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Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097
Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrcet.ac.in

B.TECH–COMPUTERSCIENCE& ENGINEERING (DATASCIENCE)
Course StructureR-22

SEMESTER III

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
01	**BS**	D3BSPS1	Probability and statistics	3	1	0	4	40	60	100
02	**ES**	D3ESSD1	Semiconductor Devices and Circuits	3	0	0	3	40	60	100
03	**PC**	D83PC1	Introduction to Data Science	3	0	0	3	40	60	100
04	**PC**	D83PC2	Computer Organization & Operating Systems	3	0	0	3	40	60	100
05	**PC**	D83PC3	Computer Networks	3	0	0	3	40	60	100
06	**ES**	D3ESPP2	Python Programming	2	0	0	2	40	60	100
07	**ES**	D3ESPP7	Python & R Programming lab	0	0	2	1	40	60	100
08	**ES**	D3ESSD2	Semiconductor Devices and Circuits Lab	0	0	2	1	40	60	100
	TOTAL			17	1	4	20	320	480	800

SEMESTER IV

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
01	**PC**	D84PC4	Data warehousing and Data Mining	3	0	0	3	40	60	100
02	**PC**	D84PC5	Design Analysis of Algorithms	3	1	0	4	40	60	100
03	**PC**	D84PC6	Database Management Systems	3	0	0	3	40	60	100
04	**PC**	D84PC7	Software Engineering	3	0	0	3	40	60	100
05	**PC**	D84PC8	Web Technologies	2	0	0	2	40	60	100
06	**PC**	D84PC9	Database Management Systems Lab	0	0	2	1	40	60	100
07	**PC**	D84PC10	DWDM Lab	0	0	2	1	40	60	100
08	**HS**	D4HSE3	Advanced English Communication skills Lab	0	1	2	2	40	60	100
09	**PC**	D84PC11	Web Technologies lab	0	0	2	1	40	60	100
10	**MC**	MC003	Intellectual Property Rights*				S			
TOTAL				14	2	8	20			
Mandatory Course: Intellectual Property Rights										

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COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

B.Tech. III SEMESTER   **L/T/P/C**
                                                            3/1/0/4

PROBABILITY & STATISTICS (D3BSPS1)

Course Objectives:

1. Random variables that describer and omnessoran uncertainty incertain realistic situation.
2. Thestudy of discrete and continuous distribution predominantly describes important probability distribution.
3. Sampling distribution of mean, variance, point estimation and interval estimation.
4. The testing of Hypothesis of Large samples.
5. The testing of Hypothesis of small samples.
6. The basic ideas of statistics including correlation and regression.

Course Outcomes:

1: Random variables and various discrete and continuous probability distribution and their properties.
2: Calculate interval estimations of Mean and Proportion of large samples.
3: Make important decisions for few samples which are taken from a large data.
4: Calculate Mean and Proportion and to make important decisions from large samples which are taken from normal populations.
5: Test the hypothesis and give the inference to the given data.
6: The statistical methods of studying data sample.

UNIT I:
Random variables
Discrete and continuous Random variables- properties- Expectation of discrete and continuous Random variables and Variance of a sum.

UNIT II:
Probability Distributions
Binomial- poison and Normal-evaluation of statistical parameters for these three distributions and problems.

UNIT III:
Basic statistics
Correlation and regression- Rank correlation- Curve fitting by the method of least squares- fitting of straight lines- second degree parabolas- power and exponential curves

UNIT IV:
Sampling distributions, Estimations and Hypothesis-I
Sampling distributions of means (σ known and unknown), Estimation theory, point estimations, Interval estimations, maximum error.
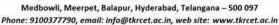
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Null hypothesis, alternative hypothesis, Type-1, Type-2 errors, critical region, confidence interval for mean, testing of single mean and two means, confidence interval for the proportions ,Test of hypothesis for the single proportions and difference between the proportions.

UNIT V:
Testing of hypothesis – II
Small samples Test for single mean- difference of two means- test for ratio of variances-Chi- square test for goodness of fit and independence of attributes, ANOVA.

TEXT BOOKS AND REFERENCE BOOKS

1. Erwin Kreyszig- Advanced Engineering Mathematics- 9thEdition- john Wiley & Sons2006.

2. N.P. Bali and Manish Goyal- A text bookof Engineering Mathematics- Laxmi Publications- Reprint-2010.

3. B.S. Grewal- Higher Engineering Mathematics- Khanna Publishers- 35thEdition- 2000.

4. S.Ross- A First Course in Probability- 6 Ed.th- Pearson Education in India-

   2002.W.Feller- An introduction to probability theory and its applications- Vol.1- 3rd edition Wiley- 1968.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

B.Tech. III SEMESTER   **L/T/P/C**
                                                                                  3/0/ 0/ 3

SEMICONDUCTOR DEVCES & CIRCUITS (D3ESSD1)

Pre-requisite: Fundamentals of Semiconductors.

Course Objectives:

1. To introduce the concepts of various semiconductor devices like Diodes, Transistors, FET's and MOSFET'S.
2. To impart the knowledge of various configurations, characteristics and applications of electronic circuits.

Course Outcomes: After this course, the student will be able to

1. Acquire the knowledge in semiconductor materials and knows the complete internal structure of PN junction its capacitances, resistances
2. Acquire the knowledge of different types of diodes including their modes of operation, etc.
3. Design the circuits for the conversion of AC to DC Voltages.
4. Gain knowledge in the structure of Transistor, FET,MOS (different types, operation, characteristics and applications)
5. Acquire knowledge in the dc bias circuitry of BJT.

UNIT – I
Introduction to semiconductor physics: Formation of P-type and N-type semiconductors, principle and operation of Diode, Volt-Ampere characteristics, Current components in a p-n Diode, Diode equation, Temperature dependence, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

UNIT – II
Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR, UJT operation and its characteristics.

UNIT – III
Rectifiers and Filters: P-N junction diode as a Rectifier - Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters(Qualitative treatment) **UNIT IV**

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Transistor current components, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector configurations and their Characteristics. Operating point, DC Load line, Transistor Biasing techniques (Qualitative treatment)

UNIT – V
Field Effect Transistor (FET & MOSFET): Construction, Principle of Operation of FET and MOSFET, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, MOSFET. **Text Books:**

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabratajit, TMH, 2/e, 1998.

References:
1. Electronic Devices and Circuits –S.Salivahanan, NSuresh Kumar & A.Vallavaraj
2. Electronic Devices and Circuits – Sanjeev Gupta & Santosh Gupta, Dhanpat Rai Publications

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COMPUTERSCIENCE&ENGINEERING (DATASCIENCE)

B.Tech. III SEMESTER.   **L/T/P/C**
                                                                                             3/0/0/3

INTRODUCTION TO DATA SCIENCE (D83PC1)

Course Objectives

1. Enable You to Analyze of Data Using R
2. Learn Techniques and Tools for Transformation of Data
3. Familiarize You with Different Formats
4. Learn Data Visualization and Optimization

Course Outcomes
After completion of the course student can able to

1. Understand the basic concept of Data Science
2. Use Data Visualization techniques
3. Know the importance of Linear Regression
4. Understand the R programming basics
5. Use the data structures in R programming

UNIT - I
What is Data Science: Computer Science, Data Science, and Real Science, Asking Interesting Questions from Data, Properties of Data, Classification and Regression, Data Science Television: The Quant Shop.
Scores and Rankings: The Body Mass Index (BMI), Developing Scoring Systems, Z-scores and Normalization, Advanced Ranking Techniques,

UNIT - II
Visualizing Data: Exploratory Data Analysis, Developing a Visualization Aesthetic, Chart Types, Great Visualizations, Reading Graphs, Interactive Visualization.
Mathematical Models: Philosophies of Modeling, A Taxonomy of Models, Baseline Models, Evaluating Models, Evaluation Environments

UNIT – III
Linear and Logistic Regression: Linear Regression, Better Regression Models, Regression as Parameter Fitting
Distance and Network Methods: Measuring Distances, Nearest Neighbor Classification, Graphs, Networks, and Distances, PageRank, Clustering

UNIT - IV
Introduction, Functions, Preview of Some Important R Data Structures, Regression Analysis of Exam Grades, Startup and Shutdown, Getting Help, The help() Function, The example() Function.
Vectors

Scalars, Vectors, Arrays, and Matrices, Declarations, Common Vector Operations, Using all() and any(),Vectorized Operations, NA and NULL Values, Filtering, Vectorized if-then-else

UNIT - V
MATRICES AND ARRAYS, LISTS, DATA FRAMES, FACTORS AND TABLES.

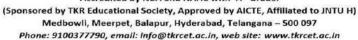**TEXT BOOKS & REFERENCE BOOKS:**

1. The Data Science Design MANUAL ,Steven S. Skiena , Springer
2. The Art of R Programming by Norman Matloff-No Starch Press

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COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

B.Tech. III SEMESTER.   L/T/P/C
                                                                                                                              3/0/0/3

COMPUTER ORGANIZATION & OPERATINGSYSTEMS (D83PC2)

Course Objectives:

1. To understand the structure of a computer and its operations.
2. Understanding the concepts of I/O and memory organization and operating systems

Course Outcomes:

1. Understand the Basic Structure of Computers, Register Transfer Language and Micro Operations
2. Design the hardwired and micro-programmed control units.
3. Analyze I/O data transfer modes and memory hierarchy
4. Understand the basic concepts of operating system, CPU scheduling and deadlocks.
5. Understand the memory management and file system.

UNIT - I:
Basic Structure of Computers: Computer Types, Functional UNIT, Basic Operational Concepts, Bus, Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating - Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions - Instruction Cycle. Memory - Reference Instructions, Input - Output and Interrupt, Instruction Formats, Addressing Modes,

UNIT - II:
Micro Programmed Control: Control Memory, Address Sequencing, Micro program Examples, Design of Control Unit, Hard Wired Control, Micro programmed Control. The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories secondary Storage, Introduction to RAID.

UNIT - III:
Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE1394.

UNIT - IV:
Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures Operating System Services and Systems Calls, System Programs, Operating System Generation.

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec,

Deadlock :System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT - V:
Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization,

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection. File System Implementation: File System Structure, File system Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

TEXT BOOKS:

1. Computer Organization - Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer System Architecture - M. moris mano, 3rd edition, Pearson
3. Operating System Concepts - AbrehamSilberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, John Wiley.

REFERENCE BOOKS:

1. Computer Organization and Architecture - William Stallings 6th Edition, Pearson
2. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition, PHI

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COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

B.Tech. III SEMESTER.   **L/T/P/C**
                                                                                    3/0/0/3
COMPUTER NETWORKS (D83PC3)

Course Objective:

Identify the components required to build different types of networks and choose the required functionality at each layer for a given application

Course Outcomes:

Upon completion of the course the student will be able to

1. Understand the protocol layering and physical level communication
2. Analyze Data link layer and MAC layer
3. Compare and contrast between the functions of the network layer and the various routing protocols
4. Demonstrate the functions and protocols of the Transport layer
5. Illustrate the functions and protocols of the Application layer

UNIT I
Introduction: OSI, TCP/IP, and other network models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN. **Physical Layer**: Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrowband, broadband ISDN and ATM.

UNIT II
Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocolstop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM. Medium Access sub layer: ALOHA, MAC addresses, Carrier sense multiple access. IEEE 80.X Standard Ethernet, wireless LANs. Bridges.

UNIT III
Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing. Dynamic routing – Broadcast routing. Rotary for mobility, The Network layer on the internet and in the ATM Networks.

UNIT IV
Transport Layer: Transport Services, Connection management, TCP and UDP protocols; Congestion Control Algorithms – General Principles – of Congestion prevention policies ATM AAL Layer Protocol.

UNIT V
Application Layer – Domain name system, SNMP, Electronic Mail (SMTP, POP3, IMAP, MIME) the World WEB, HTTP.

Text Books:
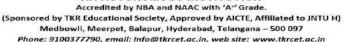1.Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.

Reference Books:
1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.
3. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH

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COMPUTERSCIENCE&ENGINEERING (DATASCIENCE)

B.Tech. III SEMESTER.   **L/T/P/C**

2/0/0/2

PYTHON PROGRAMMING (D3ESPP2)

Course Objective:

To understand and learn the concepts of basic python programming, as it is a current programming constructs used for real time applications.

Course Outcomes:

After completion of course the student will be able to

1.   Understand the basic concepts of python programming
2.   Illustrate operators, conditional statements, loops in python
3.   Construct code and test small python programs using functions and data structures
4.   Develop different programs using file concept modules of python
5.   Apply the concepts of object – oriented programming in python

UNIT I
INTRODUCTION
Introduction to Python, History, Need of Python Programming, features Applications, python environment setup, Basic syntax, Variables, Data Types, Keywords, Input-Output, Indentation, script structure, Running Python Scripts.

UNIT II
OPERATORS
Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, Conditional statements if, if-else Looping Control Structures for, while Control Statements: Break, Continue, Pass.

UNIT III
FUNCTIONS
Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

DATA STRUCTURES
Lists, Tuples, dictionaries, sets, Sequences, Comprehensions.
UNIT IV
FILES
File input/output, Text processing file functions.

MODULES
Creating modules, import statement, from. Name spacing, Packages, using packages, implementing packages: numpy, pandas, Django framework, iterator tools, scipy, matplot lib.

UNIT V
Object Oriented Programming in Python Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding.

Error and Exception Handling
Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

Text Books:
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2. Wesley J. Chun "Core Python Programming", Second Edition, Prentice Hall.

Reference Books:
1. Allen Downey, "Think Python", Second Edition , Green Tea Press.
2. Introduction to Computation & Programming Using Python, Spring 203 Edition, By John V.Guttag.

   Programming in Python

3: A Complete Introduction to the Python Language (Developer's Library), by Mark Summerfield, 2ndEdition

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COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

B.Tech. III SEMESTER   **L/T/P/C**
                                                                                               0/0/2/1

PYTHON & RPROGRAMMING LAB (D3ESPP7)

Course Objectives:

- To install and run the Python interpreter using control structures, Lists, Dictionaries, Strings and Files
- Effective use of Business Intelligence(BI) technology (Tableau) to apply data visualization

Course Outcomes:
At the end of the course a student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Develop Programs and understand how to map Visual Layouts and Graphical Properties.
4. Create a Dashboard that links multiple visualizations.
5. Use graphical user interfaces to create Frames for providing solutions to real world problems.

Python   Programming

Week-1:

1   i)UseawebbrowsertogotothePythonwebsitehttp://python.org.Thispagecontainsinfor mationabout Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
      ii)Start the Python interpreter and type help() to start the online help utility.
2   Start a Python interpreter and use it as a Calculator.

Week-2:

1.   Print the below triangle using for loop. 5
       4 4
       3 33
       2 222
       1 1111

2.   Write a program to check whether the given input is digit or lower case character or upper case character or a special character(use 'if-else-if'ladder)

Week-3:

1 i) Write a program to convert a list and tuple into arrays. ii)Write a program to find common values between two arrays.

2 Write a function called gcd that takes parameters and band returns their greatest common divisor

Week-4:

1. Write a function called is _sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.

2. Writes a recursive function that generates all binary strings of n-bit length

Week-5:

1. Write a python program that defines a matrix and prints

2. Use the structure of exception handling all general purpose exceptions.

Week-6:

1 Write a function called draw_ rectangle that takes a Canvasanda Rectangle as arguments and draws a representation of the Rectangle on the Canvas

2 Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week-7

1. Write a Python code to merge two given file contents into a third file.

2. WriteaPythoncodetoopenagivenfileandconstructafunctiontocheckforgivenwordspres entin it and display on found.

Week-8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.

2. a) Install Num Py package with pip andex ploreit.

R Programming

1 Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?

2 Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts (line, barcharts,Treemaps),Using the Show me panel.

3 Tableau Calculations, Over view of SUM, AVR, and Aggregate features, Creating custom calculations and fields.

4 Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.

5 Editing and Formatting Axes, Manipulating Datain Tableau data, Pivoting Tableau data.

6 Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

7 Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tool tips, Formatting your data with colors.

8 Creating Dashboards & Storytelling, creating your first dash board and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

9 Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.

10 Creating custom charts, cyclical data and circular area charts, DualAxis charts.

TEXTBOOKS:

1.   Super charged Python: Take your code to the next level, Overland
2.   Learning Python, MarkLutz, O'reilly

REFERENCEBOOKS:

- Python Programming: AModern Approach, Vamsi Kurama, Pearson
- PythonProgrammingAModularApproachwithGraphics,Database,Mobile,andWeb Applications,Sheetal Taneja, Naveen Kumar,Pearson
- ProgrammingwithPython,AUser'sBook,MichaelDawson,CengageLearning,IndiaEdition
- R Programming by Norman ThinkPython, AllenDowney, Green Tea Press
- Core Python Programming, W.Chun,Pearson
- Introduction to Python, KennethA. Lambert,Cengage ☐ Microsoft Power BIcook book, BrettPowell, 2ndedition. ☐ RProgramming for Data Science by Roger D.Peng (References) ☐ The Art of Matl off Cengage Learning India.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

B.Tech. III SEMESTER   **L/T/P/C**
                                                                                                0/0/2/1

SEMICONDUCTOR DEVCES & CIRCUITS LAB (D3ESSD2)

Course Objectives

- To impart the   of various configurations, characteristics and applications of various electronic devices.
- Acquires the knowledge of various biasing circuits of Transistor.

Course Outcomes

After the completion of the lab student can be able to:

1. Design different electronic circuits for different applications using devices like Diodes, Transistors, etc.
2. Design circuits which can convert AC to DC.
3. Design various transistor biasing circuits.
4. Design different Amplifier Circuits.

List of Experiments:

PART A: Electronic workshop practice (in 3 lab sessions):

1. Familiarization of R,L,C, Components
2. Study and operation of
    - Multimeters (Analog and Digital)
    - Function Generator ▪ Regulated Power Supplies ▪ CRO.
3. Familiarization of Devices, Diodes, BJT, and JFET, MOSFET's

PART B:

1. Forward & Reverse Bias Characteristics of PN Junction. Diode.
2. Zener Diode V-I Characteristics
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters.
5. Input & Output Characteristics of Transistor in CB Configuration.
6. Input & Output Characteristics of Transistor in CE Configuration.
7. FET Characteristics in CS Configuration.
8. Design of Fixed Bias Circuit.
9. Design of Self Bias Circuit.
10. Transistor as an Amplifier.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

SEMESTER IV   **L/T/P/C**
                                                                                                         3/0/0/3

DATA WAREHOUSING & DATA MINING (D84PC4)

Course Objectives:
To provide students with an understanding of Datawarehouse principles and Data mining concepts.

Course Outcomes:
   Upon completion of the course the student will be able to :
1. Experiment formally with data warehouse and summarizes the architecture and
    components used for constyucting a data warehouse.   L3
2. Implement the data pre-processing techniqes to incorporate the data mining tasks on
    various kinds of data.   L3
3. Identify the significance of association rule by understanding the item-set representation. L3
4. Classify the data to gain learning experiences using various classification techniques   L4
5. Categorize the data based on the similarity measures through different clustering algorithms to
    Estimate the outliers.   L4

Unit I
Data Warehouse
 Introduction to Data warehouse, Difference between operational database systems and data warehouses.
 Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction –
 Transformation – Loading, Logical (Multi – Dimensional), Data Modelling, Schema Design, Star, Snow
 Flake Schema and Fact Constellation, Fact Table, Fully Addictive, Semi – Addictive, Non-Addictive
 Measures; Fact Constellation, Fact Table, Fully Addictive, Semi – Addictive, Non-Addictive Measures;
 Fact – Less – Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server
 Architecture – ROLAP, MOLAP and HOLAP

UNIT II
Introduction to Data Mining
Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing,
Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and
Binarization, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

Unit III
Association Rules
Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence
Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth
Algorithms, Compact Representation of Frequent Item Set, Maximal Frequent Item Set, Closed Frequent Item
Set.

UNIT IV
Classification
Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers,
Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test

conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naïve – Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

UNIT V
Clustering
Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical ClusteringAgglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

Text Books:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier 2 Edition, 2006.

2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.

Reference Books:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundamentals, Paulraj Ponnaiah, Wiley Student Edition.
3. The Data Warehousing Life Cycle Toolkit – Ralph Kimbal. Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

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COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

SEMESTER IV   **L/T/P/C**
                                                                                     3/1/0/4
DESIGN AND ANALYSIS OF ALGORITHMS (D84PC5)

Course Objective:
To provide students with an understanding of design paradigms for developing an algorithm and analysing it for a given problem.

Course Outcomes:
   Upon completion of the course the student will be able to:
   1. Apply mathematical analysis methods to analyse the performance of algorithms and apply divide and conquer technique to solve the computing problems.   L3
   2. Demonstrate disjoint set operations and apply backtracking technique to solve the computing problems.   L3
   3. Apply Greedy method to solve various computing problems.   L3
   4. Analyse efficient algorithms in common engineering design situations using dynamic programming technique.   L4
   5. Solve complex problems using branch and bound technique and analyze NP   hard and NP Complete problems.   L4

UNIT I
Introduction
Algorithm definition, Algorithm Specification, Performance Analysis-Space complexity, Time complexity, Randomized Algorithms. Divide and conquer- General method, applications – Binary search, Merge sort, Quick sort, Strassen's Matrix Multiplication.

UNIT II
Disjoint Set Operations
Disjoint set operations, union and find algorithms, AND/OR graphs, Connected Components and Spanning trees, Bi-connected components Backtracking-General method, applications the 8- queen problem, sum of subsets problem, graph colouring, Hamiltonian cycles.

UNIT III
Greedy Method
General method, applications- Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Single source shortest path problem.

UNIT IV
Dynamic Programming
General Method, applications- Chained matrix multiplication, All pairs shortest path problem, Optimal binary search trees, 0/1 knapsack problem, Reliability design, Travelling sales person problem.

UNIT V
Branch and Bound
General Method, applications-0/1 Knapsack problem, LC Branch and Bound solution, FIFO Branch and Bound solution, Traveling sales person problem. NP-Hard and NP Complete problems- Basic concepts, Non-deterministic algorithms, NP – Hard and NP-Complete classes, Cook's theorem.

Text Books:
1. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni and S.Rajasekharan, Universities Press.
2. Design and Analysis of Algorithms, P. H. Dave, H. B. Dave, 2nd edition, Pearson Education.

Reference Books:
1. Algorithm Design: Foundations, Analysis and Internet examples, M. T. Goodrich and R. Tomassia, John Wiley and sons.
2. Design and Analysis of Algorithms, S. Sridhar, Oxford Univ. Press
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education.
4. Foundations of Algorithms, R. Neapolitan and K. Naimipour, 4th edition, Jones and Bartlett Student edition.
5. Introduction to Algorithms, 3rd Edition, T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein PHI.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

SEMESTER IV   **L/T/P/C**
                                                                                          3/0/0/3
DATABASE MANAGEMENT SYSTEMS (D84PC6)

Course Objectives:
- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:
Upon completion of the course the student will be able to:
1. Apply database management principles in designing relational databases.   L3
2. Construct ER diagram to design databases to perform operations using Relational Algebra & calculus L3
3. Apply normalization techniques on a database constructed by using SQL   L3
4. Implement transaction processing and concurrency control techniques for a given database.   L3
5. Apply indexing techniques to perform data manipulation tasks for a given database   L3

UNIT - I
Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II
Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III
SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL,triggers and active databases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

UNIT - IV
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, LockBased Protocols,Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:
1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

SEMESTER IV **L/T/P/C**
3/0/0/3

SOFTWARE ENGINEERING (D84PC7)

Course Objectives
The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.

Course Outcomes:
Upon completion of the course the student will be able to:
1. Identify common patterns in software development processes and apply different process models to develop software applications. L3
2. Distinguish the various software requirements, prepare SRS document and analyse them. L4
3. Identify the required design process or model to develop software applications. L4
4. Develop test-cases by using different testing strategies for software applications. L4
5. Analyze the importance of quality assurance and risk strategies associated for a defined software development life cycle. L4

UNIT - I
Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). Process models: The waterfall model, Spiral model and Agile methodology

UNIT - II
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT - III
Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT - V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill
2. International Edition. 2. Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCE BOOKS:
1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley 3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

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COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

SEMESTER IV   **L/T/P/C**
                                                                                                 2/0/0/2

WEB TECHNOLOGIES (D84PC8)

COURSE OBJECTIVES:

To introduce PHP language for server side scripting and introduce XML and processing of XML Data with Java , Server side programming with Java Servlets and JSP, Client side scripting with Java script and AJAX.

COURSE OUTCOMES:
Upon completion of the course the student will be able to
1. Understand basics of server side scripting using PHP   L2
2. Write programs with knowledge of client side scripting , validation of forms and AJAX programs   L4
3. Illustrate well formed XML programs , use XML data with JAVA Script   L3
4. Design server side programming applications with servlets   L5
5. Develop real time applications using JSP   L5

Unit – I:
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

Unit – II:
Client-side Scripting: Introduction to Javascript: Javascript language – declaring variables, the scope of variables, functions, event handlers (click, onsubmit etc.), Document Object Model, Form validation. Simple AJAX application.

Unit – III:
XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

Unit – IV:
Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading
Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

Unit – V:
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

TEXTBOOK:
1. Web Technologies, Uttam K Roy, Oxford University Press.
2.The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill.

REFERENCE BOOKS

1.Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech.
2.Java Server Pages –Hans Bergsten, SPD O'Reilly Java Script, D. Flanagan, O'Reilly,SPD.
3.Beginning Web Programming-Jon Duckett WROX.
4.Programming World Wide Web, R. W. Sebesta, Fourth Edition, Pearson.
5.Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

SEMESTER IV   L/T/P/C
                                                                                                  0/0/2/1

DATABASE MANAGEMENT SYSTEMS LAB (D84PC9)

Course Objectives:
- •Introduce ER data model, database design and normalization
- •Learn SQL basics for data definition and data manipulation

Course Outcomes:

1.	Design database schema for a given application and apply normalization	L3
2.	Acquire skills in using SQL commands for data definition and data manipulation.	L3
3.	Develop solutions for database applications using procedures, cursors and triggers	L3

List of Experiments:
1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
   A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
   B. B. Nested, Correlated subqueries
6. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
7. Triggers (Creation of insert trigger, delete trigger, update trigger)
8. Procedures
9. Usage of Cursors

CASE STUDY: 1.University, 2.Librery, 3,Reservation

TEXT BOOKS:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3 rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

B.Tech IV SEMESTER   L/T/P/C
                                                                                                 0/0/2/1

DATA WAREHOUSING AND DATA MINING LAB (D84PC10)

Course Objective:
To equip students with a comprehensive understanding of various kinds of tools.
classification and clusters in large datasets.

Course Outcomes:
Upon completion of the course, the student will be able to :

1. Analyze data from files and other sources.   L4
2. Apply various data manipulation tasks on various datasets.   L3
3. Apply Data mining techniques on real time datasets   L3

List of experiments and Tasks
Experiment-1: Build Data Warehouse and Explore WEKA

A. Build Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration Tool,
   Pentaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica,
   Business Objects, etc,)
   (i)Identify   source   tables   and   populate   sample   data.
   (ii)Design   multi-dimensional   data   models namely Star,   Snowflake   and
      Fact Constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare,
      manufacturing, Automobiles, sales etc).
   (ii)Write ETL scripts and implement using data warehouse tools
   (iv)Perform Various OLAP operations such as slice, dice, roll up, drill up and pivot.
   (v). Explore visualization features of the tool for analysis like identifying trends etc.

B. Explore WEKA Data Mining/Machine Learning Toolkit.
   (i)   Downloading and/or installation of WEKA data mining toolkit.
   (ii) Understand the features of WEKA tool kit such as Explorer, Knowledge flow interface,
        Experimenter, command-line interface.
   (iii) Navigate the options available in the WEKA (ex.select attributes panel, preprocess panel,
        classify panel, cluster panel, associate panel and visualize)
   (iv) Study the ARFF file format
   (v)   Explore the available data sets in WEKA.
   (vi) Load a data set (ex.Weather dataset,Iris dataset,etc.) (vii) Load each dataset and observe the
        following:
   (vii.i) List attribute names and they types (vii.ii)
   Number of records in each dataset.

(vii.iii) Identify the class attribute (if any)
(vii.iv) Plot Histogram
(vii.v) Determine the number of records for each class
(vii.vi) Visualize the data in various dimensions

Experiment-2:
Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets

A. Explore various options in Weka for preprocessing data and apply (like Discretization Filters, Resample filter, etc.) in each dataset.

B. Load each dataset into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.

C. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. Derive interesting insights and observe the effect of discretization in the rule generation process.

Experiment-3:
Demonstrate performing classification on data sets.

A. Load each dataset into Weka and run id3, j48 classification algorithm, study the classifier output. Compute entropy values, Kappa statistic.

B. Extract if-then rues from decision tree generated by classifier, Observe the confusion matrix and derive Accuracy, F- measure, TPrate, FPrate , Precision and recall values.
Apply cross-validation strategy with various fold levels and
compare the accuracy results.

C. Load each dataset into Weka and perform Naïve-bayes classification and k-Nearest Neighbor classification, Interpret the results obtained. **D.** Plot RoC Curves.

E. Compare classification results of ID3,J48, Naïve-Bayes and k-NN classifiers for each dataset
, and reduce which classifier is performing best and poor for each dataset and
justify.

Experiment-4:
Demonstrate Performing Clustering on Data Sets Clustering Tab

A. Load each dataset into Weka and run simple k-means clustering algorithm with different values of k(number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.

B. Explore other clustering techniques available in Weka.

C. Explore visualization features of weka to visualize the clusters. Derive interesting insights and explain.

Experiment-5:
Demonstrate Performing Regression on Data Sets

A. Load each dataset into Weka and build Linear Regression model. Study the cluster formed. Use training set option. Interpret the regression model and derive patterns and conclusions from the regression results.

B. Use options cross-validation and percentage split and repeat running the Linear Regression Model. Observe the results and derive meaningful results.

C. Explore Simple linear regression techniques that only looks at one variable.

Experiment-5:
Sample Programs using German Credit Data.
Task 1: Credit Risk Assessment
Description: The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible.

Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involved a compromise. Not too strict and not too lenient. To do the assignment, student first and foremost need some knowledge about the world of credit. Student can acquire such knowledge in a number of ways.

1. Knowledge engineering: Find a loan officer who is willing to talk. Interview him/her and try to represent him/her knowledge in a number of ways.
2. Books: Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
2. Common sense: Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
1. Case histories: Find records of actual cases where competent loan officers correctly judged when and not to. Approve a loan application.

The German Credit Data

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such data set. Consisting of 1000 actual cases collected in Germany.
In spite of the fact that the data is German, you should probably make use of it for this assignment(Unless you really can consult a real loan officer!)
There are 20 attributes used in judging a loan applicant (ie., 7 Numerical attributes and 13 Categorical or Nominal attributes). The goal is to classify the applicant into one of two categories. Good or Bad.
Subtasks:

1. List all the categorical (or nominal) attributes and the real valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision tree . train a Decision tree using the complete data set as the training data. Report the model obtained after training.
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly?(This is also called testing on the training set) why do you think can not get 100% training accuracy?
5. Is testing on the training set as you did above a good idea? Why or why not?

6. One approach for solving the problem encountered in the previous question is using crossvalidation? Describe what is cross validation briefly. Train a decision tree again using cross validation and report your results. Does accuracy increase/decrease? Why?

7. Check to see if the data shows a bias against "foreign workers" or "personal-status". One way to do this is to remove these attributes from the data set and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. Did removing these attributes have any significantly effect? Discuss.

8. Another question might be, do you really need to input so many attributes to get good results? May be only a few would do. For example, you could try just having attributes 2,3,5,7,10,17 and 21. Try out some combinations.(You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

9. Sometimes, The cost of rejecting an applicant who actually has good credit might be higher than accepting an applicant who has bad credit. Instead of counting the misclassification equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. By using a cost matrix in weak. Train your decision tree and report the Decision Tree and cross validation results. Are they significantly different from results obtained in problem 6.

10. Do you think, it is a good idea to predict simple decision trees instead of having long complex decision tress? How does the complexity of a Decision Tree relate to the bias of the model?

11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning. Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross validation and report the Decision Trees you obtain? Also Report your accuracy using the pruned model Does your Accuracy increase?

12. How can you convert a Decision Tree into "if-then-else rules". Make up your own small Decision Tree consisting 2-3 levels and convert into a set of rules. There also exist different classifiers that output the model in the form of rules. One such classifier in weka is rules, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this data set? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error).Report the rule obtained by training a oneR classifier. Rank the performance of j48, OneR.

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COMPUTER SCIENCE AND ENGINEERING (DATASCIENCE)

Semester IV   **L/T/P/C**
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ADVANCED ENGLISH COMMUNICATION SKILLS (AECS) LAB

1. Introduction

The introduction of the Advanced English Communication Skills Lab is considered essential at the B.Tech level. At this stage, the students need to prepare themselves for their career which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use appropriate English and perform the following:

1. Gathering ideas and information to organise ideas relevantly and coherently.
2. Making oral presentations.
3. Writing formal letters.
4. Transferring information from non-verbal to verbal texts and vice-versa.
5. Writing project/research reports/technical reports.
6. Participating in group discussions.
7. Engaging in debates.
8. Facing interviews.
9. Taking part in social and professional communication.

2. Objectives:

The objective of this lab is to focus on multi-media instruction for language development. Student are taught vocabulary which enables them to use appropriate words according to the content. The lab is intended to prepare students to listen and respond appropriately in different social and professional contexts. Another main objective of the lab is to guide students to communicate coherently in writing: understand the dynamics Of Group discussion; requirements needed to participate in interviews: prepare resumes and finally preparing the students for placements.

3.Course Outcomes:

Upon completion of the course the student will be able to:

1.Experiment with use of words by studying prefixes ,suffixes ,collections and contextual usage   L3
2.Distinguish between free writing and structured writing and improving writing skills   L4
3.Choosing how to start a conversation and using the right body language   L5
4. Assessing one self and understanding the dynamics of group discussions, organizing ideas etc   L5
5. Prioritizing the requirements needed to participate in interviews learning the strategies like
   opening and answering strategies to make oneself effective in an inrerview.   L5

4. Syllabus:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

A.Activities on Listening and Reading Comprehension: Active Listening – Development of Listening Skills Through Audio clips - Benefits of Reading – Methods and Techniques of Reading – Basic Steps to Effective Reading – Common Obstacles – Discourse Markers or Linkers - Sub-skills of reading - Reading for facts, negative facts and Specific Details- Guessing Meanings from Context, Inferring Meaning - Critical Reading — Reading Comprehension – Exercises for Practice.

B.Activities on Writing Skills: Vocabulary for Competitive Examinations - Planning for Writing – Improving Writing Skills - Structure and presentation of different types of writing – Free Writing and Structured Writing - Letter Writing –Writing a Letter of Application –Resume vs. Curriculum Vitae – Writing a Résumé – Styles of Résumé - e-Correspondence – Emails – Blog Writing - (N)etiquette – Report Writing – Importance of Reports – Types and Formats of Reports– Technical Report Writing– Exercises for Practice.

C.Activities on Presentation Skills - Starting a conversation – responding appropriately and relevantly – using the right language and body language – Role Play in different situations including Seeking Clarification, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk – Oral presentations (individual and group) through JAM sessions- PPTs – Importance of Presentation Skills – Planning, Preparing, Rehearsing and Making a Presentation – Dealing with Glossophobia or Stage Fear – Understanding Nuances of Delivery - Presentations through Posters/Projects/Reports – Checklist for Making a Presentation and Rubrics of Evaluation

D.Activities on Group Discussion (GD): Types of GD and GD as a part of a Selection Procedure - Dynamics of Group Discussion- Myths of GD - Intervention, Summarizing - Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas – Do's and Don'ts - GD Strategies – Exercises for Practice.

E.Interview Skills: Concept and Process - Interview Preparation Techniques - Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies - Interview Through Tele-conference & Video-conference - Mock Interviews.

5.Minimum Requirement: The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- One PC with latest configuration for the teacher
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6.Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **Oxford Advanced Learner's Dictionary**, 10th Edition
- **Cambridge Advanced Learner's Dictionary**
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech

7.Books Recommended:

1. Rizvi, M. Ashraf (2018). *Effective Technical Communication*. (2nd ed.). McGraw Hill Education (India) Pvt. Ltd.

2. Suresh Kumar, E. (2015). *Engineering English.* Orient BlackSwan Pvt. Ltd.

3. Bailey, Stephen. (2018). Academic *Writing: A Handbook for International Students.* (5th Edition). Routledge.

4. Koneru, Aruna. (2016). *Professional Communication*. McGraw Hill Education (India) Pvt. Ltd.

5. Raman, Meenakshi & Sharma, Sangeeta. (2022). *Technical Communication, Principles and Practice.* (4TH Edition) Oxford University Press.

6. Anderson,Paul V. (2007). *Technical Communication**.* Cengage Learning Pvt. Ltd. New Delhi.

7. McCarthy, Michael; O'Dell, Felicity & Redman, Stuart. (2017). *English Vocabulary in Use* Series. Cambridge University Press

8. Sen, Leela. (2009). *Communication Skills.* PHI Learning Pvt Ltd., New Delhi.

9. Elbow, Peter. (1998). *Writing with Power.* OxfordUniversity Press.

10. Goleman, Daniel. (2013). *EmotionalIntelligence*: *Why it can matter more than IQ.* Bloomsbury Publishing.

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COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

SEMESTER IV   **L/T/P/C**
                                                                                                   0/0/2/1

WEB TECHNOLOGIES LAB (D84PC11)

COURSE OBJECTIVES:

To enable the student to program web applications using the following technologies HTML, JavaScript, AJAX, PHP, Tomcat Server, Servlets, JSP.

COURSE OUTCOMES:

1. Use LAMP Stack for webapplications   L3
2. Use Tomcat Server for Servlets andJSPs   L3
3. Write simple applications with Technologies like HTML, Javascript, AJAX, PHP,
   Servlets, and JSPs, Parse XML files using Java (DOM and SAXparsers)   L3
4. Connect to Database and get results.   L3

LIST OF EXPERIMENTS:

1. Write an HTML page including JavaScript that takes a given set of integer numbers and shows them after sorting in descending order.

2. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.

3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.

4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and fontsize).

5. Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using (a) DOM Parser and (b) SAX parser Implement the following web applications using (a) PHP, (b) Servlets and (c)JSP:

6. A user validation web application, where the user submits the login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.

7. Modify the above program to use an xml file instead of database.

8. ModifytheaboveprogramtouseAJAXtoshowtheresultonthesamepagebelowthesubmit button.

9. A simple calculator web application that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands.

10. Modify the above program such that it stores each query in a database and checks the database first for the result. If the query is already available in the DB, it returns the value that was previously computed (from DB) or it computes the result and returns it after storing the new query and result in DB.

11. A web application takes a name as input and on submit it shows a hello page where is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You message with the duration of usage (hint: Use session to store name and time).

12. A web application that takes name and age from an HTML page. If the age is less than It should send a page with "Hello , you are not authorized to visit this site" message, where should be replaced with the entered name. Otherwise it should send "Welcome to this site" message.

13. A web application for implementation: The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions. If name and password matches, serves a welcome page with user's full name. If name matches and password doesn't match, then serves "password mismatch" page If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)

14. A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary.

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A+
NAAC

COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

SEMESTER IV   **L/T/P/C**
                                                                                                          0/0/0/0

INTELLECTUAL PROPERTY RIGHTS (D4MCIPR)

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

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

UNIT – III:
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. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV:
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V:
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, copy right law, international patent law, and international development in trade secrets law.

Suggested Reading:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.