Semester V

DISCIPLINE SPECIFIC CORE COURSE – 13 (DSC-13)
V.1. Linear Programming and Game Theory

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Linear Programming and Game Theory, **DSC 13, V.1**	**4**	**3**	**0**	**1**	**12th Pass**	**NIL**

Learning Objectives

To provide an understanding of the optimization of linear models in the many areas. This course starts with the definition of LPP, underlying assumptions and modeling of problems. Illustration of graphical methods will help to conceive the idea behind the solution of LPP. This will also help the reader to visualize the overall concept though explained for only two decision variables. Once the concept becomes clear, the theoretical as well as logical approach of the most popularly used simplex method will be explained.

Learning outcomes

After completing this course, student should be able to

- Formulate linear programming models for given real situations
- Learn simplex method and its computational efficiency
- Formulate dual problems and understand economical interpretation of primal dual relationship
- Analyze post optimality and its economical interpretation
- Solve Transportation problems and assignment problems
- Learn some basic concepts of game theory
- Learn linear programming solution of games with mixed strategies

Syllabus

Unit I: Formulation of Linear Programming Models - Theory of simplex method - optimality and unboundedness - the simplex algorithm - simplex method in tableau format - Computational efficiency of the technique **(10 hours)**

Unit II: Introduction to artificial variables – two-phase method, Big-M method and their comparison - Formulation of the dual problem, Primal-dual relationships, Economic interpretation of the dual **(10 Hours)**

Unit III: Introduction to Post optimality analysis - Dual Simplex Method and its application - Formulation of the Transportation problem - Algorithm for solving transportation problem - Northwest - corner method, least cost method and Vogel approximation method for determining the starting basic solution **(10 hours)**

Unit IV: Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem - Formulation of two person zero sum games - Solving two person zero sum games - Games with mixed strategies - Graphical solution procedure -Linear programming solution of games **(15 hours)**

Practicals - **(30 Hours)**

Program with Solver and its application to simple models

- Formulation of the model in Solver
- Solution of LPP with Solver
- Sensitivity analysis with Solver
- Solution of Transportation and Assignment problem with Solver
- Innovation Project

Essential/recommended readings

- Linear Programming and Network Flows, Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, (2nd edition), John Wiley and Sons, India, 2004.
- **I**ntroduction to Operations Research, F. S. Hillier and G. J. Lieberman, (9th Edition), Tata McGrawHill, Singapore, 2009.
- Operations Research, An Introduction, Hamdy A. Taha, (8th edition), Prentice-Hall India, 2006.

DISCIPLINE SPECIFIC CORE COURSE – 14 (DSC-14)
V.2. Data Communication and Netwroking

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course	Eligibility criteria	Pre-requisite of the course (if any)

		Lecture	Tutorial	Practical/ Practice		
Data Communication and Networking DSC 14, V.2	**4**	**3**	**0**	**1**	**12th Pass**	**Programming, Data Structure, Design and Analysis of Algorithms**

Learning Objectives

This course introduces to the students, fundamentals of data communication and computer networks, organization of network architecture, its components and functions. The course gives them a practical understanding of client-server programming and also introduces the basics of network security.

Learning outcomes

Through this course, students:

- Will understand Data communication, Communication Channels, Topologies and Networking Applications.
- Will have knowledge of Layered Architecture & Models, Network Devices, Error Management, and Network Protocols.
- Will have exposure to Network Architectures of Enterprise Applications.
- Will be able to understand the Routing Mechanism and TCP/UDP applications on Network Devices, Socket Programming, and Web/Server Based Applications.

Syllabus

Unit I: Introduction to Data Communication; Components and Basics-Communication Channels – Topologies

(15 Hours)

Unit II: Networking Applications - Layered Architecture & Models – Network Devices

(10 Hours)

Unit III: Introduction to Data Link - Error Management

(10 Hours)

Unit IV: Network Protocols – Network Security – Network Architectures of Enterprise Applications

(10 Hours)

Practical Component- (30 Hours)

- Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channels.
- Simulate and implement stop and wait protocol for noisy channels.

- Simulate and implement go-back n sliding window protocol.
- Simulate and implement selective repeat sliding window protocol.
- Simulate and implement the Dijkstra algorithm for shortest-path routing.
- Implementation of socket programming.

Essential/recommended readings

- Data Communication and Networking, Forouzan, B.A., Tata McGraw-Hill. 2013
- Computer Networking: A Top-Down Approach Featuring the Internet, Kurose, .F. *a*nd Ross, K.W., 3rd Ed., Addison Wesley, 2004
- Computer Networks, A S Tanenbaum, PHI, IV Ed, 2003
- Computer Communication Networks, W. Stallings, PHI, 1999

DISCIPLINE SPECIFIC CORE COURSE – 15 (DSC-15)
V.3. Software Engineering

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Software Engineering, DSC-15, V.3	**4**	**3**	**0**	**1**	**12th Pass**	**NIL**

Learning Objectives

This course objective is to train students in developing software and large scale software products in a systematic manner through requirement analysis, design principles, quality assurance, software process models, and estimation of schedules, productivity and cost.

Learning outcomes

After completing this course, student should be able to understand:

- Software Engineering basics, Software Process Models, Software Requirement Process.
- System Design and Testing Approaches.
- Scheduling, Productivity and Cost Estimation.

- Risk Management.

Syllabus

Unit I: Introduction to software Engineering – Software Engineering Principles – Software metrics – Software development life-cycle. **(10 Hours)**

Unit II: Software Process Models – Software Requirement Process -– System Design – Testing. **(10 Hours)**

Unit III: Scheduling Estimation Models. **(10 Hours)**

Unit IV: Productivity Estimation – Cost Estimation – Schedule Estimation – Risk Management – Case Study
(15 Hours)

Practicals - (30 Hours)

- Analysis of a desktop/enterprise Software Applications under lens of software design fundamentals
- Requirement gathering, verification and specification of a new Software Project
- Creating Prototypes and outlines of problems in the frame of Software engineering aligned with design methodologies
- Reverse engineering management aspects any Open Source Software Project and identify Software
- Software Projects sign off with Project Charter and management of project plans
- Hands on Experiment on Requirement Management, Deliverable attributes of Software projects
- Design a Software Application, Product, and Service and integrate with existing system
- Estimation of Costing of Software, Time sheet management in estimation of Effort, Resource Management
- Design of User Guides, Software Manuals, Update Documentation, Release Guides, Deployment Guides, FAQs
- Basic Understanding on use of Agile & Scrum
- Innovation Project

Essential/recommended readings

- Requirements Risks Can Drown Software Projects, Leishman and Cook, Computer (November 2001).
- Software Engineering: A Look Back and A Path to the Future. Leveson, Nancy, December 14, 1996.
- Applied Software Project Management, Andrew Stallman & Jennifer Greene,

O`Reilly, 2005.

- R . S. Pressman, “Software Engineering – A practitioner’s approach”, 5th Ed., McGraw Hill
  Int. Ed., 2001.
- K. K. Aggarwal & Yogesh Singh, “Software Engineering”, 2nd Ed., New Age International, 2005.