***A***

**COURSE FILE**

***ON***

**“DATABASE SECURITY”**

**IV B-Tech II Semester**

****

**INFORMATION TECHNOLOGY**

**CMR TECHNICAL CAMPUS**

**KANDLAKOYA (V), MEDCHAL (M), R.R.DIST.**

**CONTENTS OF COURSE FILE:**

1. Department vision & mission
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3. List of Cos (action verbs as per blooms)
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6. Session execution log
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11. University question papers or question bank.
12. Power point presentations (PPTs)
13. Websites or URLs e- Resources

**Submitted By**

**1. DEPARTMENT VISION & MISSION**

**Vision:**

To produce globally competent and industry ready graduates in Computer Science & Engineering by imparting quality education with a know-how of cutting edge technology and holistic personality.

**Mission:**

**M1**. To offer high quality education in Computer Science & Engineering in order to build core competence for the students by laying solid foundation in Applied Mathematics, and program framework with a focus on concept building.

**M2**. The department promotes excellence in teaching, research, and collaborative activities to prepare students for professional career or higher studies.

**M3**. Creating intellectual environment for developing logical skills and problem solving strategies, thus to develop, able and proficient computer engineer to compete in the current global scenario.

**2. LIST OF PEOs AND POs**

**2.1 Program Educational Objectives (PEO):**

**PEO 1:** Excel in professional career or higher education by acquiring knowledge in mathematical, computing and engineering principles.

**PEO 2:** To provide intellectual environment for analyzing and designing computing systems for technical problems socially and economically.

**PEO 3:** Exhibit professionalism, multidisciplinary teamwork and adapt to current trends by engaging in lifelong learning and practice their profession with legal and ethical responsibilities.

**2.1 .Program Outcomes (PO):**

* **PO1**. An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to the discipline.
* **PO2**. An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution.
* **PO3.** An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
* **PO4**. An ability to design and conduct experiments, as well as to analyze and interpret data.
* **PO5**. An ability to use current techniques, skills, and modern tools necessary for computing practice.
* **PO6** An ability to analyze the local and global impact of computing on individuals, organizations, and society.
* **PO7.** Knowledge of contemporary issues.
* **PO8.** An understanding of professional, ethical, legal, security and social issues and responsibilities.
* **PO9.** An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.
* **PO10.** An ability to communicate effectively with a range of audiences.
* **PO11.** An understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects.
* **PO12.** Recognition of the need for and an ability to engage in continuing professional development.

**NBA Graduate Attributes**

PO1 Engineering knowledge

PO2 Problem analysis

PO3 Design/development of solutions

PO4 Conduct investigations of complex problems

PO5 Modern tool usage

PO6 The engineer and society

PO7 Environment and sustainability

PO8 Ethics

PO9 Individual and team work

PO10 Communication

PO11 Project management and finance

PO12 Life-long learning

**3. COURSE OUTCOMES**

|  |  |
| --- | --- |
| **CO1** | **Ability to carry out a risk analysis for large database** |
| **CO2** | **Ability to setup and maintain the accounts with privileges and roles** |
| **CO3** | **Describe at least one integrity auditing technique for outsourced databases** |
| **CO4** | ***Create secure authentication procedures for web application users*** |

**4. SYLLABUS COPY**

**UNIT-I**

**SYLLABUS**

**Introduction**

Introduction to database security, Problems in databases, Security controls conclusions.

**Security models-1**

Introduction, Access matrix model, Take grant model, Acten model, PN model, Hartson and Hsiao’s model, Fernandez’s model, Bussolati and marttella’s model for distributed databases.

**UNIT - II**

**SYLLABUS**

**Security models-2**

Bell and Lapadula’s model,Biba’s model,Dion’s model, Sea view model, jajodia and sandhu’s model, The Lattice model for the flow control conclusion.

**Security mechanisms**

Introduction, user identification/Authentication, Memory protection, Resource protection, Control Flow Mechanisms, Isolation, Security Functionalities in some operating systems, Trusted Computer System Evaluation Criteria

**UNIT – III**

**SYLLABUS**

**Security software design**

Introduction- A Methodological Approach to security software design, Secure Operating System design, Secure DBMS Design, Security Packages, Database Security Design.

**Statistical database protection and intrusion detection systems**

Introduction-Statistics concepts and definitions, Types of Attacks, Inference Controls, Evaluation Criteria for control comparison, Introduction IDES System, RETISS System, ASES System Discovery.

**UNIT - IV**

**SYLLABUS**

**Models for the protection of new generation database systems-1**

Introduction- A Model for the protection of frame based systems, A model for the protection of object-oriented Systems SORION, Model for the protection of object oriented databases

**UNIT** – **V**

**SYLLABUS**

**Models for the protection of new generation database systems-2**

A model for the protection of new generation database systems: the orion model, jajodia and kogan’s model, A model for the protection of Active Databases, Conclusions

**Suggested Books**

**TEXT BOOKS**

**T1.** Database security by Pearson Edition (1/e)

**T2.** Database security and auditing: Protecting Data Integrity and Accessibility, 1st edition, Hasson Afyouni, Thomson Edition

**REFERENCE BOOKS**

**R1**. Database security by Alfred basta, Melissa zgola, CENGAGE learning.

**5. SESSION PLAN/LESSON PLAN**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.NO** | **Topic (JNTU syllabus)** | **Sub-Topic** | **NO. OF LECTURES REQUIRED** | **Suggested Books** | **Remarks** |
| **UNIT - I** | | | | | |
| **1** | **Introduction:** | Introduction to database security | **L1** | **T1,R1** |  |
| **2** | Problems in database | **L2-L3** | **T1, T2** |  |
| **3** | Security control conclusions | **L4-L5** | **T1** |  |
| **4** | Security models-1  Introduction,Access matrix model | **L6-L7** | **T1** |  |
| **5** | Take grant model | **L8** | **T1** |  |
| **6** | Acten model | **L9-L10** | **T1** |  |
| **7** | PN model, Hartson and hsiao’s model | **L11** | **T1** |  |
| **8** | Fernandez’s model, Bussolati and Martella’s model for distributed databases | **L12** | **T1** | **Unit-I completed** |
| **UNIT - II** | | | | | |
| **9** | **Security models-2 and security mechanisms** | Bell and Lapadula’s model | **L13** | **T1** |  |
| **10** | Biba’s model | **L14** | **T1, R1** |  |
| **11** | Dions model, Sea view model | **L15** | **T1, R1** |  |
| **12** | Jajodia and Sandhu’s model,The lattice model for the Flow control Conclusion | **L16** | **T1, R1** |  |
| **13** | Security mechanisms, Introduction and user identification/Authentication | **L17** | **T1** |  |
| **14** | Memory protection | **L18** | **T1, R1** |  |
| **15** | Resource protection | **L19** | **T1** |  |
| **16** | Control flow mechanisms, Isolation | **L20** | **T1** |  |
| **17** | Security functionalities in some operating systems | **L21** | **T1** |  |
| **18** | Trusted computer System evaluation Criteria | **L22** | **T1, T2** | **II UNIT COMPLETED** |
| **UNIT -III** | | | | | |
| **19** | **Security software design and Statistical database protection and intrusion detection systems** | Introduction, Secure operating system design | **L23-L24** | **T1** |  |
| **20** | Semantic networks Secure DBMS design | **L25-L26** | **T1** |  |
| **21** | Security packages | **L26-L27** | **T1** |  |
| **22** | Database security design | **L28-L29** | **T1** |  |
| **23** | introduction and statistics concepts and definitions | **L30** | **T1, T2** |  |
| **24** | Types of attacks, Inference Controls | **L31-L33** | **T1** | **III UNIT COMPLETED** |
| **25** | Evaluation criteria for control comparison | **L34-L35** | **T1** |  |
| **26** | RETISS System, ASES System Discovery | **L36** | **T1** |  |
| **UNIT –IV** | | | | | |
| **27** | **Models for the protection of new generation database systems-1** | Introduction, A model for the protection of frame based systems | **L37** | **T1, T2** |  |
| **28** | A model for the protection of object oriented systems :SORIAN | **L38** | **T1** |  |
| **29** | A model for the protection of object oriented databases | **L39** | **T1, T2** | **IV UNIT COMPLETED** |
| **UNIT –V** | | | | | |
| 30 | **Models for the protection of new generation database systems-2** | A Model for the protection of new generation database systems : The orion model | **L40-L41** | **T1** |  |
| **31** | Jajodia and Kogan’s model | **L42** | **T1, T2** |  |
| **32** | A model for the protection of Active databases, conclusions | **L43** | **T1, R1** | **V UNIT COMPLETED** |

**6. Session Execution Log:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S no** | **unit** | **Scheduled completed date** | **Completed date** | **Remarks** |
| **1** | **I** | **14-12-2018** | **02-01-2018** |  |
| **2** | **II** | **03-01-2018** | **24-01-2018** |  |
| **3** | **III** | **25-01-2018** | **28-02-2018** |  |
| **4** | **IV** | **01-03-2018** | **15-03-2018** |  |
| **5** | **V** | **16-03-2018** | **28-03-2018** |  |

**7. Lecture Notes – (hand written)**

**8.** **Assignment Questions**

**I Assignment**

**Set-1**

1. What is database security? Explain some of the problems in database security?
2. Write short notes on access matrix model. Explain in detail about authorization state?
3. Explain in detail about Biba’s model?
4. Describe kernelized secure operating system?

**Set-2**

1. Describe kernelized secure operating system?
2. Discuss the Acten model and Fernandez’s model security models for distributed databases?
3. Explain paging technique and segmentation?
4. Explain in detail about flow control and inference control?

**Set-3**

1. Explain about PN model?
2. Explain jajodia and Sandhu’s model?
3. Describe kernelized secure operating system?
4. What is database security? Explain some of the problems in database security?

**II Assignment**

**Set -1**

1. A) Write short notes on intrusion detection, and the models employed by intrusion detection system?
2. Explain in detail IDES system?
3. Explain in detail about elements of object oriented databases?
4. A) Discuss the Jajodia and Kogan’s model for the protection of new generation database systems?

B) Write about objects of ORION authorization model?

4. A) Explain in detail about elements of object oriented databases?

B) Write about the SORION model and entities of it?

**Set-2**

1. A) Explain in detail about elements of object oriented databases?

B) Write about the SORION model and entities of it?

2. Give a note on security packages?

3. Explain in detail about the weak authorization base?

4. List and explain various types of attacks on database?

**Set -3**

1. List and explain the issue that needs to be considered for mandatory protection?
2. A) Explain in detail the classification exam?

B) What are the three types of classification constraints?

3. Discuss database security design in detail?

4. Explain in detail about the weak authorization base?

**9. Mid exam question papers (samples)**

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**CMR TECHNICAL CAMPUS**

**Kandlakoya (v), Medchal Road, Hyderabad -501401**

**IV.B.TECH II-SEM-I MID EXAMINATIONS, JAN-2018 *Date:* 08.02.2018**

**Subject: DATABASE SECURITY Branch: IT Time: 1hr Marks: 2X5=10 M**

**Answer Any Two Questions:**

1. Discuss the Acten model and Fernandez’s model security models for distributed databases? (CO1)
2. What is database security? Explain some of the problems in database security? (CO1)
3. Explain paging technique and segmentation? (CO2)
4. Describe kernelized secure operating system? (CO3)

**10. Scheme of evaluation**

|  |  |
| --- | --- |
| Question | Scheme of evaluation |
| 1. Discuss the Acten model and Fernandez’s model security models for distributed databases? | Explanation(5M) |
| 1. What is database security? Explain some of the problems in database security? | Definition(2M)  Explanation(5M) |
| 1. Explain paging technique and segmentation? | Explanation(5M) |
| 1. Describe kernelized secure operating system? | Explanation(5M) |

**11. University Question Papers or Question Bank.**

***UNIT-1***

1. Define the term database? Discuss the need for security?(CO1)
2. What is database security? Explain some of the problems in database security?(CO1)
3. Describe database security controls?(CO1)
4. Discuss the following security models for distributed databases?(CO2)
5. Acten model
6. Fernandez’s model
7. Explain any three security models for distributed databases in detail?(CO2)
8. Explain clearly the take grant model, PN model and Fernandez’s model for database security?(CO2)

***UNIT-II***

1. Discuss Bell and LaPadula’s security model?(CO2)
2. Explain in detail about Biba’s model? How is different from Bell and LaPadula’s model?(CO2)
3. Explain the security model proposed by Jajodia and sandhu?(CO2)
4. Illustrate Lattice model for flow control(CO3)
5. What is the need for user identification,Discuss authentication mechanisms in detail?(CO3)
6. Brielfly explain about the paging technique?(CO1)
7. Explain how trusted computer system provides security?(CO2)

***UNIT-III***

1. Explain the methodological approach to security software design?(CO2)
2. Describe in detail the Kernelized secure operating system?(CO1)
3. Explain the Virtual Machine Monitor security kernel in detail?(CO2)
4. Discuss database security design in detail?(CO2)
5. Give a note on security packages?(CO1)
6. List and explain various types of attacks on databases?(CO1)
7. Write briefly about inference control and list and explain different techniques of inference control?(CO1)
8. Explain in detail IDES system?(CO3)
9. Write short notes on ASES system discovery?(CO1)

***UNIT-IV***

1. Explain in detail about the elements of active databases?(CO3)
2. Discuss the model for the protection of frame based systems in detail?(CO2)
3. Discuss the models for protection of frame based systems and object-oriented systems?(CO2)
4. Discuss model for the protection of object oriented systems and object oriented data bases?(CO2)

***UNIT-V***

1. Write briefly about the ORION authorization model and subjects if it?(CO1)
2. Explain briefly about authorizations?(CO3)
3. Discuss the Jajodia and Kogan’s model for protecting databases?(CO2)
4. Explain the model for the protection of active databases?(CO4)

**12. Power Point Presentations: (softcopy)**

**13. WEBSITES OR URLS E- RESOURCES**

1. <https://www.tutorialspoint.com/db2/db2_database_security.html>
2. <https://docs.oracle.com/cd/b19306_01/server.102/b14220/security.html>
3. [https://study.com/academy/lesson/database-security management.html](https://study.com/academy/lesson/database-security%20management.html)
4. <https://www.slideshare.net/alraee/database-security>
5. <https://www.cse.iitb.ac.in/infolab/data/courses/cs632/.../dbsecurity-overview.ppt>
6. <https://people.eecs.ku.edu/~hossein/teaching/fa07/710/lectures/db-security.ppt>
7. [www.cs.sjsu.edu/faculty/lee/cs157b/fall2003/database\_security.ppt](http://www.cs.sjsu.edu/faculty/lee/cs157b/fall2003/database_security.ppt)
8. <https://www.cs.kent.ac.uk/people/staff/saf/dbdc/portfolios/.../formal%20lecture.ppt>
9. [www.csudh.edu/eyadat/classes/cis471/handouts/.../database%20security.ppt](http://www.csudh.edu/eyadat/classes/cis471/handouts/.../database%20security.ppt)