**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
**KAKINADA – 533 003, Andhra Pradesh, India**
**DEPARTMENT OF CSE –INTERNET OF THINGS (IoT)**

# COURSE STRUCTURE AND SYLLABUS

## For UG – R20

### B. Tech - COMPUTER SCIENCE & ENGINEERING with Specialization

## Common to

**(i) CSE (INTERNET OF THINGS) – Branch Code:49**
**(ii) INTERNET of THINGS - Branch Code:60**

*(Applicable for batches admitted from 2020-2021)*

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## KAKINADA – 533 003, Andhra Pradesh, India
## DEPARTMENT OF CSE –INTERNET OF THINGS (IoT)

### II Year – I SEMESTER

| S. No | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | BSC2101 | Mathematics – III | 3 | 0 | 0 | 3 |
| 2. | PCC2101 | Mathematical Foundations of Computer Science | 3 | 0 | 0 | 3 |
| 3. | PCC2102 | Data Structures | 3 | 0 | 0 | 3 |
| 4. | PCC2103 | Operating Systems | 3 | 0 | 0 | 3 |
| 5. | PCC2104 | Java Programming | 3 | 0 | 0 | 3 |
| 6. | PCC2105 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 7. | PCC2106 | OS&UNIX Programming Lab | 0 | 0 | 3 | 1.5 |
| 8. | PCC2107 | Java Programming Lab | 0 | 0 | 3 | 1.5 |
| 9. | SC2101 | Free and Open Source Software | 0 | 0 | 4 | 2 |
| 10. | MC2101 | Essence of Indian Traditional Knowledge | 2 | 0 | 0 | 0 |
| **TOTAL** | | | | | | **21.5** |

### II Year – II SEMESTER

| S. No | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | ESC2201 | Computer Organization& Architecture | 3 | 0 | 0 | 3 |
| 2. | BSC2201 | Probability and Statistics | 3 | 0 | 0 | 3 |
| 3. | PCC2201 | Formal Languages & Automata Theory | 3 | 0 | 0 | 3 |
| 4. | PCC2202 | Database Management Systems | 3 | 0 | 0 | 3 |
| 5. | HSMC2201 | Managerial Economics and Financial Accountancy | 3 | 0 | 0 | 3 |
| 6. | ESC2202 | Computer Organization& Architecture Lab | 0 | 0 | 3 | 1.5 |
| 7. | PCC2203 | R Programming Lab | 0 | 0 | 3 | 1.5 |
| 8. | PCC2204 | Database Management Systems Lab | 0 | 0 | 3 | 1.5 |
| 9. | SC2201 | Android Application Development | 0 | 0 | 4 | 2 |
| **TOTAL** | | | | | | **21.5** |
| | **Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)** | | 4 | 0 | 0 | 4 |
| | Internship 2 Months (Mandatory) during summer vacation | | | | | |

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| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **COMPUTER ORGANIZATION & ARCHITECTURE (ESC2201)** | | | | | |

**Course Objectives:**

The course objectives of Computer Organization are to discuss and make student familiar with the

- Principles and the Implementation of ComputerArithmetic
- Operation of CPUs including RTL, ALU, Instruction Cycle andBusses
- FundamentalsofdifferentInstructionSetArchitecturesandtheirrelationshiptothe CPU Design
- Memory System and I/OOrganization
- Principles of Operation of Multiprocessor Systems andPipelining

**Course Outcomes:**

By the end of the course, the student will

- Develop a detailed understanding of computersystems
- Cite different number systems, binary addition and subtraction, standard, floating-point, and microoperations
- Develop a detailed understanding of architecture and functionality ofcentral processing unit
- Exemplify in a better way the I/O and memoryorganization
- Illustrate concepts of parallel processing, pipelining and inter processor communication

**UNIT I**

Basic Structure of Computers: Basic Organization of Computers, Historical Perspective, Bus Structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating, Point Representation. Other Binary Codes, Error Detection Codes.
Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms.

**UNIT II**

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.
Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Instruction Cycle, Memory – Reference Instructions. Input –Output and Interrupt, Complete Computer Description.

**UNIT III**

Central Processing Unit: General Register Organization, STACK Organization. Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.
Micro programmed Control: Control Memory, Address Sequencing, Micro Program example, Design of Control Unit.

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## UNIT IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access.

## UNIT V

Multi Processors: Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter Processor Arbitration.

Pipeline: Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, Array Processor.

**Text Books:**

1) Computer System Architecture, M. Morris Mano, Third Edition, Pearson,2008.
2) Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5/e, McGraw Hill,2002.

**Reference Books:**

1) Computer Organization and Architecture, William Stallings, 6/e, Pearson,2006.
2) Structured Computer Organization, Andrew S. Tanenbaum, 4/e, Pearson,2005.
3) Fundamentals of Computer Organization and Design, Sivarama P. Dandamudi, Springer, 2006.

**e-Resources:**

1) https://nptel.ac.in/courses/106/105/106105163/
2)http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf

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| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **PROBABILITY AND STATISTICS (BSC2201)** | | | | | |

**Course Objectives:**

- To familiarize the students with the foundations of probability and statisticalmethods
- To impart probability concepts and statistical methods in various applicationsEngineering

**Course Outcomes:**

Upon successful completion of this course, the student should be able to

- Classify the concepts of data science and its importance (L4) or(L2)
- Interpret the association of characteristics and through correlation and regression tools (L4)
- Make use of the concepts of probability and their applications(L3)
- Apply discrete and continuous probability distributions(L3)
- Design the components of a classical hypothesis test(L6)
- Infer the statistical inferential methods based on small and large sampling tests(L4)

**UNIT I**

Descriptive statistics and methods for data science: Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) – Skewness Kurtosis.

**UNITII**

Correlation and Curve fitting: Correlation – correlation coefficient – rank correlation – regression coefficients and properties – regression lines – Method of least squares – Straight line – parabola – Exponential – Powercurves.

**UNIT III**

Probability and Distributions: Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normaldistributions.

**UNIT IV**

Sampling Theory:Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, $\chi^2$ and F- distributions – Point and Interval estimations – Maximum error of estimate.

**UNIT V**

Tests of Hypothesis: Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions.

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**Text Books:**

1) Miller and Freund's, Probability and Statistics for Engineers,7/e, Pearson,2008.
2) S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e,Sultan Chand & Sons Publications,2012.

**Reference Books:**

1) Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineersand the Scientists,8th Edition, Pearson2007.
2) Jay l. Devore, Probability and Statistics for Engineering and the Sciences, 8thEdition, Cengage.
3) Sheldon M. Ross, Introduction to probability and statistics Engineers and the Scientists,4th Edition, Academic Foundation, 2011.
4) Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson,2010.

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| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **FORMAL LANGUAGES AND AUTOMATA THEORY (PCC2201)** | | | | | |

**Course Objectives:**

- To learn fundamentals of Regular and Context Free Grammars andLanguages
- To understand the relation between Regular Language and Finite Automata andmachines
- To learn how to design Automata's and machines as Acceptors, Verifiers and Translators
- To understand the relation between Contexts free Languages, PDA andTM
- To learn how to design PDA as acceptor and TM asCalculators

**Course Outcomes:**

By the end of the course students can

- Classify machines by their power to recognize languages.
- Summarize language classes & grammars relationship among them with the helpof Chomskyhierarchy
- Employ finite state machines to solve problems incomputing
- Illustrate deterministic and non-deterministicmachines
- Quote the hierarchy of problems arising in the computerscience

**UNIT I**

Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

**UNIT II**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, InterConversion.

**UNIT III**

Formal Languages, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Є-Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

**UNIT IV**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Two Stack Pushdown Automata, Application of PushdownAutomata.

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## UNIT V

Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Modified PCP, Classes of P and NP, NP-Hard and NP-Complete Problems.

**Text Books:**

1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson,2008
2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishraand N. Chandrasekharan, 3rd Edition, PHI, 2007

**Reference Books:**

1) Elements of Theory of Computation, Lewis H.P. &Papadimition C.H., Pearson/PHI
2) Theory of Computation, V. Kulkarni, Oxford University Press,2013
3) Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill,2014

**e-Resources:**

1) https://nptel.ac.in/courses/106/104/106104028/

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|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **DATABASE MANAGEMENT SYSTEMS (PCC2202)** | | | | | |

**Course Objectives:**

- To introduce about database managementsystems
- To give a good formal foundation on the relational model of data and usage of RelationalAlgebra
- To introduce the concepts of basic SQL as a universal Databaselanguage
- To demonstrate the principles behind systematic database design approaches bycovering conceptual design, logical design throughnormalization
- To provide an overview of physical design of a database system, by discussing Databaseindexing techniques and storagetechniques

**Course Outcomes:**

By the end of the course, the student will be able to

- Describe a relational database and object-orienteddatabase
- Create, maintain and manipulate a relational database usingSQL
- Describe ER model and normalization for databasedesign
- Examine issues in data storage and query processing and can formulate appropriatesolutions
- Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage

**UNIT I**

Introduction: Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for thedatabase.

**UNIT II**

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, Stringconversion).

**UNIT III**

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. SQL: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

**UNIT IV**

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce- codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF), Fifth Normal Form(5NF).

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**UNIT V**

Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.
Indexing Techniques: B+ Trees: Search, Insert, Delete algorithms, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes , Index data Structures, Hash Based Indexing: Tree base Indexing, Comparison of File Organizations, Indexes and PerformanceTuning

**Text Books:**

1) Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke,TMH
2) Database System Concepts,5/e, Silberschatz, Korth,TMH

**Reference Books:**

1) Introduction to Database Systems, 8/e C J Date,PEA.
2) Database Management System, 6/e RamezElmasri, Shamkant B. Navathe,PEA
3) Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, CengageLearning.

**e-Resources:**

1) https://nptel.ac.in/courses/106/105/106105175/
2)https://www.geeksforgeeks.org/introduction-to-nosql/

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| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY (HSMC2201)** | | | | | |

**Course Objectives:**

- The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demandforecasting.
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-ProfitAnalysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of BusinessCycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performanceevaluation.
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgetingproposals.

**Unit-I**

Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

**Unit – II:**

Theories of Production and Cost Analyses:
Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume- Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

**Unit – III:**

Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

**Unit – IV:**

Introduction to Accounting & Financing Analysis:
Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

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**Unit – V:**

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and ProfitabilityIndex)

**Course Outcomes:**

- The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for aproduct.
- The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination ofinputs.
- The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different BusinessUnits.
- The Learner is able to prepare Financial Statements and the usage of various Accounting tools forAnalysis.
- The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decisionmaking.

**TEXT BOOKS:**

A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

**REFERENCES:**

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & CompanyLtd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New editionedition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & CompanyLtd,
4. MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House PvtLtd
5. I.M Pandey, Financial Management , Vikas Publishing House PvtLtd
6. V. Maheswari, Managerial Economics, S. Chand & CompanyLtd,

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| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| COMPUTER ORGANIZATION& ARCHITECTURE LAB (ESC2202) | | | | | |

**Course Objectives:**
Upon completion of the Course, the students will be able to:
- Know the characteristics of various components.
- Understand the utilization of components

**Course Outcomes:**
At the end of this course, students will demonstrate the ability to
- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Solve elementary problems by assembly language programming
- Implement assembly language program for given task for 8086 microprocessor.

**List of Experiments:**
1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Design a JK Flip-Flop, Edge triggered J-K NAND Flip Flop and show its functionality Handle race condition and clock gating in your circuit.
4. Design a 4 – bit Adder / Subtractor
5. Combinational logic circuits: Implementation of Boolean functions using logic gates
6. Arithmetic operations using logic gates; Implementation of Multiplexers, Demultiplexers, Encoders, Decoders; Implementation of Boolean functions using Multiplexers/Decoders
7. Study of sequential logic circuits: Implementation of flip flops, Verify the excitation tables of various FLIP-FLOPS.
8. Design and realization a Synchronous and Asynchronous counter using flip-flops
9. Design and realization of an 8-bit parallel load and serial out shift register using flipflops
10. Implementation of counters, Design and realization a Synchronous and Asynchronous counter using flip-flops
11. Design and realization of 4x1 mux, 8x1mux using 2x1 mux

Write assembly language programs in 8086 for the following: (MASAM can also beused)

1. To add two 8 bit number (A+B=RESULT with a carry and without a carry).
2. To subtract one 8 bit number from another (A-B=RESULT with a borrow and without a borrow).
3. To find out AND, OR, NOT, XOR, NAND, NOR, XNOR of two 8 bit number.
4. To find out addition of two 16 bit numbers.
5. To find out subtraction of two 16 bit numbers.
6. To evaluate the expression a = b + c –d * e

Considering 8-bit, 16 bit and 32-bit binary numbers as b, c, d, e.

Take the input in consecutive memory locations and results also Display the results by using “int xx” of 8086. Validate program for the boundary conditions.

7. To take N numbers as input. Perform the following operations on them.

a. Arrange in ascending and descending order.
b. Find max and minimum
c. Find average

Considering 8-bit, 16-bit binary numbers and 2-digit, 4 digit and 8-digit BCD numbers. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

8. To implement the above operations as procedures and call from the main procedure.
9. To find the factorial of a given number as a Procedure and call from the main program which display the result.

**Note:** Experiments can be done using Logic board, EasyCPU, RTSlim, Little Man Computer (LMC), Assemblers for 8085 programming, 8086 based trainer kits, MIPS simulator PCSpim, Xilinx schematic editor and simulation tools or any other choice

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| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| R PROGRAMMING LAB (PCC2203) | | | | | |

**Course Objective:** In this course student will learn about the fundamentals of R programming, standard R libraries,solid understanding of R functions,write programs using the R and gain skills in R programming Language, get acquaintances with Arrays, Files, Strings, Packages, and distributions using R.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Implement basic concepts of R programming, and its different module that includes conditional, looping, lists, Strings, Functions, Frames, Arrays, and File programming.
2. Implement the concepts of R Script to extract the data from data frames and file operations.
3. Implement the various statistical techniques using R.
4. Extend the functionality of R by using add-on packages
5. Use R Graphics and Tables to visualize results of various statistical operations on data

**LIST OF LAB PROGRAMS:**

Week 1:

Installing R and RStudio
Basic functionality of R, variable, data types in R

Week 2:

a) Implement R script to show the usage of various operators available in Rlanguage.
b) Implement R script to read person‘s age from keyboard and display whether he is eligiblefor voting ornot.
c) Implement R script to find biggest number between two numbers.
d) Implement R script to check the given year is leap year ornot.

Week 3:

a) Implement R Script to generate first N naturalnumbers.
b) Implement R Script to check given number is palindrome ornot.
c) Implement R script to print factorial of anumber.
d) Implement R Script to check given number is Armstrong ornot.

Week 4:

a) Implement R Script to perform various operations on string using stringlibraries.
b) Implement R Script to check given string is palindrome ornot.
c) Implement R script to accept line of text and find the number of characters, number of vowels and number of blank spaces init.
d) Implement R script for Call-by-value and Call-by-reference

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Week 5:

a) Implement R Script to create a list.
b) Implement R Script to access elements in the list.
c) Implement R Script to merge two or more lists. Implement R Script to perform matrix operation

Week 6:

Implement R script to perform following operations:
d) various operations on vectors
e) Finding the sum and average of given numbers using arrays.
f) To display elements of list in reverse order.
g) Finding the minimum and maximum elements in the array.

Week 7:

a)Implement R Script to perform various operations on matrices
b) Implement R Script to extract the data from dataframes.
c) Write R script to display file contents.
d) Write R script to copy file contents from one file to another

Week 8:

a) Implement R Script to create a Pie chart, Bar Chart, scatter plot andHistogram.
b) Implement R Script to perform mean, median, mode, range, summary, variance, standard deviation operations.

Introduction to ggplot2 graphics

Week 9:

a) Implement R Script to perform Normal, Binomialdistributions.
b) Implement R Script to perform correlation, Linear and multipleregression.

Week 10:

Introduction to Non-Tabular Data Types: Time series, spatial data, Network data.
Data Transformations: Converting Numeric Variables into Factors, Date Operations, String Parsing, Geocoding

Week 11:

Introduction Dirty data problems: Missing values, data manipulation, duplicates, forms of data dates, outliers, spelling

Week 12:

Data sources: SQLite examples for relational databases, Loading SPSS and SAS files, Reading from Excel and Google Spreadsheets, API and web scraping examples

**REFERENCES:**

1. R Cookbook Paperback – 2011 by Teetor Paul O Reilly Publications
2. Beginning R: The Statistical Programming Language by Dr. Mark Gardener, Wiley Publications
3. R Programming For Dummies by JorisMeysAndrie de Vries, Wiley Publications
4. Hands-On Programming with R by Grolemund, O Reilly Publications

5. Statistical Programming in R by KG Srinivas G.M. Siddesh, Chetan Shetty &Sowmya B.J. - 2017 edition
6. R Fundamentals and Programming Techniques, ThomasLumely.
7. R for Everyone Advanced Analytics and Graphics, Jared P. Lander- Addison WesleySeries
8. The Art of R Programming, Norman Matloff, CengageLearning
9. Maria DoloresUgarte,AnaF.Militino,AlanT.Arnholt–ProbabilityandStatisticswithR2nd Edition on, CRC Press,2016.
10. R-programming for Data science, RogerD.Peng.
11. An Introduction to statistical learning-with applications in R, Trevor Hastie and Rob Tibshirani.

**Web Links**

1. URL: https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf ( Online Resources)
2. http://nptel.ac.in/courses/106104135/48
3. http://nptel.ac.in/courses/110106064/

**SOFTWARE requirements:**

1. The R statistical software program. Available from: https://www.r-project.org/

RStudio an Integrated Development Environment (IDE) for R. Available from: https://www.rstudio.com/

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## DEPARTMENT OF CSE –INTERNET OF THINGS (IoT)

| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **DATABASE MANAGEMENT SYSTEMS LAB (PCC2204)** | | | | | |

**Course Objectives:**

This Course will enable students to

- Populate and query a database using SQL DDL/DMLCommands
- Declare and enforce integrity constraints on adatabase
- Writing Queries using advanced concepts ofSQL
- Programming PL/SQL including procedures, functions, cursors andtriggers

**Course Outcomes:**

At the end of the course the student will be able to:

- Utilize SQL to execute queries for creating database and performing data manipulation operations
- Examine integrity constraints to build efficientdatabases
- Apply Queries using Advanced Concepts ofSQL

Build PL/SQL programs including stored procedures, functions, cursors andtriggers

**List of Exercises:**

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECTcommand.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in theclass.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char,to_date)
5. 
   i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records werefound)
   ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQLblock.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCEfunctions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATIONERROR.

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Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

8. Program development using creation of stored functions, invoke functions in SQL Statements and write complexfunctions.
9. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSORvariables.
10. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OFTriggers
11. Create a table and perform the search operation on table using indexing and non-indexing techniques.

**Text Books/Suggested Reading:**

1) Oracle: The Complete Reference by OraclePress
2) Nilesh Shah, "Database Systems Using Oracle", PHI,2007
3) Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education,2007

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## DEPARTMENT OF CSE –INTERNET OF THINGS (IoT)

| II Year – II Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |
| **ANDROID APPLICATION DEVELOPMENT (SC2201)** | | | | | |

**Course Objectives:**

- To learn how to develop Applications in android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.

1. Create an Android application that shows Hello + name of the user and run it on an emulator.
(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.

2. Create a screen that has input boxes for User Name, Password, 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.

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.

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.

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.

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.

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.

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**Note:**
Android Application Development with MIT App Inventor:For the first one week, the student is advised to go through the App Inventor from MIT which gives insight into the various properties of each component.
The student should pay attention to the properties of each components, which are used later in Android programming. Following are useful links:
1. http://ai2.appinventor.mit.edu
2. https://drive.google.com/file/d/0B8rTtW_91YclTWF4czdBMEpZcWs/view