

IV/IV B.Tech IT Syllabus of Admitted Batch 2019-2023

UG PROGRAM – B.TECH (IT)

W.E.F. Admitted Batch 2019-2020

DEPARTMENT OF INFORMATION TECHNOLOGY



ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(UGC AUTONOMOUS)

(Affiliated to Andhra University, Approved by AICTE & Accredited by NBA)

Sangivalasa, Bheemunipatnam Mandal, Visakhapatnam Dt. 531162.

Phone: 08933-225083/84/87 Fax:226395

Website: www.anits.edu.in

email:principal@anits.edu.in

FOURTH YEAR SEMESTER – I												
Code	Course	Category	L	T	P	E	O	Total	Sessional Marks	External Marks	Total Marks	Credits
IT411	Open Elective-3	OE	3	0	0	1	2	6	40	60	100	3
IT412	Professional Elective-3	PE	3	0	0	1	2	6	40	60	100	3
IT413	Professional Elective-4	PE	3	0	0	1	2	6	40	60	100	3
IT414	Cryptography & Network Security	PC	3	0	0	1	3	7	40	60	100	3
IT415	Foundation on Data Science	PC	2	1	0	1	2	6	40	60	100	3
IT416	Data Science Applications Lab	PC	0	0	3	0	3	6	50	50	100	1.5
IT417	Elective Lab-2	SC	0	1	3	0	3	7	50	50	100	2.5
IT418	Project Phase-I	PR	0	0	4	0	4	8	100		100	2
IT419	Internship in Industry-II	PR	-	-	-	0	2	2	100	-	100	2
TOTAL			14	2	10	5	23	54	500	400	900	23
FOURTH YEAR SEMESTER – II												
Code	Course	Category	L	T	P	E	O	Total	Sessional Marks	External Marks	Total Marks	Credits
IT421	Open Elective-4	OE	3	0	0	1	2	6	40	60	100	3
IT422	Professional Elective-5 / MOOC - 1	PE	3	0	0	1	2	6	40	60	100	3
IT423	Project Phase-II	PR	0	0	16	0	16	32	100	100	200	8
TOTAL			6	0	16	2	20	44	180	220	400	14

YEAR - SEM	IV/IV SEM 1	IV/IV SEM 2
ELECTIVE-STREAM	PE-III	PE-V
Stream 1: Networks	Mobile Adhoc Networks	Storage Area Networks
Stream 2: Data Engineering	Soft Computing	Natural Language Processing
Stream 3: Management	Organizational Behaviour	Principles of Economics Management
Stream 4: Security & Embedded	Web Security	Malware Analysis
Stream 5: Software Engineering	Software Testing Methodologies	Design Patterns
ELECTIVE-STREAM	PE-IV	
Stream 1: Networks	Cloud Computing	
Stream 2: Data Engineering	Deep Learning	
Stream 3: Management	Intellectual Property Rights	
Stream 4: Security & Embedded	Digital Forensics	
Stream 5: Software Engineering	Software Project Management	
	Elective lab 2	
	Mobile Application development lab	
	Matlab	
	R-programming	

SEMESTER-1

MOBILE ADHOC NETWORKS

(Professional Elective-III)

COURSECODE: IT412 A

L T P E O

3 0 0 1 2

CREDITS: 3

Sessional Marks: 40

External Marks: 60

End Exam: 3 Hrs

Prerequisite(s): Computer Networks

Course Objectives:

1. To give an understanding of the basic knowledge on wireless LANs, adhoc wireless networks, and protocols.
2. To give an overview of networking principles and how the wireless protocols, routing, operate.
3. To know the basic background in wireless networks that will allow them to practice in this field and that will form the foundation for more advanced courses in networking.
4. To acquire the basic skills needed to write network applications in software tools i.e Netsim, NS2/NS3.
5. To give an overview of the issues and challenges in adhoc networks.

Course Outcomes:

After completion of this course, the students will be able to:

CO-1: Implement a routing algorithm.

CO-2: Gain knowledge on different layers and services.

CO-3: Identify the issues involved in wireless network security.

CO-4: Find various QoS issues and energy management schemes.

Mapping of Course Outcomes with POs and PSOs

COs/POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	3						3	1	2	1
CO2	3	1	1											1
CO3	3	2	1			3					2	1	1	1
CO4	3					2	1				2	1	1	

UNIT – I

8 Lectures

Wireless LANS AND PANS: Introduction Fundamentals of WLANS, IEEE 802.11 Standard, HIPERLAN Standard, Bluetooth.

Wireless Internet: Wireless Internet, Mobile IP, TCP in wireless Domain WAP.

Learning outcomes: At the end of this unit, the students will be able to

- Learn different Wireless local area networks and personal area networks.
- Learn the mobile internet protocol.

UNIT – II

10 Lectures

Adhoc Wireless Networks: Introduction in Ad-Hoc wireless Networks, Ad-Hoc Wireless internet.

MAC Protocols For Adhoc Wireless Networks: Introduction, issues in designing a MAC protocol for adhoc wireless networks, design goals, classification of MAC protocols, contention based protocols.

Learning outcomes: At the end of this unit, the students will be able to

- Learn basics of wireless ad hoc networks
- Learn the different MAC protocols in wireless adhoc networks

UNIT – III

12 Lectures

Routing Protocols: Introduction, issues in designing a routing protocol for adhoc wireless networks, classification, table-driven routing protocols, on-demand routing protocols, hybrid routing protocols, hierarchical routing protocols, power-aware routing protocols.

Transport Layer And Security Protocols: Introduction, issues in designing a transport layer protocol for adhoc wireless networks, design goals of a Transport Layer Protocol for Ad-Hoc Wireless Networks, classification of Transport Layer Solutions, other Transport Layer Protocol for Ad-Hoc wireless Networks, Security in adhoc wireless networks.

Learning outcomes: At the end of this unit, the students will be able to

- Learn different routing protocols at network layer
- Learn different routing protocols at transport layer and security issues.

UNIT – IV

12 Lectures

Quality Of Service: Introduction, issues and challenges in providing QoS in adhoc wireless networks, classification of QoS solutions, MAC layer solutions, network layer solutions, QoS frameworks for adhoc wireless networks.

Learning outcomes: At the end of this unit, the students will be able to

- Learn different Quality Of Service solutions
- Learn the framework for MANETs

UNIT – V

12 Lectures

Energy Management: Introduction, need for energy management in adhoc wireless networks, classification of energy management schemes, battery management schemes, transmission power management schemes, system power management schemes.

Learning outcomes: At the end of this unit, the students will be able to

- Learn different energy management schemes
- Recollect the power-aware routing protocols

TEXT BOOKS:

1. Adhoc wireless networks architecture and protocols, C. Siva Ram Murthy, B.S. Manoj (2004), Prentice Hall of India, NewDelhi. [Unit-1,2,3,4,5]
2. Wireless Adhoc and sensor networks, protocols, performance and control, Jagannathan Sarangapani (2007), CRC press, NewDelhi. [Unit-4]

REFERENCES:

1. Adhcmobile wireless networks protocols & systems, C. K. Toh (2009), Pearson Education India, NewDelhi.
2. Wireless sensor networks, C .S. Raghavendra, Krishna M. Sivalingam (2004), Springer Science, USA.

Note: Newly introduced Syllabus

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Enterprenuership
Mobile Adhoc Networks	IT412	2022	Wireless LANS AND PANS, Wireless Internet, MAC Protocols For Adhoc Wireless Networks, Routing Protocols, Transport Layer And Security Protocols, Quality Of Service, Energy Management	Mapping with Skill development

SOFT COMPUTING
(Professional Elective – III)

COURSE CODE: IT412 B

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Artificial Intelligence

Course Objectives

The course would aim to make the student understand the basic idea of problem solving through the principles of soft computing, which would be seen as a well-balanced integration of fuzzy logic, evolutionary computing, and neural information processing.

1. To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
2. To familiarize with genetic algorithms.
3. To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Recognize the feasibility of applying a soft computing methodology for a particular problem.

CO-2: Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

CO-3: Apply genetic algorithms to combinatorial optimization problems.

CO-4: Apply neural networks to pattern classification and regression problems.

Mapping of Course Outcomes with POs and PSOs

COs/POs- PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	2	1	1	1				1	3	2
CO2	3	3	3	3	2	1	1	1				1	3	2
CO3	3	3	3	3	3	1	1	1				1	3	2
CO4	3	3	3	3	3	1	1	1				1	3	2

UNIT I

9 Lectures

Fuzzy Logic: Fuzzy Set Theory: Basic Definition and Terminology, Set Theoretic Operations, MF Formulation and Parameterization, MF of two dimensions, Fuzzy Union, Intersection and Complement.

Learning outcomes: At the end of this unit, the students will be able to

- understand the basics of fuzzy logic
- illustrate the operations on fuzzy logic

UNIT II

9 Lectures

Fuzzy Rules and Fuzzy Reasoning: Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Fuzzy Reasoning. Fuzzy Inference System Introduction, Mamdani Fuzzy models, Other Variants, Sugeno Fuzzy Models, Tekamoto Fuzzy Models.

Learning outcomes: At the end of this unit, the students will be able to

- explore different types of fuzzy models
- apply fuzzy models to real world applications

UNIT III

9 Lectures

Genetic Algorithms: Fundamentals of Genetic Algorithms: Basic Concepts Creation, Offspring's Encoding, Fitness functions, Reproduction, Genetic Modelling: Inheritance Operators, Cross over, Inversion and detection, Mutation operator, Bitwise operators.

Learning outcomes: At the end of this unit, the students will be able to

- understand the importance of genetic algorithms
- explore the applications of genetic algorithms

UNIT IV

9 Lectures

Artificial Neural Networks: Introduction, Architecture, Back Propagation and feed Forward Networks, Offline Learning, Online Learning.

Supervised Learning of Neural Networks: Introduction, Perceptrons, Adaline Back Propagation Multilayer Perceptrons, Back Propagation Learning Rules, Methods of Speeding. Radial Basis Function Networks, Functional Expansion Networks.

Learning outcomes: At the end of this unit, the students will be able to

- understand the basics of neural networks
- explore the importance of neural networks in supervised learning

UNIT V

9 Lectures

Neuro-Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

Learning outcomes: At the end of this unit, the students will be able to

- understand the architecture of neuro-fuzzy systems
- understand the framework of neuron functions

TEXT BOOKS

1. J.S.R. Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing” PHI/Pearson Education, New Delhi 2004.

REFERENCES

1. T. J. Ross, “Fuzzy Logic with Engineering Applications.” TMH, New York, 1997.
2. D. E. Goldberg, Genetic Algorithms in Search Optimization and Machine Learning, Addison Wesley, 3rd Ed.
3. B. Kosko, Neural Network and fuzzy systems, Prentice Hall of India, 2006

4. Kecman, Learning and Soft Computing, Pearson, 1st Ed, 2001.

Note: No change in syllabus w.r.t R15.

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Soft Computing	IT412	R15	Back Propagation and feed Forward Networks Hybrid Learning Algorithm	Skill development

ORGANIZATIONAL BEHAVIOUR

(Professional Elective – III)

COURSE CODE: IT412 C

L P T E O

3 0 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Basic knowledge of general Management

Course Objectives

1. To help the students to develop cognizance of the importance of human behaviour.
2. To enable students to describe how people behave under different conditions and understand why people behave as they do.
3. To provide the students to analyse specific strategic human resources demands for future action.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Demonstrate the applicability of the concept of organizational behaviour to understand the behaviour of people in the organization.

CO-2: Demonstrate the applicability of analysing the complexities associated with management of individual behaviour in the organization.

CO-3: Analyse the complexities associated with management of the group behaviour in the organization.

CO-4: Demonstrate how the organizational behaviour can integrate in understanding the motivation (why) behind behaviour of people in the organization.

Mapping of Course Outcomes with POs and PSOs

COs/POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	1	2	1	2	1	2	2	1	1
CO2	1	1	1	1	1	1	2	1	2	1	2	2	1	1
CO3	1	1	1	1	1	2	2	1	2	1	2	2	1	1
CO4	1	1	1	1	1	2	3	1	2	1	2	2	1	1

UNIT-I

9 Lectures

Meaning, Fundamental concepts, Definition, Approaches to OB, Characteristics and limitations of OB, Challenges and Opportunities of OB, Models of OB.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the Fundamental concepts of Organizational Behaviour.
- Understand the Challenges and Opportunities of OB.

UNIT-II

9Lectures

Personality: Definition, Features, Big five model, MBTI, Johari Window, Managerial Implications of Personality. Perceptions and Attributions: Definition, Features, factors affecting perception, Process. Attribution, perceptual and attribution errors, Managerial Implications of Perception.

Learning outcomes: At the end of this unit, the students will be able to

- Demonstrate the concepts of Managerial Implications of Personality.
- Understand the Managerial Implications of Perception.

UNIT-III

9Lectures

Learning: Definition, Features, Classical and operant conditioning, social learning theory, Behavioural modification. Attitude: Definition, Features, ABC model of Attitude, Managerial Implications of Attitude.

Learning outcomes: At the end of this unit, the students will be able to

- Analyse Behavioural Modification.
- Understand the Managerial Implications of Attitude.

UNIT-IV

9Lectures

Motivation: Concept, Definition, Features, Types of Motivation, Process, Managerial Implications of Motivation. Leadership: Concept, Definition, Leadership Styles, Transactional and Transformational Leadership, Leadership development.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the Managerial Implications of Motivation.
- Understand the Transactional and Transformational Leadership.

UNIT-V

9Lectures

Groups and Teams: Definition, Features, Group development stages, Group vs. Teams, Managing and developing effective teams. Conflict Management: Definition, Features, Types of Conflict, Conflict Resolution Strategies, Relationship between Conflict and Performance.

Learning outcomes: At the end of this unit, the students will be able to

- Demonstrate the concepts of Group development stages.
- Analyse the Relationship between Conflict and Performance.

TEXT BOOKS

1. Robbins, S. P., & Judge, T. (2013). Organizational behavior (15th ed.). Boston: Pearson.

REFERENCES

1. Nelson, D , Quick, J.C., & Khandelwal, P., (2011). ORGB . Cengage Learning.
2. Newstrom J. W., & Davis, K. (2011). Human behavior at work (12th ed.). Tata McGraw Hill
3. Pareek. U. (2010). Understanding Organizational Behavior (2nd ed.). Oxford University Press
4. Schermerhorn, J. R., Osborn, R.N., Hunt, M.U.J (2016). Organizational Behavior (12th ed.). Wiley.

Change of Syllabus

New Subject

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Enterpen uership
Organization al Behaviour	IT412	R19	Managerial Implications of Personality Conflict Management	Entrepreneurship

WEB SECURITY
(Professional Elective – III)

COURSE CODE: IT412 D

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

PREREQUISITE: Basic knowledge of Computer Networks and various types of attacks.

COURSE OBJECTIVE:

1. This course provides the foundation for understanding the key issues associated with securing web applications.
2. The purpose of this course is to provide the physical and host security for the servers.
3. Understand how to control access to the web content..

COURSE OUTCOMES:

After completion of this course, the students will be able to:

CO1: Analyze the risks associated with problem identification in web security.

CO2: Minimize the risks by minimizing services of the host computer to secure.

CO3: Maintain security for web applications and for digital payments.

CO4: Apply control access methods for web content.

Mapping of Course Outcomes with POs and PSOs

COs/POs- PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2		2	2	2	2	1		3	3	2
CO2	1	2	2	2		2	2		2	1		3	3	2
CO3	1	2	3	2	1	3	2	2	3	3	2	3	3	3
CO4	1	2	3	2	2	3	2	2	3	3	3	3	3	3

UNIT 1:

9 Lectures

The Web Security Landscape- The Web Security Problem, Risk Analysis and Best Practices, Cryptography and the Web - Cryptography and Web Security, Working Cryptographic Systems and Protocols- Offline Encryption Systems, PGP/OpenPGP, S/MIME, Online Cryptographic Protocols and Systems, Legal Restrictions on Cryptography

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the web security problem and analyze the risks in it.
- Know the legal restrictions on cryptography.

UNIT 2:**9 Lectures**

Physical Security for Servers: Planning for the Forgotten Threats, Protecting Computer Hardware, Protecting your data, Story- A failed site inspection.

Host Security for Servers: Current host security problems, Securing the host computer, Minimizing risk by minimizing services, Operating securely, Secure remote access and content updating, Firewalls and the web.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand how security will be provided to the servers.
- Understand the risk minimization.

UNIT 3:**9 Lectures**

Securing web applications: Securely using fields, hidden fields and cookies, Rules for programming languages, Using PHP securely, writing scripts that run with additional privileges, connecting to databases.

Deploying SSL service certificates: Planning for your SSL server, Creating SSL servers with free BSD, installing an SSL certificate on Microsoft IIS, Obtaining certificate from a commercial CA.

Securing Web services: Protecting via Redundancy, Protecting your DNS, Protecting your domain registration.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand how to maintain security for web applications
- Deploy the SSL service certificate.
- Protect web services via redundancy and also understand the role of DNS protection.

UNIT 4:**9 Lectures**

Controlling access to your web content: Access control strategies, controlling access with Apache, controlling access with Microsoft IIS

Client side digital certificates- client certificates, A tour of the verisign digital ID center.

Code Signing and Microsoft's Authenticode- Why code signing, Microsoft authenticode technology, other code signing methods.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the access control strategies to control the access to web content.
- Understand the role of signing.

UNIT 5:**9 Lectures**

Pornography, Filtering Software, and Censorship: Pornography Filtering, PICS, PSACi.

Privacy Policies, Legislation, and P3P: Policies That Protect Privacy and Privacy Policies, Children's Online Privacy Protection Act, P3P.

Digital Payments: Charga-Plates, Diners Club, and Credit Cards, Internet based payment systems, How to evaluate a credit card payment system.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand various filtering softwares.
- Know about various policies that protect privacy.
- Understand how to evaluate digital payments.

TEXT BOOKS:

1. “Web Security, Privacy and Commerce”, 2nd edition, Simson Garfinkel, O’Reilly, 2002.

REFERENCES:

1. “E-commerce: Business, Technology, Society”, 3rd edition, Kenneth C. Laudon and Carol Guercio Traver, Addison Wesley, 2007

CHANGE OF SYLLABUS

New Syllabus

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/ Enterprenuership
Web security	IT412	2022	Protecting your data, Securing the host computer, Minimizing risk by minimizing services, Operating securely, Secure remote access and content updating, Firewalls and the web, Rules for programming languages, Using PHP securely, writing scripts that run with additional privileges, connecting to databases, Protecting via Redundancy, Protecting your DNS, Protecting your domain registration, code signing, Pornography Filtering, Charga-Plates, Diners Club, and Credit Cards, Internet based payment systems, How to evaluate a credit card payment system.	Employability & Skill development

SOFTWARE TESTING METHODOLOGIES

Professional Elective- III

COURSE CODE IT412 E

L P T E O

3 0 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

Pre-requisite(s): Software Engineering

Course Objectives:

1. To get familiar the students about basic concepts of software testing and its techniques.
2. To study in detail the process of performing the black box and white box testing approaches with examples.
3. To study about the various test cases and advanced concepts of object oriented testing.

Course Outcomes:

After completion of the course, the student will be able to:

CO-1: Identify the basic needs for developing a test tool to support test automation.

CO-2: Analyze and evaluate the verification and Validation process in Software Testing.

CO-3: Apply software testing methods and modern software testing tools for testing the projects.

CO-4: Analyze the problems by designing and selecting software test models, criteria, strategies, and methods and how to maintain quality of software.

Mapping of Course Outcomes with POs and PSOs

COs/POs- PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	3	2	1	1			3	3	3	3	3	3
CO2	1	3	3	2	1		1		3	3	3	3	2	3
CO3	1	2	3		2	1			3	3	3	3	3	3
CO4	1	2	3	3	3		1	1	3	3	3	3	3	3

UNIT-I:

10 Lectures

Software Testing: Introduction, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to development life cycle, Software Testing Methodology.

Learning Outcomes: At the end of this unit student will be able to learn

- Software Testing its myths and facts
- Software Testing lifecycle
- Methodology for Software Testing.

UNIT-II:**7 Lectures**

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation

Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing

Learning Outcomes: At the end of this unit student will be able to learn the

- difference between Verification and Validation
- Verification activities
- Validation activities

UNIT-III:**12 Lectures**

Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

Dynamic Testing II: White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

Static Testing: Inspections, Structured Walkthroughs, Technical reviews

Regression testing: Progressive Vs regressive testing, Regression testing techniques

Learning Outcomes: At the end of this unit student will be able to learn

- To evaluate different black box testing techniques
- Evaluate white box testing techniques
- Evaluate regression testing techniques.

UNIT-IV:**10 Lectures**

Efficient Test Suite Management: Test case design. Why does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite

Learning Outcomes: At the end of this unit student will be able to learn

- Analyze types of test case prioritization and techniques
- To synthesis efficiency of test suite management

UNIT-V:**8 Lectures**

Software Quality Management: Software Quality, Broadening the Concept of Quality, Quality Cost, Benefits of Investment on Quality, Quality Control and Quality Assurance, Software Quality Metrics, SQA Models

Testing Process Maturity Models: Need for Test Process Maturity, Measurement and Improvement of a Test Process, Test Process Maturity Models

Learning Outcomes: At the end of this unit student will be able to learn

- Quality Assurance with models and techniques
- Identify Testing Process Maturity Models

CASE STUDY (Not considered in the examination): introduction Selenium testing tool - Installation process, how to write and run a test case in Selenium.

TEXT BOOKS:

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford University Press 2010

REFERENCE BOOKS:

1. Software Testing, Principles, techniques and Tools, M G Limaye, TMH, 2009.
2. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley 2006

CHANGE OF SYLLABUS

New Course

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Enterprenuership
Software Testing Methodologies	IT412	R-20	Skill Development: Black Box testing techniques, White-Box Testing Techniques	Skill Development

CLOUD COMPUTING

Professional Elective-4

COURSE CODE IT413 A

L P T E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Fundamentals of Databases, Basics of Security and Privacy

Course Objectives

1. Get into insights of essential characteristics of cloud computing, architecture, and applications.
2. Understand the underlying principle of cloud virtualization, cloud storage, data management, and data visualization.
3. Understand different cloud programming platforms and tools to develop and deploy applications on the cloud.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Illustrate the principles and paradigm of Cloud Computing.

CO-2: Explore the Service Models and the role of Virtualization Technology.

CO-3: Categorize the Architectural Designs, and Manage the Resources of a cloud.

CO-4: Apply security aspects, design and build a cloud service.

Mapping of Course Outcomes with POs and PSOs

COs/POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	1	3	1	1	1	2	1		1	3	2
CO2	2	3	3	3	3	2	1	1	2	1		1	3	2
CO3	1	3	3	3	3	2	1	1	2	1		1	3	2
CO4	3	3	3	3	3	2	2	1	2	1		2	3	2

UNIT-I Introduction to Cloud Computing (Text Book 1)

8 Lectures

Evolution of Cloud Computing System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Desired Features of Cloud Computing, Challenges and Risks, Benefits and Disadvantages of Cloud Computing, Layers and Types of Cloud; Desired Features of a Cloud.

Learning outcomes: At the end of this unit, the students will be able to

- Understand features and tasks that can be performed by the cloud.
- Describe and differentiate types of cloud.

UNIT-II Cloud Infrastructure and Virtualization (Text Book 1)**12 Lectures**

Infrastructure as a Service (IaaS); On-demand Provisioning; Elasticity in Cloud; Platform as a Service (PaaS); Software as a Service (SaaS); XaaS Examples of IaaS, SaaS, and PaaS Providers; Types of Cloud: Public, Private and Hybrid Clouds.

Cloud Resource Virtualization - Introduction to virtualization Different approaches to virtualization Hypervisors Machine Image Virtual Machine (VM) Process VM vs System VM Resource Virtualization: Server, Storage, Network Full Virtualization vs Para Virtualization Operating System Support for Virtualization Virtual Machine (resource) Provisioning and Manageability VM Placement, VM Migration

Learning outcomes: At the end of this unit, the students will be able to

- Define virtualization.
- Understand the notion of IaaS, PaaS, and SaaS.

UNIT-III Architectural Design (Text Book 1)**8 Lectures**

Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, InterCloud Resource Management, Resource Provisioning, and Platform Deployment, Global Exchange of Cloud Resources. Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards.

Learning outcomes: At the end of this unit, the students will be able to

- Explain the layered architecture of cloud.
- Explore cloud standards.

UNIT-IV Cloud Security (Text Book 1)**12 Lectures**

Cloud Security: Security Overview, Cloud Security Challenges, and Risks, Software-as-a-Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security,

Identity and Presence, Identity Management and Access Control, Autonomic Security Establishing Trusted Cloud computing, Secure Execution Environments, and Communications, Identity Management and Access control Identity management, Access control, Autonomic Security Storage Area Networks, Disaster Recovery in Clouds.

Learning outcomes: At the end of this unit, the students will be able to

- Describe requirements for security.
- Explore IAM (Identity Access Management)

UNIT-V Case-Studies (Text Book 2)**5 Lectures**

Cloud-Based Case-Studies: Amazon EC2 (Virtualization), S3 (Storage), VPC (Virtual Private Cloud), IAM (Security), CloudWatch (Deployment, Management service).

Learning outcomes: At the end of this unit, the students will be able to

- Describe features like storage and security.
- Explore well-known cloud services

TEXT BOOKS

1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley (Unit-I to IV)
2. Dan C Marinescu, Cloud Computing, Theory, and Practice, MK Elsevier (Unit-V)

REFERENCES

1. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai Selvi McGraw Hill Publication (Unit-I to IV)
2. Miller Michael, "Cloud Computing: Web-Based Applications that Change the Way You Work and Collaborate Online", Pearson Education India (Unit-I to IV)
3. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing – A Practical Approach, Tata McGraw Hill Education (Unit-I to IV)

ONLINE RESOURCES

1. <https://www.geeksforgeeks.org/cloud-computing/>
2. https://www.tutorialspoint.com/cloud_computing/cloud_computing_virtualization.htm
3. <https://www.javatpoint.com/cloud-computing-architecture>

CHANGE OF SYLLABUS

Previous Unit No(R15)	Current Unit No (R19)	Changes Incorporated
Unit-3	Unit-3	<u>Topics Ignored</u> <ul style="list-style-type: none">• Programming Models in Cloud 1% Change
Unit-5	Unit-4 Cloud Security	<u>Topics Ignored</u> <ul style="list-style-type: none">• Advanced topics: Mobile• Media, Interoperability, and standards The topics are reorganized 1% change
-	Unit-5 Case-Studies	<u>Topics included</u> <ul style="list-style-type: none">• AWS cloud services like EC2, S3, VPC, Cloud Watch 4% change has taken place
Overall change: 6%		

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Cloud Computing	IT413	2022	Amazon EC2 (Virtualization), S3 (Storage), VPC (Virtual Private Cloud), IAM(Security), CloudWatch	Employability

DEEP LEARNING
(Professional Elective-IV)

COURSE CODE IT413 B

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

Pre requisite(s): Probability, Linear Algebra, Knowledge of machine learning concepts.

Course Objectives

1. To present the mathematical, statistical and computational challenges of building neural networks.
2. To acquire the knowledge on fundamental concepts of deep learning.
3. To enable the students to know deep learning techniques to support real-time applications.

Course Outcomes

After completion of the course, the students will be able to:

CO-1: Demonstrate the mathematical foundation of neural network.

CO-2: Analyze the Learning Networks in modeling real world systems.

CO-3: Identify the appropriate architectures and applications to train the deep models in different domains.

CO-4: Apply optimization strategies for large scale applications.

Mapping of Course Out comes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				1		1	1	1		1	3	2
CO2	2	3	2					2	2	2		1	3	2
CO3	3	2	2	3	3	1	2	3	3	1	1	1	3	2
CO4	2	3	3	3	3	2	2	1	1	1		1	3	2

UNIT-I

9Lectures

Introduction to Deep Learning: Why Deep Learning? History of Deep Learning, What is a neural network? McCulloch Pitts Neuron, Bayes' Rule.

Foundations of Neural Networks and Deep Learning: Scalars, Vectors, Thresholding Logic, Variance and Covariance Perceptrons, PCA, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feed forward Neural Networks, Representation Power of Feed forward Neural Networks, Back propagation.

Learning out comes: At the end of this unit, the students will be able to

- Describe basics of mathematical foundation that will help the learner to understand the concepts of Deep Learning.
- Understand and describe model of deep learning

UNIT-II

9Lectures

Deep Learning Models: Building Blocks of Deep Learning, Architectures of Deep Learning: Unsupervised Pre trained Networks, Convolution Neural Networks (CNN's), Restricted Boltzmann Machines.

Additional Deep Learning Models: Autoencoders, Recurrent Neural Networks. Recursive Neural Tensor Nets, Deep Belief Nets.

Learning out comes: At the end of this unit, the students will be able to

- Understand and learn the various deep learning models.
- Able to apply the appropriate model.

UNIT-III

9 Lectures

Introduction to various CNN Architectures: Convolutional Neural Networks: LeNet, Alex Net, VGG Net, Google Net, Res Net.

Recurrent Neural Networks: Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs.

Learning outcomes: At the end of this unit, the students will be able to

- Distinguish the concepts of CNN and RNN.
- Able to apply the appropriate architecture to train the models.

UNIT-IV

9 Lectures

Generative modeling algorithms: Generative Adversarial Networks, Discriminator.

Applications: Diverse applications: Image captioning, visual question answering, Deep Reinforcement Learning and Network Visualization.

Learning outcomes: At the end of this unit, the students will be able to

- Able to train the model using GAN
- Solve the Real time problems using suitable model.

UNIT-V

9 Lectures

Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms.

Optimization Strategies: Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithm

Learning outcomes: At the end of this unit, the students will be able to

- Understand the various strategies.
- Able to apply the suitable optimization strategy.

TEXT BOOKS

1. Neural Networks and Deep Learning: A Textbook Book by Charu C. Aggarwal (Unit-2: Ch-2, 4, 6, 7; Unit-3: Ch-3,7 & 8; Unit-4: Ch-10)
2. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press, 2016 (Unit-1: Ch-2, 3, 4, 5 & 6; Unit-5: Ch-8).

REFERENCE BOOKS

1. Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition, 2017.
2. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
3. Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O'Reilly, Shroff Publishers, 2019.

ONLINE RESOURCES

1. <http://www.saying.ren/slides/opt4dl>
2. <https://deeplearningtutorials.readthedocs.io/en/latest/lenet>
3. <http://neuralnetworksanddeeplearning.com/index.html>
4. <https://www.deeplearningbook.org/>

CHANGE OF SYLLABUS:

The course is newly introduced for R-19 syllabus

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Entrepreneurship
DEEP LEARNING	IT413	R19 (2022)	Google Net, Res Net, Deep Reinforcement Learning, Network Visualization.	Employability

INTELLECTUAL PROPERTY RIGHTS

(Professional Elective-IV)

COURSE CODE IT413 C

L P T E O

3 0 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

PREREQUISITE(S): Not required.

COURSE OBJECTIVES

1. Understand intellectual property rights and law of copy rights.
2. Procedure to apply various patents for innovative ideas and products.
3. Aware various trade laws in the field of business.

COURSE OUTCOMES

After completion of this course, the students will be able to:

CO-1: Analyse the importance of Intellectual property rights and its usage.

CO-2: Illustrate various international laws in trade policies.

CO-3: Identify the international trade secrets trade secret litigation.

CO-4: Analyse international trade and copy right laws

Mapping of Course Outcomes with POs and PSOs

COs/POs- PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	1	2	1	2	1	2	2	1	1
CO2	1	1	1	1	1	1	2	1	2	1	2	2	1	1
CO3	1	1	1	1	1	2	2	1	2	1	2	2	1	1
CO4	1	1	1	1	1	2	2	1	2	1	2	2	1	1

UNIT I (Textbook 1)

10 Lectures

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the importance of intellectual property rights.
- Understand the types of intellectual property.

UNIT II (Textbook 1 & 3)

10 Lectures

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Geographical Indications: Concept, definition, significance in business, registration of GI, GI and Trade Marks.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the purpose of trademarks
- Identify Trademark rights and Geographical Indications.

UNIT III (Textbook 1 & 2)**9 Lectures**

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the fundamentals of copy right law.
- Analyse copy right ownership issues.

UNIT IV (Textbook 1)**9 Lectures**

Trade Secrets: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, protection for submission, trade secretes litigation

Learning outcomes: At the end of this unit, the students will be able to

- Understand Trade secretes law
- Analyse trade secretes litigation

UNIT V (Textbook 2)**9 Lectures**

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international trade mark law.

Learning outcomes: At the end of this unit, the students will be able to

- Analyse the patent law
- Analyse the copyright law

TEXT BOOKS

1. Deborah, E. Bouchoux, Cengage learning, Intellectual property right,
2. Prabuddha Ganguli, Intellectual property right – Unleashing the knowledge economy, Tata Mc Graw Hill Publishing Company Ltd.
3. The protection of geographical indication (Law and Practice) 2nd Edition, by Michael Blakeney, 2019, ISBN: 9781788975407.

REFERENCES

1. A guide to filing a design patent application. USPTO, 2009.
2. How to make patent drawings yourself: prepare formal drawings required by the U.S. Patent Office. By Jack Lo and David Pressman. Nolo Press, 2007.

CHANGE OF SYLLABUS**R15 to R19 no change**

Current Unit No (R19)	Current Unit No (R20)	Changes Incorporated(content added)
Unit-2	Unit-2	Geographical Indications: Concept, definition, significance in business, registration of GI, GI and Trade Marks.
Overall change:5 %		

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/ Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Intellectual Property Rights	IT422	R15	purpose of trademarks, copy right ownership issues	Skill development

DIGITAL FORENSICS

(Professional Elective-IV)

COURSE CODE IT413 D

L P T E O

3 0 0 1 2

CREDITS: 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

PREREQUISITE(S): Cyber Security

COURSE OBJECTIVE:

1. To understand the basic digital forensics techniques for conducting the forensic examination on different digital devices.
2. To understand how to examine digital evidences such as the data acquisition, identification analysis.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

CO-1: Define the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world.

CO-2: Underline the need of digital forensic and role of digital evidences.

CO-3: Illustrate the methodology of incident response and various security issues in ICT world and identify digital forensic tools for data collection.

CO-4: List the method to generate legal evidence and supporting investigation reports and will also be able to use various digital forensic tools.

Mapping of Course Outcomes with POs and PSOs

COs/POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1			3	2	3				2	2	2
CO2	3	2	1	1		3	2	3				2	2	3
CO3	2	3	3	3	3	2	2	3				3	3	2
CO4	2	3	3	2	2	2	2	3				3	2	2

UNIT –I Introduction to forensics (Text book-I)

8 Lectures

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the fundamentals of digital forensics.
- Identify legal procedures in relation to cyber crime.

UNIT – II Investigations (Text book-I)

8 Lectures

Understanding Computing Investigations–Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the procedures for conducting investigations.
- Conduct investigations in relation to cyber crime.

UNIT – III Data Acquisition and its tools (Text book-I)**10 Lectures**

Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.

Case study on disk analysis tools- Autopsy/the Sleuth Kit, volatility

Learning outcomes: At the end of this unit, the students will be able to

- Handle data acquisition tools .
- Analyze several formats of data during a forensic case

UNIT – IV Case Analysis (Text book-I)**10 Lectures**

Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case.

Case study on Digital forensic tool kit –FTK toolkit(FTK user guide book)

Learning outcomes: At the end of this unit, the students will be able to

- Idealize a crime scene.
- Analyze an crime scene and collecting evidences.

UNIT – V Digital forensics tools (Text book-II)**10 Lectures**

Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool.

Learning outcomes: At the end of this unit, the students will be able to

- Understand various tools in relation to cyber forensics.
- Analyze several crime related to E-mail.

TEXT BOOKS:

1. Warren G. Kruse II and Jay G. Heiser, “Computer Forensics: Incident Response essentials”, Addison Wesley, 2002.(unit-1,2,3&4)
2. Nelson, B, Phillips, A, Enfinger, F, Stuart, C., “Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5. (unit-5)

REFERENCE BOOKS:

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.
2. FTK User guide book

CHANGE OF SYLLABUS:

New Syllabus

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Enterprenuership
Digital forensics	IT 412 PE-IV	2022	Procedure for corporate High-Tech investigations, understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, remote network acquisition tools, other forensics acquisitions tools, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case	Employability

SOFTWARE PROJECT MANAGEMENT

Professional Elective-IV

COURSE CODE: IT413 E

L P T E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks :60

End Exam: 3 Hours

PRE-REQUISITE(S): Software models and Software testing

COURSE OBJECTIVES:

This course is aimed at introducing the primary important concepts of project management related to managing software development projects.

1. They will also get familiar with the different activities involved in Software Project Management.
2. They will also come to know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

CO-1: Determine the principles of software project management.

CO-2: Demonstrate cost estimation.

CO-3: Analyse risk management and control the project.

CO-4: Estimate the Quality of software project.

Mapping of Course Outcomes with POs and PSOs

COs/POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	1	3	3	3	2	3	3
CO2	3	3	3	3	3	3	-	1	3	3	3	2	3	3
CO3	2	3	3	3	3	2	-	2	3	3	3	2	3	3
CO4	2	2	2	2	2	3	-	1	3	3	3	2	3	3

UNIT-I:

8 Lectures

Project evaluation and project planning :Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

Learning Outcomes: At the end of this unit student will be able to learn

- Identify the importance of project management control
- Summarize the use of Risk evaluation

UNIT-II:**8 Lectures**

Project life cycle and effort estimation : Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points

Learning Outcomes: At the end of this unit student will be able to learn

- Summarize the Agile methods to produce shorter development cycles.
- Listing Cost estimation techniques.

UNIT-III:**10 Lectures**

Activity planning and risk management: Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring .

- Measuring internal product attributes.
- Identify the importance of CRM method.

UNIT-IV:**10 Lectures**

Staffing in software projects : Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

Learning Outcomes: At the end of this unit student will be able to learn

- Estimate goods
- Dealing problems of current estimation methods

UNIT-V:**10 Lectures**

Software Project Management: General management, introduction to software project management, Conventional software management, project initiation, feasibility study, project planning, project evaluation, resource allocation, project monitoring, project control, case studies

Learning Outcomes: At the end of this unit student will be able to learn

- Apply different techniques to Monitoring the project
- Measure the software quality

Textbooks:

1. Software Project Management -Bob Hughes, Mike Cotterell and Rajib Mall: – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

Reference Books:

1. “Effective Software Project Management” SRobert K. Wysocki – Wiley Publication,2011.
2. “Software Project Management”-Walker Royce: Addison-Wesley, 1998.

CHANGE OF SYLLABUS

Previous Unit No(R15)	Current Unit No (R19)	Changes Incorporated
Unit-2	Unit-2 Project life cycle and effort estimation	<u>Topics ignored</u> <ul style="list-style-type: none">• COCOMO II A Parametric Productivity Model - Staffing Pattern 8% concepts are removed
Unit-3	Unit-3 Activity planning and risk management	<u>Topics ignored</u> <ul style="list-style-type: none">• PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules. 8% concepts pertaining to applications and trends are removed
<u>Overall change: 16%</u>		

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Enterp renuership
Software Project Management	IT413	2021-22	<u>Employability:</u> Risk evaluation, Strategic program Management, Agile methods, Extreme Programming, SCRUM, Critical path (CRM) method Risk identification, Assessment, <u>Skill Development:</u> Monitoring, Working in teams, Decision making, Team structures , project monitoring, project control	Employabilty & Skill Development

CRYPTOGRAPHY & NETWORK SECURITY

COURSE CODE: IT414

L T P E O

3 0 0 1 3

CREDITS: 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3Hours

PREREQUISITE(S): Mathematical Foundations

COURSE OBJECTIVES:

1. Learn fundamentals of cryptography and its application to network security.
2. Understand network security threats, security services, and countermeasures. Including basic encryption techniques, cryptographic algorithms, authentication and digital signature, public key infrastructure, access control, security models, as well as their applications to IP security, Web security, trusted operating systems.
3. Understand vulnerability analysis of network security.
4. Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

CO-1: Identify some of the standard algorithms to encrypt and decrypt information.

CO-2: Develop strategies to protect organization information assets from common attacks.

CO-3: Identify how authentication is implemented in wireless systems

CO-4: Acquire knowledge on the role of a “professional computing practitioner” with particular regard to an understanding of legal and ethical issues.

Mapping of Course Outcomes with POs and PSOs

COs/POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2									
CO2	3	2	3			2						2		
CO3	1	1	2	3	1						2			
CO4	1		1					3						

UNIT –I

12 Lectures

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Mathematics of Cryptography: Integer Arithmetic, the extended Euclidean Algorithm, Modular Arithmetic, Matrices, Linear Congruence. Algebraic Structures, Basics of Groups, Rings, Prime numbers.

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks

Learning outcomes: At the end of this unit, the students will be able to

- Learn the different types of attacks.
- Learn the different cryptographic techniques.

UNIT – II

10 Lectures

Symmetric key Ciphers: Introduction, Algorithm modes and types, An overview of symmetric key cryptography, Modern Block Ciphers and Components of Modern Block Ciphers, Algorithms- DES, AES, IDEA, Blowfish, RC4, Differential and Linear Cryptanalysis.

Asymmetric key Ciphers: Principles of public key crypto systems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution, Diffie-Hellman Key exchange algorithm.

Learning outcomes: At the end of this unit, the students will be able to

- Learn the different Public key cryptographic techniques.
- Learn the different Private key cryptographic techniques.

UNIT – III

10 Lectures

Message Integrity, Message Authentication Algorithms and Hash Functions: Message integrity, Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures.

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

Database Security: The Need for Database Security, Database Management Systems, Relational Databases, SQL Injection attacks, DB Control, Inference, Database Encryption.

Learning outcomes: At the end of this unit, the students will be able to

- Learn the different Message authentication techniques.
- Learn the different authentication applications.
- Learn the security issues related to Database.

UNIT – IV

8 Lectures

E-Mail Security: E-mail System, Pretty Good Privacy, S/MIME

IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations.

Learning outcomes: At the end of this unit, the students will be able to

- Learn the different security at application layer.
- Learn the difference between PGP and S/MIME.

UNIT – V

10 Lectures

Web Security: Web security considerations, SSL Message Formats, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

Learning outcomes: At the end of this unit, the students will be able to

- Learn the different security at Transport layer
- Learn the different intruders and firewalls

TEXT BOOKS:

1. William Stallings, Cryptography And Network Security, 4th Edition, (Pearson Education/PHI). [Unit-1, 2,3,4,5]
2. Computer Security, Principles and practice, William Stallings, Pearson Education, 3rd Edition. [Unit-3-Chapter-5].

REFERENCES:

1. Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., New Delhi
2. Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi
3. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes-Ousley, Keith Strassberg TataMcgraw-Hill.

CHANGE OF SYLLABUS

Previous Unit No(R15)	Current Unit No (R19)	Changes Incorporated
Unit-1	Unit-1	<u>Topics included</u> <ul style="list-style-type: none"> • Integer Arithmetic, the extended Euclidean Algorithm, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, Basics of Groups, Rings, Prime numbers. <u>Topics ignored</u> <ul style="list-style-type: none"> • KeyDistribution, Diffie-Hellman Keyexchange algorithm. 10% concepts relevant to cryptography are included
Unit-2	Unit-2	<u>Topics included</u> <ul style="list-style-type: none"> • Modern Block Ciphers and Components of Modern Block Ciphers • Diffie-Hellman Key exchange algorithm 10% concepts relevant to cryptography are included
Unit-3	Unit-3	<u>Topics included</u> <ul style="list-style-type: none"> • Message integrity • Database Security 8% concepts relevant to cryptography are included
Unit-4	Unit-4	<u>Topics included</u> <ul style="list-style-type: none"> • E-mail System. 2% concepts relevant to cryptography are included
Unit-5	Unit-5	<u>Topics included</u> <ul style="list-style-type: none"> • SSL Message Formats 5% concepts relevant to cryptography are included
<u>Overall change: 35%</u>		

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
CRYPTOGRAPHY & NETWORK SECURITY	IT414	R15	Attacks on Computers and Computer Security, Cryptography: Concepts and Techniques, Symmetric key Ciphers, A Symmetric key Ciphers, Message Integrity, Message Authentication Algorithms and Hash Functions, E-Mail Security, IP Security, Web Security, Intruders, virus and Firewalls, Database Security	Mapping with Employability

FOUNDATION ON DATA SCIENCE

COURSE CODE IT415

L T P E O

2 1 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

PREREQUISITE(S): Probability and Statistics, Algorithms, Python Programming

COURSE OBJECTIVES

1. To identify the types of data, understand about how to collect the data, manage the data.
2. Familiarize the student about the concepts of data visualization and formal inference procedures.
3. Demonstrate the applications of data science, technologies for visualization.

COURSE OUTCOMES

After completion of this course, the students will be able to:

CO-1: Apply explorative data analysis for solving real world business problems, and effectively present results using data visualization techniques

CO-2: Apply social network analysis techniques and financial modelling techniques for the given problem.

CO-3: Apply principles of Data Science for the analysis of the given business problem and build recommendation engine.

CO-4: Apply classification and regression algorithms to build machine intelligence.

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	3			1	1	1		1	3	1
CO2	3	2	1	1	3			1	1	1		1	3	1
CO3	3	2	1	1	3			1	1	1		1	3	1
CO4	3	2	1	1	3			1	1	1		1	3	1

UNIT-I Introduction

9 Lectures

Introduction: What is Data Science? Statistical Inference, Exploratory Data Analysis, and Data Science Process: Statistical thinking in the Age of Big Data, Exploratory Data Analysis, The Data science process.

Learning outcomes: At the end of this unit, the students will be able to

- understand the basic concepts of data science
- Understand the data science process.

UNIT-II Algorithms 9Lectures

Machine Learning Algorithms: Three basic algorithms Linear Regression, k-Nearest Neighbour's (K-NN), k-means,

Spam Filters, Naïve Bayes, and Wrangling: Naïve Bayes, comparing Naïve Bayes to k-NN

Learning outcomes: At the end of this unit, the students will be able to

- Comparing the three basic machine learning algorithms

UNIT-III Financial Modelling

9Lectures

Logistic Regression: Classifiers, M6D Logistic Regression Case Study Time stamps and Financial Modelling:Timestamps, Financial Modelling

Learning outcomes: At the end of this unit, the students will be able to

- Apply Logistic regression classifier for binary classification problem
- Understand Financial Modeling

UNIT-IV Visualization

9Lectures

Recommendation Engines: Building a User-Facing Data Product at Scale: A Real World Recommendation Engine.

Data Visualization and Fraud Detection: Marks Data Visualization Projects, Data Science and Risk.

Learning outcomes: At the end of this unit, the students will be able to

- Implement Recommendation Engine
- Understand data visualization projects

UNIT-V Social Networks

9Lectures

Social Networks and Data Journalism: Social Network Analysis at Morning Analytics, social network analysis, terminology from social networks, morning side analytics, Data Journalism

Learning outcomes: At the end of this unit, the students will be able to

- understand the various concepts of social network analysis
- understand data journalism

Text Books

1. Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from the Frontline, O'Reilly,2013.

References

1. Python Data Science Handbook: Essential Tools for Working with Data, from Shroff/O'Reilly; First edition (1 January 2016)
2. Jure Leskovek, AnandRajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press, 2014.

Note: The course is newly introduced for R-19 regulations.

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Entrepreneurship
Foundation s of Data Science	IT415	2022	Three basic algorithms Linear Regression, k-Nearest Neighbour's (K-NN), k-means, A Real World Recommendation Engine.	skill development

DATA SCIENCE APPLICATIONS LAB

COURSE CODE IT416

L T P E O

0 0 3 0 3

CREDITS 1.5

Sessional Marks: 50

End Exam Marks: 50

End Exam: 3 hours

PREREQUISITE(S): Statistics, Python programming language

COURSE OBJECTIVES

1. To be able to formulate machine learning problems corresponding to different applications.
2. To understand a range of machine learning algorithms along with their strengths and weaknesses.
3. To be able to apply machine learning algorithms to solve problems of moderate complexity.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

CO-1: The implementation procedures for the ensembled and clustering machine learning algorithms

CO-2: Creating static, animated, and interactive visualizations using Matplotlib.

CO-3: Identify and apply Machine Learning algorithms to solve classification and regression problems.

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	3			1	1	1		1	3	1
CO2	3	2	1	1	3			1	1	1		1	3	1
CO3	3	2	1	1	3			1	1	1		1	3	1

S. No.	Program	Course Outcomes
1	Introduction to Python Libraries- Numpy, Pandas, Matplotlib, Scikit, Bokeh Data Visualization using Bar Graph, Pie Chart, Box Plot, Histogram, Line Plots, scatter plots Case Study: Analyze sports data and answer the following questions: Which country played the most matches. Top 3 countries who won the most matches. which country played most matches in home ground How was the performance of Sri Lanka Team which toured most foreign country Month in which matches are played	CO2
2	Perform Data exploration and pre-processing in Python. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.	CO2

S. No.	Program	Course Outcomes
3	Implement regularized Linear regression	CO3
4	Write a program to implement the Naive Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.	CO3
5	Write a program to demonstrate Regression analysis with residual plots on a given data set.	CO3
6	Build Machine Learning models using Ensembling techniques: Bagging, Stacking CO1 and Boosting	CO1
7	Write a program to demonstrate the working of the decision tree-based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.	CO3
8	Build model using VM with different kernels	CO3
9	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions using Python ML library classes.	CO3
10	Write a program to implement k-Means clustering algorithm to cluster the set of data stored in .CV file. Compare the results of various "k" values for the quality of clustering. Determine the value of K using Elbow method.	CO1

TEXT BOOKS

1. Python for Data Analysis, October 2012 Publisher(s): O'Reilly Media,
2. Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from the Frontline, 'Reilly, 2013.

CHANGE OF SYLLABUS:

The course is newly introduced for R-19 regulations

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Data Science Applications Lab	IT416	R19	<ul style="list-style-type: none"> • Data exploration • Implement the Naive Bayesian classifier • Demonstrate Regression analysis • Ensembling techniques • ID3 algorithm • Implement k-Nearest Neighbour algorithm • Implement k-Means clustering algorithm 	Skill development

MOBILE APPLICATION DEVELOPMENT LAB

(Elective Lab-2)

COURSE CODE: IT417 A

L P T E O

0 3 1 0 0

CREDITS 2.5

Sessional Marks: 50

End Exam Marks: 50

Exam: 3 Hours

Prerequisite:

Object oriented concepts, Java Programming, Database Concepts

Course Objectives:

1. Understand the basic concepts AppDevelopment
2. Be familiar with Android system and user interface

Course Outcomes:

After completion of this course, the students will be able to:

1. Demonstrate the basic concepts of Android Programming
2. Design and develop interfaces and basic applications
3. Develop and deploy Applications and web based apps.

Mapping of course Outcomes with Pos and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	2	1	2	3	3	3	2	2	2
CO2	2	3	3	3	3	3	1	2	3	3	3	2	2	3
CO3	3	3	3	3	3	3	1	2	3	3	3	3	2	3

UNIT I:

6 Lectures

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, building you First Android application, Understanding Anatomy of Android Application, Android Manifest file

Learning outcomes: At the end of this unit, the students will be able to

- Analyze fundamental advantages of java or Kotlin Programming
- Install and Use Android Studio IDE to perform basic applications.

UNIT II:

9 Lectures

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

Learning outcomes: At the end of this unit, the students will be able to

- Implement Activities, Services and Intents for Android Applications.
- Apply Broadcasts for Intents and apply permissions for apps.

UNIT III:

9 Lectures

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Learning outcomes: At the end of this unit, the students will be able to

- Design and implement interfaces for Applications.
- Analyze and design layouts and Animations for applications.

UNIT IV:

9 Lectures

Data Storage: Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Learning outcomes: At the end of this unit, the students will be able to

- Analyze API & SQLITE Databases, content providers.
- Manage different networks and developing and deployment of apps.

UNIT V:

9 Lectures

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Learning outcomes: At the end of this unit, the students will be able to

- Testing of Android application and Publishing.
- Manage different resources in a hierarchy.

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. R3. Android Application Development All in one for Dummies by Barry Burd, Edition:

Lab Programs:

WEEK 1:

1. a) Create an Android application that shows Hello + name of the user and run it on an emulator. **CO1**

(b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button. **CO1**

WEEK 2:

2. Create a screen that has input boxes for User Name, Password, and Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout. **CO2**

WEEK 3:

3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a “Back” button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener. **CO2**

WEEK 4:

4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents. **CO3**

5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification. **CO3**

WEEK 5:

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message. **CO3**

WEEK 6:

7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user. **CO3**

WEEK 7:

9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc. **CO3**

WEEK 8:

11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts. **CO3**
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time. **CO3**
13. Create an application that shows the given URL (from a text field) in a browser **CO3**

CHANGE OF SYLLABUS:

Syllabus was same as R15 but the pattern of the syllabus was changed.

R15 MCAD Theory and MCAD Lab are merged into R19 MCAD lab

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/ Entrepreneurship
MCAD Lab	IT417 PE A		Understanding Anatomy of Android Application, Android Manifest file, Context, Activities, Services, Intents, Android Manifest File, User Interface Screen elements, Designing User Interfaces, Android Data and Storage APIs, Sqlite, Testing Android applications, Publishing Android application, Managing Application resources	Employability

MATLAB
(Elective Lab-2)

COURSE CODE IT417 B

L T P E O
0 1 3 0 0

CREDITS 2.5

Sessional Marks: 50
End Exam Marks: 50
End Exam: 3 Hours

Prerequisite: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

Course Objectives:

1. To use Programming Environment
2. To use graph plots
3. To develop m files
4. To define control statements
5. To develop Manipulating Text

Course Outcomes:

After completion of this course, a student will be able to:

CO-1: Demonstrate Programming Environment

CO-2: Express proficiency in graph plots and Develop programs using m files

CO-3: Design programs using control statements and Develop applications using Manipulating Text

Articulation Matrix (CO - PO / PSO Mapping):

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	2	1	2	3	3	3	2	2	2
CO2	2	3	3	3	3	3	1	2	3	3	3	2	2	3
CO3	3	3	3	3	3	3	1	2	3	3	3	3	2	3

Unit I

Lectures 6

Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy. Programming Environment: Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays.

Learning outcomes: At the end of this unit, the students will be able to

- Analyze fundamental advantages of MATLAB Programming over the other programming languages.
- Install, Code and Use MATLAB Programming Language to perform basic tasks. Solve, test basic problems.

Unit II

Lectures 9

Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save.

Learning outcomes: At the end of this unit, the students will be able to

- Apply critical programming language concepts through graphs.
- Implement Built in functions.
- Manipulate programs by using waveforms.

Unit III

Lectures 9

Procedures and Functions: Arguments and return values, M-files, formatted console. Input-output String handling.

Learning outcomes: At the end of this unit, the students will be able to

- Familiarize the usage Arguments and return values to enhance the problem solving.
- Implement M-files.

Unit IV

Lectures 9

Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.

Learning outcomes: At the end of this unit, the students will be able to

- Familiarize the usage of statements

Unit V

Lectures 9

Manipulating Text: Writing to a text file, Reading from a text file, Randomising and Sorting a list, searching a list.

GUI Interface: Attaching buttons to actions, Getting Input, Setting Output.

Learning outcomes: At the end of this unit, the students will be able to

- Implement Manipulating Text
- Familiarize the GUI Interface

TEXT BOOK:

1. MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley, 2004.

REFERENCES

1. C.B. Moler, Numerical Computing with MATLAB, SIAM, 2004.
2. E. Isaacson and H. B. Keller. Analysis of Numerical Methods. Dover Publishing, 1994.

LAB EXPERIMENTS:

1. Write a program to assign the following expressions to a variable A and then to print out the value of A. (WEEK 1- C01)
 - a. $(3+4)/(5+6)$
 - b. $(0.0000123 + 5.67 \times 10^{-3}) \times 0.4567 \times 10^{-4}$
2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius. (WEEK 2- C01)
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
 - a. 2, 4, 6, 8, 10

b. 1/2, 1, 3/2, 2, 5/2

c. 1, 1/2, 1/3, 1/4, 1/5

d. 1, 1/4, 1/9, 1/16, 1/25.

(WEEK 3- C01)

4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2 ,0.5, 1.3] ; while the numbers of each product are [3, 2 ,1 ,5]. Use MATLAB to calculate the total bill. (WEEK 4-CO1)
5. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order. (WEEK 5-CO2)
6. The —identityl matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I. (WEEK 6-CO2)
7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,...,√Nth entries, i.e. those numbers which have indices that are square numbers. (WEEK 7-CO2)
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2). (WEEK 8-CO2)
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates:

$$r_n = \sqrt{n}$$

$$\theta_n = \frac{137.51}{n} \text{ (WEEK 9-CO2)}$$

10. Calculate 10 approximate points from the function $y=2x$ by using the formulae:
 - i. $x_n = n$
 - ii. $y_n = 2n + \text{rand} - 0.5$ (WEEK 10-CO2)
11. Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval(). Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit. (WEEK 11-CO3)
12. Calculate and replay 1 second of a sine wave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples. (WEEK 12-CO3)
13. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end. (WEEK 13-CO3)
14. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics. (WEEK 14-CO3)

CHANGE OF SYLLABUS:

New Syllabus

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Enterprenuership
MATLAB	IT417 PE B	2022-2023	Graph Plots, Functions &Control Statements	Skill development

R-PROGRAMMING **(Elective Lab-2)**

COURSE CODE: IT417 C

L T P E O

0 1 3 0 3

CREDITS 2.5

Sessional Marks: 50

End Exam Marks: 50

End Exam: 3 Hours

Prerequisite(s): Basic probability and statistics problems

Course Objectives:

1. Understanding and being able to use basic programming concepts
2. Automate data analysis
3. Working collaboratively and openly on code
4. Knowing how to generate dynamic documents
5. Being able to use a continuous test-driven development approach

Course Outcomes:

After completion of this course, the students will be able to:

CO-1: Apply basic fundamental concepts to solve the real-world problem using R programming language.

CO-2: Design and implement the solution using vectors, matrices, data frame, list and statistical problems in R program.

CO-3: Implement the solution using factors and tables and to solve statistical problems apply OOP concepts in R Programming.

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	3	1	1	1	2	1	2	3	3	2
CO2	3	3	1	3	3	1	1	1	2	1	2	3	3	2
CO3	3	3	1	2	3	1	1	1	2	1	2	3	3	2

UNIT – I

8 Lectures

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

Learning outcomes: At the end of this unit, the students will be able to

- Analyze fundamental advantages of R Programming over the other programming languages.
- Install, Code and Use R Programming Language in R Studio IDE to perform basic tasks on Operators and Factors.
- Solve, test and debug basic problems using R script.

UNIT – II

9 Lectures

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes

Vectors: Generating sequences, Vectors and subscripts, extracting elements of a vector using subscripts, working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

Learning outcomes: At the end of this unit, the students will be able to

- Apply critical programming language concepts such as, iteration, control structures and functions by writing R programs and through examples.
- Implement Flow control statements required to real world problems.
- Manipulate R programs by using R data structures like Vectors.

UNIT – III

8 Lectures

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations.

Learning outcomes: At the end of this unit, the students will be able to

- Manipulate R programs by using R data structures like lists and Data Frames.

UNIT – IV

9 Lectures

FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, extracting a Sub-table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions.

Learning outcomes: At the end of this unit, the students will be able to

- Familiarize the usage of Factors and Tables to enhance the problem solving.
- Define, Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.

UNIT – V

8 Lectures

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation.

Learning outcomes: At the end of this unit, the students will be able to

- Design object-oriented programs with S classes.
- import external data into R for data processing and statistical analysis.

TEXT BOOKS:

1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage Learning India.

REFERENCES:

1. Garrett Grolemond, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014
2. Venables, W.N., and Ripley, "S programming", Springer, 2000.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_ma33/preview
2. <https://data-flair.training/blogs/object-oriented-programming-in-r/>
3. <http://www.r-tutor.com/elementary-statistics>
4. <https://www.tutorialspoint.com/r/>

ONLINE RESOURCES:

1. <https://www.r-tutor.com/elementary-statistics>
2. <https://www.edx.org/learn/r-programming>
3. <https://www.javatpoint.com/r-tutorial>

LIST OF PROGRAMS:**WEEK 1:**

1. a) Write an R-Program to print Hello World **CO1**
b) Write an R-Program to take input from user. **CO1**
c) Write an R-Program to demonstrate working with operators (Arithmetic, Relational, Logical, Assignment operators). **CO1**

WEEK 2:

2. a) Write an R Program to Check if a Number is Odd or Even **CO1**
b) Write an R Program to check if the given Number is a Prime Number **CO1**
c) Write an R Program to Find the Factorial of a Number **CO1**

WEEK 3:

3. a) Write an R Program to Find the Factors of a Number **CO1**
b) Write an R Program to Find the Fibonacci sequence Using Recursive Function. **CO1**

WEEK 4:

4. a) Write an R Program to Make a Simple Calculator. **CO1**
b) Write an R Program to Find L.C.M of two numbers. **CO1**
c) Write an R Program to create a Vector and to access elements in a Vector. **CO2**

WEEK 5:

5. a) Write an R Program to create a Matrix and access rows and columns using functions *colnames()* and *rownames()* . **CO2**
b) Write an R Program to create a Matrix using *cbind()* and *rbind()* functions. **CO2**
c) Write an R Program to create a Matrix from a Vector using *dim()* function. **CO2**

WEEK 6:

6. a) Write an R Program to create a List and modify its components. **CO2**
b) Write an R Program to create a Data Frame. **CO2**
c) Write an R Program to access a Data Frame like a List. **CO2**
d) Write an R Program to access a Data Frame like a Matrix. **CO2**

WEEK 7:

7. a) Write an R Program to create a Factor. **CO3**
b) Write an R Program to Access and Modify Components of a Factor. **CO3**

c) Write an R Program to create an S3 Class and S3 Objects. **CO3**

WEEK 8:

8. a) Write an R Program to write a own generic function in S3 Class. **CO3**

b) Write an R Program to create an S4 Class and S4 Objects. **CO3**

WEEK 9:

9. a) Write an R Program to write a own generic function in S4 Class. **CO3**

b) Write an R Program to create Reference Class and modify its Methods. **CO3**

CHANGE OF SYLLABUS:

New Syllabus

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
R Programming	IT 417 PE C	2022	Installing R, functions, R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes, Factors and Tables, Calculating a Probability, Functions for Statistical Distributions, Simulation, code profiling, Statistical Analysis with R, data manipulation.	Employability

SEMESTER-2

STORAGE AREA NETWORKS

(Professional Elective – V)

COURSE CODE: IT422 A

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

PREREQUISITE: Basic knowledge of Computer Networks and various types of networks and Network Layers.

COURSE OBJECTIVE:

1. Ability to demonstrate storage area networks and their products and to provide the mechanisms for backup/recovery.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

CO 1: Describe Storage Area Networks characteristics and components.

CO 2: Become familiar with the SAN application environment, network storage and topologies

CO 3: Identifying the issues and down time's in relation with the SAN failure

CO 4: Analyze and understand the security and monitoring aspects in SAN's

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1			1		1			1			2	1	
CO2	2		2	2		1			1			2	2	
CO3	2			2		1			1			2	2	
CO4	2			3		1		2	1			2	2	

UNIT I

15 Lectures

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications.

UNIT II**10 Lectures**

Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system Evolution of networked storage, Architecture, components, and topologies of FC- SAN, NAS, and IP-SAN , Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need , Understand the appropriateness of the different networked storage options for different application environments

UNIT 3:**10 Lectures**

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures.

UNIT 4:**10 Lectures**

Architecture of backup/recovery and the different backup/recovery topologies replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities.

Unit 5:**10 Lectures**

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center. Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain Virtualization technologies, block-level and file-level virtualization technologies and processes.

Text Books:

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.

Reference Books:

1. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.
2. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002

CHANGE OF SYLLABUS:

No change in syllabus w.r.t R15.

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Storage Area Networks	IT412	2015	Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Understand the appropriateness of the different networked storage options for different application environments, List and analyzes the common threats in each domain Virtualization technologies, block-level and file-level virtualization technologies and processes.	Employability & Skill development

NATURAL LANGUAGE PROCESSING

(Professional Elective – V)

COURSE CODE: IT422 B

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Statistics, FLAT

Course Objectives

1. Learn the basics of natural language processing and understand various steps in it.
2. Introduce the fundamentals of language processing from the algorithmic viewpoint.
3. Discuss various issues that make natural language processing a hard task.
4. Discuss some well-known applications of natural language processing

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Describe the fundamental concepts and techniques of natural language processing.

CO-2: Analyse syntactically and semantically to avoid ambiguity.

CO-3: Generate and translate various languages.

CO-4: Analyse large volume text data generated from a range of real-world applications.

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1			2	1	1	1	1			1	3	2
CO2		3		1	2			1	1			1	3	2
CO3	2	2	1	1	2			1				1	3	2
CO4		3	2	2	2			1	1			1	3	2

UNIT I

9 Lectures

Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought, and Understanding, The State of the Art, Some Brief History

Regular Expressions: Basic Regular Expression Patterns, Disjunction, Grouping, and Precedence, Advanced Operators, Regular Expression Substitution

Finite State Automata: Using FSA to recognize sheeptalk, Formal Languages, Non-deterministic FSAs, Using NFSA to accept strings, Recognition as search, Relating deterministic and non-deterministic automata, Regular languages and FSAs

Learning outcomes: At the end of this unit, the students will be able to

- have an overview on key concepts of language processing
- realize the need for natural language processing

UNIT II

9 Lectures

N-grams: Counting words in corpora, Simple N-grams, Training and Test sets, Evaluating N-grams, Smoothing, Interpolation, Backoff

Part-of-Speech Tagging: English Word Classes, Tagsets for English, Part-of-speech tagging, Rule-based part-of-speech tagging, HMM part-of-speech tagging, Transformation-based tagging, Evaluation and Error Analysis

Learning outcomes: At the end of this unit, the students will be able to

- explore the N-grams and understand smoothing, interpolation
- understand different types of part-of-speech tagging

UNIT III

9 Lectures

Formal Grammars of English: Constituency, Context-Free Grammars, Some grammar rules for English, Treebanks, Grammar equivalence and normal form, Finite-state and context-free grammars, Dependency grammars, Spoken language syntax

Parsing with CFG: Parsing as search, Ambiguity, Search in the face of ambiguity, Dynamic programming parsing methods, Partial parsing

Learning outcomes: At the end of this unit, the students will be able to

- understand grammar rules for English
- apply different parsing methods

UNIT IV

9 Lectures

Statistical parsing: Probabilistic context-free grammars, Probabilistic CKY parsing, Learning PCFG rule probabilities, Problems with PCFGs, Improving PCFGs, Probabilistic lexicalized CFGs, Evaluating parsers

Lexical Semantics: Word Senses, Relations between senses, WordNet, Event participants, Primitive decomposition

Learning outcomes: At the end of this unit, the students will be able to

- understand the importance of statistical parsing
- understanding lexical semantics

UNIT V

9 Lectures

Computational Lexical Semantics: Word sense disambiguation, Supervised word sense disambiguation, WSD evaluation, baselines, ceilings, dictionary and thesaurus methods, Word similarity

Applications: Question answering and summarization, Machine translation

Learning outcomes: At the end of this unit, the students will be able to

- understand computational lexical semantics
- explore real world applications

TEXT BOOKS

1. Daniel Jurafsky, James H. Martin, Speech and Language Processing, Pearson publications, 2nd Edition.

REFERENCES

1. Machine Learning for Text by Charu C. Aggarwal, Springer, 2018 edition
2. Foundations of Statistical Natural Language Processing by Christopher D. Manning and Hinrich Schuetze, MIT press, 1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition, 2009
4. Roland R. Hausser, Foundations of Computational Linguistics: Human-Computer Communication in Natural Language, Paperback, MIT press, 2011

Note: The course is newly introduced for R-19 regulations

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Entrepreneurship
Natural Language Processing	IT422	2022	HMM part-of-speech tagging WordNet Machine Translation	Skill development

PRINCIPLES OF ECONOMICS MANAGEMENT

(Professional Elective V)

COURSE CODE: IT422 C

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisites: Linear and non-linear data structures, working experience of any one structured programming language

Course Objective: The course is intended to identify and analyze the optimal quantity and pricing decisions of firms in different market structures, and understand the basic principles of management.

Course Outcomes:

After completion of this course, the students will be able to:

CO-1: Analyze how elasticity affects revenue.

CO-2: Relate production function and cost function.

CO-3: Analyze the optimal quantity and pricing decisions of firms in different market Structures (perfect competition, monopoly, monopolistic competition) to achieve profit maximization.

CO-4: Describe the basic principles of management: planning, organizing, controlling, and directing

CO-5: Analyze ethical dilemmas faced by business and managers

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			1			1	1	1	1	1	1	1	2	2
CO2			1	1		1	1	1	1	1	1	1	3	2
CO3			1			1	1	1	1	1	3	1	3	2
CO4			1		1	1	1	1	1	1	3	1	3	2

Unit I

9 Lectures

Introduction to Economics: Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply: law of demand, law of supply, equilibrium between demand & supply Elasticity: elasticity of demand, price elasticity, income elasticity, cross elasticity

Theory of production: production function, meaning.

Learning Outcomes:

At the end of this unit, the students will be skilled in critical thinking and decision-making, supported by economic principles and best practices in business.

Unit II

9 Lectures

Cost: meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost, Break even analysis: meaning, explanation, numerical.

Markets: meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly)

National Income: meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP.

Learning Outcomes: At the end of this unit, the students will be able to
Students will have the ability to use data to inform economic and business decision making.

Unit III

9 Lectures

Basic economic problems: Poverty-meaning, absolute & relative poverty, causes, measures to reduce Unemployment: meaning, types, causes, remedies, Inflation: meaning, types, causes, measures to control Money: meaning, functions, types, monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools Banking: meaning, types, functions, Central Bank- RBI: its functions, concepts: CRR, bank rate.

Learning Outcomes: At the end of this unit, the students will be able to
Students will be able to comprehend economics-related writing.

Unit IV

9 Lectures

Introduction to Management: Definitions, Nature, Management, Difference between Management & administration, skill, types and roles of managers, Management Principles: Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory,

Learning Outcomes: At the end of this unit, the students will be able to

- Students will be able to put together quantitative reports as well as to evaluate reports put together by others.

Unit V

9 Lectures

Functions of Management; Planning, Organizing, Staffing, Directing, Controlling (meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization, chain of command, centralization and decentralization

Learning Outcomes: At the end of this unit, the students will be able to

- Work effectively in teams and to address strategic and organizational challenges.

Text Books:

1. Engineering Economics, R.Paneerselvam, PHI publication

Reference Books:

1. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications

Web Resources:

- <https://www.managementstudyguide.com/principles-managerial-economics.htm>
<https://www.sciencedirect.com/book/9780323998628/principles-of-economics-and-management-for-manufacturing-engineering>

CHANGE OF SYLLABUS

No Change

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Principles of economics management	IT422C	R15	Basic economic problems Organizing	Skill Development

MALWARE ANALYSIS

(Professional Elective V)

COURSE CODE: IT422 D

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks: 60

End Exam:3 Hours

PREREQUISITE: Basic knowledge of Computer Networks and various types of attacks.

COURSE OBJECTIVE:

1. The goal of malware analysis is to gain an understanding of how a specific piece of malware functions so that defenses can be built to protect an organization's network.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

CO1: Analyze the nature of malware, its capabilities, and how it is combated through detection and classification

CO2: Apply the tools and methodologies used to perform static and dynamic analysis on unknown executables.

CO3: Apply techniques and concepts to unpack, extract, decrypt, or bypass new anti analysis techniques in future malware samples.

CO4: Broad understanding of the social, economic, and historical context in which malware occurs.

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		1		1	2	2	1	2		3	3	2
CO2	3	3	2	1	3	2	2	2	1	2		3	3	2
CO3	3	3	3	2	3	2	2	2	2	2		3	3	2
CO4						3	3	3	3	3		3	3	2

UNIT 1:

9 Lectures

Introduction to malware, OS security concepts, malware threats, evolution of malware, malware types, viruses, worms, rootkits, Trojans, bots, spyware, adware, logic bombs, malware analysis, static malware analysis, dynamic malware analysis.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand what exactly malware is?
- Analyze malware.

UNIT 2:**9 Lectures**

Basic Static Analysis: Antivirus Scanning, Fingerprint for Malware, Portable Executable File Format, The PE File Headers and Sections.

Malware Analysis In Virtual Machines: The Structure of a Virtual Machine.

Introduction to x86 architecture: Memory, instructions, opcodes, operands, registers, functions, stack. - The difference between source code and compiled code.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand how to analyze malware
- Know about various tools to analyze the malware.

UNIT 3:**9 Lectures**

Dynamic Analysis: Live malware analysis, dead malware analysis, analyzing traces of malware- system-calls, api-calls, registries, network activities. Anti-dynamic analysis techniques anti-vm, runtime-evasion techniques , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching

Learning Outcomes: At the end of this unit, the students will be able to

- Understand What dynamic analysis and what are different techniques to handle them.
- Trace and debug the malware.

UNIT 4:**9 Lectures**

Malware Functionality: Downloader, Backdoors, Credential Stealers, Persistence Mechanisms, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand how to analyze malware
- Know about various tools to analyze the malware.

UNIT 5:**9 Lectures**

Malware Detection Techniques: Signature-based techniques: malware signatures, packed malware signature, metamorphic and polymorphic malware signature Non-signature based techniques: similarity-based techniques, machine-learning methods, invariant inferences.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand how to detect various malwares.
- Apply different techniques to detect various malware.

TEXTBOOK:

1. Practical malware analysis The Hands-On Guide to Dissecting Malicious Software by Michael Sikorski and Andrew Honig ISBN-10: 159327-290-1, ISBN-13: 978-1-59327-290-6, 2012 2

REFERENCES:

1. Computer viruses: from theory to applications by Filiol, Eric Springer Science & Business Media, 2006
2. Android Malware by Xuxian Jiang and Yajin Zhou, Springer ISBN 978-1-4614-7393-0, 2005
3. Hacking exposed™ malware & rootkits: malware & rootkits security secrets & Solutions by Michael Davis, Sean Bodmer, Aaron Lemasters, McGraw-Hill, ISBN: 978-0-07-159119-5, 2010 Windows Malware Analysis Essentials by Victor Marak, Packt Publishing, 2015

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITES:

- <http://www.malware-analyzer.com>
- <http://resources.infosecinstitute.com/malware-analysis-basic-dynamic-techniques/#gref>
- <http://www.remux.org>

CHANGE OF SYLLABUS

New Syllabus introduced

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/ Skill development/ Entrepreneurship
Malware Analysis	IT422	2022	Static malware analysis, Dynamic malware analysis, fingerprint for malware, dead malware analysis, analyzing traces of malware system calls, anti-vm, runtime-evasion techniques , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, OllyDbg, Downloader, Backdoors, Credential Stealers, Persistence Mechanisms, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection, malware signatures, packed malware signature, similarity-based techniques, machine-learning methods, invariant inferences.	Employability & Skill development

DESIGN PATTERNS

(Professional Elective V)

COURSE CODE IT422 E

L P T E O

3 0 0 1 2

CREDITS 3

Sessional Marks: 40

End Exam Marks:60

End Exam: 3Hours

PRE-REQUISITE(S): Database Management System

COURSE OBJECTIVES

1. Understand the concept of Design patterns and its importance.
2. Understand the behavioural knowledge of the problem and solutions.
3. Relate the Creational, Structural, behavioural Design patterns.
4. Apply the suitable design patterns to refine the basic design for given context..

COURSE OUTCOMES

After completion of the course, the student will be able to:

CO-1: Identify the appropriate design patterns to solve object oriented design problems.

CO-2: Develop design solutions using creational patterns.

CO-3: Apply structural patterns to solve design problems.

CO-4: Construct design solutions by using behavioural patterns.

Mapping of Course Outcomes with POs and PSOs

CO's/PO's- PSO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	3				2	2		2	2	1
CO2	3	2	1	1	3				2	2		2	2	1
CO3	3	2	1	1	3				2	2		2	2	1
CO4	3	2	1	1	3				2	2		2	2	1

UNIT-I:

8 Lectures

Introduction: What is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, Catalog of Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

Learning Outcomes: At the end of this unit student will be able to learn

- Listing contents of Catalog of design patterns.
- Determine Object granularity and specify object interface.

UNIT-II:**10 Lectures**

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation, Summary. Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns..

Learning Outcomes: At the end of this unit student will be able to learn

- Identify the importance of structural patterns
- Review the importance of prototype pattern

UNIT-III:**10 Lectures**

Structural Patterns Part I: Adapter, Bridge, Composite.

Structural Patterns Part II: Decorator, acade, Flyweight, Proxy.

Learning Outcomes: At the end of this unit student will be able to learn

- Summarizes the implementation issues when applying the bridge pattern
- Use of observer, state, strategy in behavioural pattern.

UNIT-IV:**10 Lectures**

Behavioral Patterns Part I: Chain of Responsibility, Command, Interpreter, Iterator.

Behavioral Patterns Part II: Mediator, Memento, Observer..

Learning Outcomes: At the end of this unit student will be able to learn

1. Summarizes the implementation issues when applying the Chain pattern
2. Identify the importance of Mediator in behavioural patterns

UNIT-V:**10 Lectures**

Behavioral Patterns Part III (Cont'd): State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns. What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

Introduction to Micro Services: Introduction and usage of micro services.

Learning Outcomes: At the end of this unit student will be able to learn

- Outline the importance of behavioural pattern.
- Summarize the importance of design patterns.

Textbooks:

1. Design Patterns By Erich Gamma, Pearson Education, 2015.

Reference Books:

1. Head First Design Patterns By Eric Freeman-Oreilly-spd
2. Meta Patterns designed by Wolf gang , Pearson.

CHANGE OF SYLLABUS

New Syllabus introduced

1.1.3 of NAAC

Name of the Course	Course Code	Year of Introduction	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development	Mapping with Employability/Skill development/Enterpren uership
Design Patterns	IT422	2022-23	Catalog of Design Patterns, Organizing the Catalog, Supporting Multiple Look-and-Feel Standards, Creational Patterns, Decorator, acade Flyweight, Proxy, Interpreter, Iterator, , Observer, Strategy, Template Method	Employability