Introduction, Oracle form designer, Object navigator, Canvas view, Property Sheet, PL/SQL editor, Blocks, LOVs, Radio Buttons, Alerts, Form Triggers, Form Level Triggers, Block level triggers, Item level triggers, Query triggers, Navigation triggers, Writing PL/SQL code, Master Detail relationship

Unit7: ORACLE REPORT DESIGNER (06 Lectures)

Creation of reports, Ordinary reports & matrix reports

Core Course 10- Lab [Credit: 2, Lab: 30]

Development of a business application in RDBMS

3rd Year: Semester V

CC -11 : Data Structures [Credit: 4, Lecture Hours: 60]

Unit 1: Introduction to data structures

Unit 2 : Linear data structures

Arrays: Definition, concept and operation on arrays
Linked list :Singly linked list, Circularly linked list, Doubly linked list
Stacks: Creation, Push , Pop
Queues: creation, insertion and deletion

Unit 3: Non-linear data structures

Tree: Definition, concept and operation of trees, Storage representation of binary trees, Manipulation of binary trees, B_tree, AVL trees, Tree Traversal Algorithms

Unit4: Sorting

Selection sort, Bubble sort, Merge sort, Quick sort, Heap sort,

Unit 5: Searching

Sequential searching, Binary searching

Reference books:

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++:, Second edition, PHI, 2009.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson, 1999.
5. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010
6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011.
7. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.
8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003.
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009.

10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley,2013
11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

Core Course 11- Lab **[Credit: 2, Lab Hours: 60]**

Students are advised to do laboratory/practical practice.

CC-12: Introduction to Big Data Analytics **[Credit: 6(5+1), Lecture Hours: 60]**

Unit 1 : Overview – Introduction, Data Mining Life Cycle : CRISP-DM Methodology and SEMMA Methodology. Big Data Life Cycle **(04 Lectures)**

Unit 2 : Methodology – Difference from traditional statistical approach of experimental design, Statistical Modelling. **(03 Lectures)**

Unit 3 : Deliverables & Stakeholders in BDA – Machine Learning Implementation, Recommender System, Dashboard, Ad-Hoc Analysis, Project/Project Understanding, Establishing advantages of the analysis. **(15 Lectures)**

Unit 4 : Data Analyst & Data Scientist – Introduction, Work-area and Role. **(01 Lecture)**

Unit 5 : BDA Methods – Introduction to R, Intoduction to SQL, Charts and Graphs, Data Tools, Statistical Methods. **(07 Lectures)**

Unit 6 : BDA Project Management – Project Description, Problem Definition : Supervised Classification, Supervised Regression, Unsupervised Learning & Ranking, Data Collection (mini project-twitter), Data Mining / Cleansing : homogenization & heterogenization, Summarizing, Data Exploration : exploratory data analysis and Data Visualization : generation of correlation matrix visualization. **(30 Lectures)**

DSE1: Operational Research

[Theory: 60 Lectures]

Course Objectives:

The students will learn:

1. Methodology of Operations Research.
2. Linear programming: solving methods, duality, and sensitivity analysis.
3. Integer Programming.
4. Network flows.
5. Multi-criteria decision techniques.
6. Decision making under uncertainty and risk.
7. Game theory.

Unit 1: Introductory Linear Algebra (8 Lectures)

System of linear equations, Matrices, Rank and Determinant of a matrix, Linearly dependent and independent vectors, Basis of a matrix.

Unit 2: Linear programming - I (12 Lectures)

Optimization Problems, Introduction to LP Formulation, Convex sets, Extreme points, Geometry of Linear Programs, Basic feasible solutions (BFS), Neighborhoods, Local and global optima, Profitable Column, Pivoting, Simplex Algorithm with initial BFS, Graphical method

Unit 3: Linear programming - II (12 Lectures)

Degeneracy and Bland's Anticycling rule (Definition), Simplex Algorithm without initial BFS, Artificial variable techniques – two phase method, M-Charnes method, special cases in LPP.

Unit 4: Transportation Models (8 Lectures)

Transportation Algorithm, Assignment model, Hungarian Method

Unit 6: Network Analysis(10 Lectures)

Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM : Introduction, Critical Path, Cost Analysis.

Unit 7: Game Theory (10 Lectures)

Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems; Games without Saddle Point; Principle of Dominance.

Suggested Readings

1. G. Hadley: Linear Programming. Narosa, 2002 (reprint).
2. A. Ravindran, D. T. Phillips and James J. Solberg: Operations Research-Principles and Practice, John Wiley & Sons, 2005.
3. Hamdy A. Taha: Operations Research-An Introduction, Prentice Hall, 8th Edition, 2008.
4. F.S. Hillier. G.J.Lieberman: Introduction to Operations Research- Concepts and Cases, 9th Edition, Tata McGraw Hill. 2010.

Course Outcomes

The students will be able to

1. Identify and develop operational research models from the verbal description of the real system.
2. Understand the mathematical tools that are needed to solve optimisation problems.
3. Use mathematical software to solve the proposed models.
4. Develop a report that describes the model and the solving technique, analyse the results and propose

recommendations in language understandable to the decision-making processes in Management Engineering.

DSE 2: Information Security [Theory: 60 Lectures]

Course Objectives:

1. Understand Security: Attacks, Services & Mechanisms
2. Study of various security algorithm available for security and protection
3. Ciphering of plain text
4. Study of conventional encryption algorithm, key management issues
5. Cryptography and various encryption methods
6. Knowledge and implementation of hash function to messages
7. Digital signature and its importance in transaction processing
8. Concept of network security, directory authentication, e-mail
9. Viruses and their implication to business applications
10. Firewalls and network security principle

Unit 1: Introduction (5 Lectures)

Security, Attacks, Computer Criminals, Security Services, Security Mechanisms.

Unit 2: Cryptography (10 Lectures)

Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

Unit 3: Program Security (10 Lectures)

Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program

Unit 4: Threats (10 Lectures)

Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication.

Unit 5: Database Security (10 Lectures)

Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.

Unit 6: Security in Networks (10 Lectures)

Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails

Unit 7: Administrating Security(5 Lectures)

Security Planning, Risk Analysis, Organisational Security Policy, Physical Security. Ethical issues in Security:
Protecting Programs and data. Information and law.

Suggested Readings

1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, Prentice Hall of India, 2006
2. W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010

Course Outcomes

Students will develop the ability to:

- Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.