SEMESTER-1

Paper-611
Recent Trends in Computer Science
(Pattern Recognition and Applications)
Theory-Compulsory
Marks: 80+20 (Credits: 4)

UNIT I

Pattern Recognition – Definitions, Different Paradigms of Pattern Recognition, Representations of Patterns and Classes, Feature extraction and Pattern Representation. Metric and non-metric proximity measures, classification vs. regression, Concept of Supervised and Unsupervised Classification.
Image processing basic: What are images, acquisition, type, point operations, Geometric transformation, and Feature extraction from image.Image Enhancement, binarization, segmentation.
Morphological Image processing: Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary Detection, Hole filling, Connected components, convex hull, thinning, thickening, skeletons, pruning, Geodesic Dilation, Erosion, Reconstruction by dilation and erosion.

UNIT II

Statistical Pattern Recognition: Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary, Normal Density, Discriminant Function for Discrete Features.
Nearest Neighbour Classifier, k-nearest neighbour.

UNIT III

Dimensionality Problem: Dimension and accuracy, Computational Complexity, Dimensionality Reduction, dimension reduction using PCA.
Association Rule Mining: Motivation and terminology, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis.
Decision tree: Introduction, decision tree from training examples, entropy, ID3 algorithm criterion, over fitting.

UNIT IV

Clustering: Basic issues in clustering, First conceptual clusteringsystem:Partitioning methods: k-means, expectation maximization (EM), Hierarchicalmethods: distance-based agglomerative and divisible clustering.
Applications of pattern recognition: handwritten character recognition, Face recognition system.
References:

1. Devi V.S.; Murty, M.N. (2011) Pattern Recognition: An Introduction, Universities Press, Hyderabad
2. R.O. Duda, P.E. Hart and D.G. Stork, Pattern Classification, John Wiley, 2001.
3. C Bishop – Pattern Recognition and Machine Learning – Springer, 2006.
4. S Sridhar, “Digital Image Processing”, Oxford University Press.
5. Rafel C. Gonzalez and Richard E. Woods, “Digital Image Processing using Matlab”, Pearson Education.

SEMESTER-1

Paper-612

(Research Methodology-I)

Theory-Compulsory

Marks: 80+20 (Credits: 4)

UNIT-I: SCOPE OF RESEARCH AND ETHICS:

Introduction and Scope
Research problem**:** Identification, Selection, Formulation ofresearch objectives.
Research design: Components, Types and Importance
Research ethics, Institutional ethics committee
Plagiarism-Pitfall.

UNIT-II: Technical Writing:

Types of technical documents;Fulllength research paper,Short/Brief communications, Letters to editor, Book chapter,Review, Conference report, Project proposal.

Componentsof a fulllengthresearchpaper;Title/Topicstatement, Abstract/key words, Aimsand objectives,Hypothesis building,Rationaleof thepaper,Workplan,Materials and methodology, Results and discussion, Key issueand arguments,Acknowledgement,Conflictofinterest statement, bibliography, Technical Resumes & Cover Letters.

Components of a research proposal; Project summaryKey words, Origin of the proposal, Major ObjectivesMethodology,InstrumentfacilityavailableinthePI's department, Overview of status of Research and Development in the subject, Importance of the proposed project in the contextof current status, Bibliography.

UNIT–III: SCIENTOMETRICS

How to cite and how to do referencing
Literature search technique, using SCOPUS, Google Scholar
PUBMED, Web of Science, Indian Citation Index, and RG
Styles of referencing; APA,MLA, Oxford, Harvard, Chicago
Annotated bibliography
Tools for citing and referencing, Grammarly, Endnote etc

UNIT –IV: PRESENTATION AND COMMUNICATION SKILLS

Tables, Figures and Pictures using Excel PowerPoint
Slide preparation
Preparation of Posters
Electronic submission of manuscripts
Communication skills, oral and poster

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Paper–613
(Research Methodology -II)
Theory –Compulsory
Marks –80 + 20 (4 CH)

UNIT –I: IPR AND CYBER LAW

Patents
Patent laws, process of patenting a research finding
Intellectual property (IP), Intellectual property right (IPR)
Copyright, Trademarks, GI
Cyber laws
COPE

UNIT –II: QUANTITATIVE DATA ANALYSES

Types of data, Data collection -Methods and Tools
Hypothesis testing
Normal and Binomial distributions and their property
Tests of significance: Student t-test, F-test, Chi-square test
Correlation and Regression
ANOVA -One-way and Two-way, Multiple-range test

UNIT –III: COMPUTER FUNDAMENTALS

Introduction to MS-Office software: MS-Word (Track change)
MS-Excel
MS-Power Point
MS-Access
Features for Statistical data analysis using computers and software
Microsoft Excel Data Analysis Tool Pak, SPSS

UNIT –IV: ADVANCED TOOLS & TECHNIQUES

Python: Basic syntax, interactive shell, editing, saving, and running a script.data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions. Conditions, Boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while);

Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa.

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

Image Processing using OpenCV and Python

SEMESTER –I
Paper –614
Marks –100 (4 CH)

TEACHING ASSIGNMENT

SEMESTER –II
Paper –621
Marks–150+ 25+25(8CH)

DISSERTATION

(Thesis + Seminar Presentation of the Thesis + Viva –Voce)