained Audit'.  
(5 marks)
- c.) Briefly explain how the 'Oracle database' keeps audit records when the 'Audit\_Trail' parameter is set to: db,extended?  
(2 marks)
- d.) Describe the importance of properly maintained audit records, with respect to followings:
  - a. Generation of audit records
  - b. Maintaining already generated audit records
  - c. Preservation of audit records
  - d. Consequences when you not properly maintain  
(10 marks)
- e.) List three types of statements that can be audited under standard audit option in the Oracle database?  
(3 marks)

### Question 3

(25 marks)

- a.) Compare the 'Conceptual model' and the 'Logical model' of data in relational databases. (3 Mark)
- b.) Pandora Pvt Ltd runs their systems using Oracle databases to store business information. Mr Sampath is working as a Database Administrator (DBA) for many years in this company and Miss Nelum is a contract basis employee who is appointed to develop the company accounting system. One day Miss Nelum wants to access a table in Human Resource (HR) schema to get some information for her developments. She made a request to Mr Sampath. Mr Sampath has temporally given 'Select' privilege to her only to the 'Employees' table in HR schema. Miss Nelum is going access this table through Account (ACNT) schema.
- a. Write the command used by Mr sampath to provide this privilege. (4 Marks)
- b. Write a SQL statement that can be used to remove this privilege from Nelum. (3 Marks)
- c.) Describe the importance of the 'Role based access control'.
- (3 Marks)
- d.) Explain the importance of 'Role based access control' in a multiuser environment.
- (3 Marks)
- e.) Your company is implementing a 'Role Based access control' system. The "sec\_clerk\_pkg" package is available inside the HR database of your company. Write a command to create a role called "sec\_clerk\_role", authorized by this package using the following diagram.

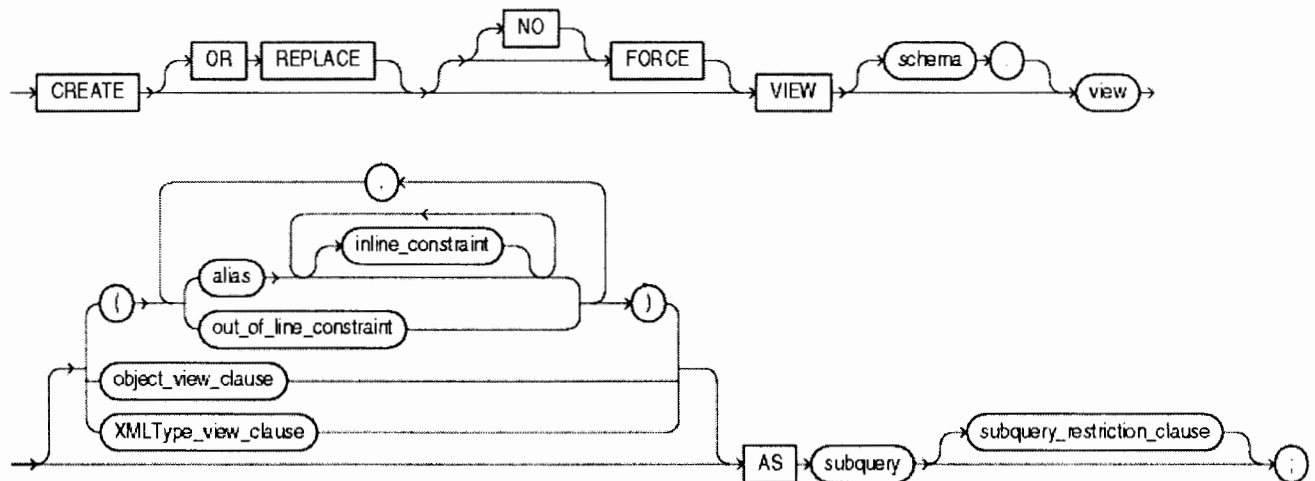
(3 Marks)



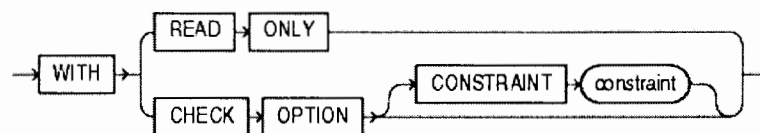
- f.) Using following diagrams, Write a command to create a **read only view** called “emp\_rec” on the Employees table in HR schema to display employees who earn less than 50,000 rupees per month.

(3 Marks)

**create\_view::=**



**subquery\_restriction\_clause::=**



- g.) Write a PLSQL statement to grant privileges on the ‘emp\_rec’ view to a HR Clerk: Mr. Scotte.

(3 Marks)

#### **Question 4** **(25 marks)**

- a.) List three security measures that can be apply in data stores and databases?  
(3 Marks)
- b.) ‘Prevention’ and ‘detection’ are two techniques used for security enhancing in any domain. List two preventive measures and two detective measures in information security.  
(4 Marks)

- c.) Explain following encryption mechanisms and give examples of their usages.
- a. Symmetric Key encryption
  - b. Asymmetric Key encryption
  - c. One-Way hash
- (6 Marks)
- d.) Explain the transparent data encryption.
- (6 Marks)
- e.) Describe the steps Oracle database performs to store data, into an encrypted column in transparent data encryption enabled database.
- (6 Marks)

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**End of the exam paper**