SYLLABUS AND PROGRAMME / COURSE OUTCOMES

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Digital Systems & Architecture**

Program Code: **Course Code: USCS101**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.
- To engage in independent and life-long learning in the background of rapid changing IT industry.

Course Outcomes:

After successful completion of this course, students would be able to

- To learn about how computer systems work and underlying principles
- To understand the basics of digital electronics needed for computers
- To understand the basics of instruction set architecture for reduced and complex instruction sets
- To understand the basics of processor structure and operation
- To understand how data is transferred between the processor and I/O devices

Unit I

Fundamentals of Digital Logic: Boolean algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits: Adders, Mux, De-Mux, Sequential Circuits: Flip- Flops (SR, JK & D), Counters: synchronous and asynchronous Counter

Computer System: Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access

Unit II

Memory System Organization: Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory: Magnetic Discs, Optical Memory, Flash Memories, RAID Levels

Processor Organization: Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU], Processor Organization, Structure and Function. Register Organization, Basic Microprocessor operations: Data Transfer (Register / Memory) Operations, Arithmetic & Logical Operations, Instruction Cycle, Instruction Pipelining. Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues

Unit III

Control Unit: Micro-Operations, Functional Requirements, Processor Control, Hardwired Implementation, Micro-programmed Control. Fundamentals of Advanced Computer Architecture: Parallel Architecture: Classification of Parallel Systems, Flynn‟s Taxonomy, Array Processors, Clusters, and NUMA Computers. Multiprocessor Systems: Structure & Interconnection Networks, Multi-Core Computers: Introduction, Organization and Performance.

Textbooks:

1. M. Mano, Computer System Architecture 3rd edition, Pearson
2. Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed., McGraw-Hill 2012
3. R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd. , 4th Edition, 2010

Additional References:

1. William Stallings (2010), Computer Organization and Architecture- designing for performance,8th edition, Prentice Hall, New Jersy.
2. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, PearsonEducation Inc,
3. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programmme: F.Y.B. Sc. CS **Course: Introduction to Programming with Python**

Program Code: **Course Code: USCS102**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as

networking, web design, security, cloud computing, IoT, data science and other emerging technologies.

- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry.

Course Outcomes:

After successful completion of this course, students would be able to:

- Ability to store, manipulate and access data in Python
- Ability to implement basic Input / Output operations in Python
- Ability to define the structure and components of a Python program.
- Ability to learn how to write loops and decision statements in Python.
- Ability to learn how to write functions and pass arguments in Python.
- Ability to create and use Compound data types in Python

Unit I

Overview of Python: History & Versions, Features of Python, Execution of a Python Program, Flavours of Python, Innards of Python, Python Interpreter, Memory Management in Python, Garbage Collection in Python, Comparison of Python with C and Java, Installing Python, Writing and Executing First Python Program, Getting Help, IDLE

Data Types, Variables and Other Basic Elements: Comments, Docstrings, Data types- Numeric Data type, Compound Data Type, Boolean Data type, Dictionary, Sets, Mapping, Basic Elements of Python, Variables

Input and Output Operations: Input Function, Output Statements, The print() function, The print("string") function, The print(variables list) function, , The print(object) function, The print(formatted string) function, Command Line Arguments

Control Statements: The if statement, The if … else Statement, The „if … elif … else" Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement

Unit II

Instruction set architectures:
Memory organization, addressing and operations; word size, big-endian and little-endian arrangements. Instructions, sequencing. Instruction sets for RISC and CISC

(examples Altera NIOS II and Freescale ColdFire). Operand addressing modes; pointers; indexing for arrays. Machine language, assembly language, assembler directives. Function calls, processor runtime stack, stack frame. Types of machine instructions: arithmetic, logic, shift, etc. Instruction sets, RISC and CISC examples.

Unit II

Operators: Arithmetic operators, Assignment operators, Unary minus operator, Relational operators, Logical operators, Bitwise operators, Membership operators, Identity operators, Precedence of Operators, Associativity of Operators

Arrays: Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions of Arrays, Attributes of an Array, The ndim Attribute, The shape Attribute, The size Attribute, The itemsize Attribute

Functions: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Arbitrary Arguments, Recursive Functions, Anonymous or Lambda Functions, Using Lambda with the filter() Function, Using Lambda with the map() Function, Using Lambda with the reduce() Function

Modules:Introduction to Modules in Python

Unit III

Strings: Creating Strings, Functions of Strings, Working with Strings, Length of a String, Indexing and Slicing, Repeating and Concatenating Strings, Checking Membership, Comparing Strings, Removing Spaces, Finding Substrings, Counting Substrings, Immutability, Splitting and Joining Strings, Changing Case, Checking Starting and Ending of a String, Sorting Strings, Searching in the Strings, Testing Methods, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String

List and Tuples: Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple

Dictionaries: Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions, Sorting the Elements of a Dictionary using Lambda, Ordered Dictionaries

Text book:

1. Practical Programming: An Introduction to Computer Science Using Python 3, Paul Gries , Jennifer Campbell, Jason Montojo, Pragmatic Bookshelf, 2nd Edition, 2014
2. Programming through Python, M. T Savaliya, R. K. Maurya& G M Magar, Sybgen Learning India, 2020

Additional References:

1. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
2. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017
3. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
4. Python Programming: Using Problem Solving Approach, ReemaThareja, Oxford Univeristy Press, 2017
5. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: LINUX Operating System**
Program Code: **Course Code: USCS103**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry.

Course Outcomes:

After successful completion of this course, students would be able to

- Work with Linux file system structure, Linux Environment
- Handle shell commands for scripting, with features of regular expressions, redirections
- Implement file security permissions
- Work with vi, sed and awk editors for shell scripting using various control structures
- Install softwares like compilers and develop programs in C and Python programming languages on Linux Platform

Unit I

Linux operating system and Basics : History, GNU Info and Utilities, Various Linux Distributions, The Unix/Linux architecture, Features of Unix/Linux, Starting the shell, Shell prompt, Command structure, File Systems and Directory Structure, man pages, more documentation pages

Basic Bash shell commands: General purpose utility Commands, basic commands, Various file types, attributes and File handling Commands, Handling Ordinary Files. More file

attributes
Advanced Bash shell commands:Simple Filters, Filters using regular expressions.
The Linux environment variable: Setting, Locating and removing environment variables like PATH etc, Default shell environment variables, Using command aliases.

Unit II

Understanding Linux file permission: Linux security, Using Linux groups, Decoding file permissions, Changing security setting, Sharing files.
Linux Security: Understanding Linux Security, uses of root, sudo command, working with passwords, Understanding ssh.
Networking: TCP/IP Basics, TCP/IP Model, Resolving IP addresses, Applications, ping, telnet, ftp, DNS
Working withEditors: awk, sed and Introduction to vi

Unit III

Basic script building: Using multiple commands, Creating script files, Displaying messages, Using variables, Redirecting Input and Output, Pipes performing math, Exiting the script.
Using structured commands: Working with if-then, if-then-else and nested if statements, test command, Compound condition testing, while command, until command, case command.
Script and Process control : Handling signals, Running scripts in background mode, Running scripts without a console, Job control, Job scheduling commands: ps, nice, renice, at, batch, cron table, Running the script at boot

Text book:

1. “Linux Command line and Shell Scripting Bible”, Richard Blum, Wiley India.
2. “Unix: Concepts and Applications”, Sumitabha Das, 4th Edition, McGraw Hill.
3. “Official Ubuntu Book”, Matthew Helmke& Elizabeth K. Joseph with Jose Antonio Rey and Philips Ballew, 8th Ed.

Additional References:

1. “Linux Administration: A Beginner's Guide”, Fifth Edition, Wale Soyinka, Tata McGraw-Hill, 2008.
2. “Linux: Complete Reference”, Richard Petersen, 6th Edition, Tata McGraw-Hill
3. “Beginning Linux Programming”, Neil Mathew, 4th Edition, Wiley Publishing, 2008.

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Open Source Technologies**

Program Code: **Course Code: USCS104**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry.

Course Outcomes:

- Differentiate between Open Source and Proprietary software and Licensing.
- Recognize the applications, benefits and features of Open-Source Technologies
- Gain knowledge to start, manage open-source projects.

Unit I

Introduction to Open-Source: Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open- Source Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.

Open-Source Principles and Methodology: Open-Source History, Open- Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization.

Licensing: What Is A License, How to create your own Licenses, Important FOSS Licenses (Apache, BSD, PL, LGPL), copyrights and copy lefts, Patent.

Unit II

Open-Source projects: Starting and maintaining own Open-Source Project, Open-Source Hardware, Open-Source Design, Open-source Teaching, Open-source media.

Collaboration: Community and Communication, Contributing to Open- Source Projects Introduction to GitHub, interacting with the community on GitHub, Communication and etiquette, testing open-source code, reporting issues, contributing code. Introduction to Wikipedia, contributing to Wikipedia or contributing to any prominent open-source project of student‟s choice.

Open-Source Ethics and Social Impact: Open source vs. closed source, Open-source Government, Ethics of Open-source, Social and Financial impacts of open-source technology, Shared software, Shared source, Open Source as a Business Strategy

Unit III

Understanding Open-Source Ecosystem: Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies

Case Studies: Example Projects: Apache Web server, BSD, GNU/Linux, Android, Mozilla (Firefox), Wikipedia, Drupal, WordPress, Git, GCC, GDB, GitHub, Open Office, LibreOffice Study: Understanding the developmental models, licensing, mode of funding, commercial/non-commercial use.

Text book:

1. “Open-Source Technology”, Kailash Vadera&Bhavyesh Gandhi, University Science Press, Laxmi Publications, 2009
2. 2. “Open-Source Technology and Policy”, Fadi P. Deek and James A. M. McHugh, Cambridge University Press, 2008.

Additional References:

1. “Perspectives on Free and Open-Source Software”, Clay Shirky and Michael Cusumano, MIT press.
2. “Understanding Open Source and Free Software Licensing”, Andrew M. St. Laurent, O‟Reilly Media.
3. “Open Source for the Enterprise”, Dan Woods, GautamGuliani, O‟Reilly Media
4. Linux kernel Home: http://kernel.org4
5. Open-Source Initiative: https://opensource.org/5
6. The Linux Foundation: http://www.linuxfoundation.org/
7. The Linux Documentation Project: http://www.tldp.org/2
8. Docker Project Home: http://www.docker.com3.
9. Linux Documentation Project: http://www.tldp.org/6
10. Wikipedia: https://en.wikipedia.org/7.https://en.wikipedia.org/wiki/Wikipedia:Contributing_to_Wikipedia8
11. GitHub: https://help.github.com/9. 12. The Linux Foundation: http://www.linuxfoundation.org/

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Discrete Mathematics**

Program Code: **Course Code: USCS105**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

- After successful completion of this course, learners would be able to:
- Define mathematical structures (relations, functions, graphs) and use them to model real life situations.
- Understand, construct and solve simple mathematical problems.
- Solve puzzles based on counting principles.
- Provide basic knowledge about models of automata theory and the corresponding formal languages.
- Develop an attitude to solve problems based on graphs and trees, which are widely used in software.

Unit I

Functions: Definition of function; Domain, co-domain, range of a function; Examples of standard functions such as identity and constant functions, absolute value function, logarithmic and exponential functions, flooring and ceiling functions; Injective, surjective and bijective functions; Composite and inverse functions.

Relations: Definition and examples of relation; Properties of relations, Representation of relations using diagraphs and matrices; Equivalence relation; Partial Order relation, Hasse

Diagrams, maximal, minimal, greatest, least element, Lattices
Recurrence Relations: Definition and Formulation of recurrence relations; Solution of a recurrence relation; Solving recurrence relations- Back tracking method, Linear homogeneous recurrence relations with constant coefficients; Homogeneous solution of linear homogeneous recurrence relation with constant coefficients; Particular solution of non-linear homogeneous recurrence relation with constant coefficients; General solution of non- linear homogeneous recurrence relation with constant coefficients; Applications- Formulate and solve recurrence relation for Fibonacci numbers, Tower of Hanoi, Intersection of lines in a plane, Sorting Algorithms.

Unit II

Counting Principles: Basic Counting Principles (Sum and Product Rule); Pigeonhole Principle (without proof) - Simple examples; Inclusion Exclusion Principle (Sieve formula) (without proof); Counting using Tree diagrams.

Permutations and Combinations: Permutation without and with repetition; Combination without and with repetition; Binomial numbers and identities: Pascal Identity, Vandermonde‟s Identity, Pascal triangle, Binomial theorem (without proof) and applications; Multionomial numbers, Multinomial theorem (without proof) and applications.

Languages, Grammars and Machines: Languages and Grammars – Introduction, Phase structure grammar, Types of grammar, derivation trees; Finite-State Machines with Output; Finite- State Machines with No Output; Regular Expression and Regular Language.

Unit III

Graphs: Graphs and Graph Models; Graph terminologies and Special types of graphs; Definition and elementary results; Representing graphs, Linked representation of a graph; Graph Isomorphism; Connectivity in graphs – path, trail, walk; Euler and Hamilton paths; Planar graphs, Graph coloring and chromatic number.

Trees: Definition, Tree terminologies and elementary results; Linked representation of binary trees; Ordered rooted tree, Binary trees, Complete and extended binary trees, Expression trees, Binary Search tree, Algorithms for searching and inserting in binary search trees, Algorithms for deleting in a binary search tree; Traversing binary trees

Text book:

1. Discrete Mathematics and Its Applications, Seventh Edition by Kenneth H. Rosen, McGraw Hill Education (India) Private Limited. (2011)
2. Discrete Mathematics: SemyourLipschutz, Marc Lipson, Schaum‟s out lines, McGraw- Hill Inc. 3rd Edition
3. Data Structures Seymour Lipschutz, Schaum‟s out lines, McGraw- Hill Inc. 2017
4. Norman L. Biggs, Discrete Mathematics, Revised Edition, Clarendon Press, Oxford 1989.

Additional References:

1. Elements of Discrete Mathematics: C.L. Liu, Tata McGraw- Hill Edition.
2. Concrete Mathematics (Foundation for Computer Science): Graham, Knuth, Patashnik Second Edition, Pearson Education.
3. Discrete Mathematics: SemyourLipschutz, Marc Lipson, Schaum‟s out lines, McGraw-Hill Inc.
4. Foundations in Discrete Mathematics: K.D. Joshi, New Age Publication, New Delhi.

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course:** Descriptive Statistics

Program Code: **Course Code: USCS106**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, learners would be able to

1. Organize, manage and present data.
2. Analyze Statistical data using measures of central tendency and dispersion.
3. Analyze Statistical data using basics techniques of R.
4. Study the relationship between variables using techniques of correlation and regression.

Unit I

Data Types and Data Presentation: Data types: Attribute, Variable, Discrete and Continuous variable, Univariate and Bivariate distribution. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio.

Data presentation: Frequency distribution, Histogram, Ogive curves.

Introduction to R: Data input, Arithmetic Operators, Vector Operations, Matrix Operations, Data Frames, Built-in Functions. Frequency Distribution, Grouped Frequency

Distribution, Diagrams and Graphs, Summary statistics for raw data and grouped frequency distribution.

Measures of Central tendency: Concept of average/central tendency, characteristics of good measure of central tendency. Arithmetic Mean (A.M.), Median, Mode - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined arithmetic mean. Partition Values: Quartiles, Deciles and Percentiles - examples for ungrouped and grouped data

Unit II

Measures dispersion: Concept of dispersion, Absolute and Relative measure of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range, Quartile deviation, Standard deviation - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined standard deviation, Variance. Coefficient of range, Coefficient of quartile deviation and Coefficient of variation (C.V.)

Moments: Concept of Moments, Raw moments, Central moments, Relation between raw and central moments.

Measures of Skewness and Kurtosis: Concept of Skewness and Kurtosis, measures based on moments, quartiles.

Unit III

Correlation: Concept of correlation, Types and interpretation, Measure of Correlation: Scatter diagram and interpretation; Karl Pearson‟s coefficient of correlation (r): Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, properties; Spearman‟s rank correlation coefficient: Definition, examples of with and without repetition. Concept of Multiple correlation.

Regression: Concept of dependent (response) and independent (predictor) variables, concept of regression, Types and prediction, difference between correlation and regression, Relation between correlation and regression. Linear Regression - Definition, examples using least square method and regression coefficient, coefficient of determination, properties. Concept of Multiple regression and Logistic regression.

Text book:

1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.
2. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

Additional References:

1. Sarma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentce Hall of India, NewDelhi.
2. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, NewDelhi.
3. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, NewDelhi.
4. Schaum‟s Outline Of Theory And Problems Of Beginning Statistics, Larry J. Stephens, Schaum‟s Outline Series Mcgraw-Hill

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Soft Skills**
Program Code: **Course Code: USCS107**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : I**

Programme Outcomes:
At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

- Learners will be able to understand the importance and types soft skills
- Learners will develop skills for Academic and Professional Presentations.
- Learners will able to understand Leadership Qualities and Ethics.
- Ability to understand the importance of stress management in their academic & professional life.

Unit I

Introduction to Soft Skills Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.

Personality Development: Knowing Yourself, Positive Thinking, Johari‟s Window, Physical Fitness

Emotional Intelligence: Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence

Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels

Etiquette and Mannerism: Introduction, Professional Etiquette, Technology Etiquette

Ethical Values: Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics

Unit II

Basic Skills in Communication: Components of effective communication: Communication process and handling them, Composing effective messages, Non – Verbal Communication: its importance and nuances: Facial Expression, Posture, Gesture, Eye contact, appearance (dress code).

Communication Skills: Spoken English, Phonetics, Accent, Intonation

Employment Communication: Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter

Job Interviews: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews

Group Discussion: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits

Unit III

Professional Skills

Creativity at Workplace: Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method

Ethical Values: Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics

Capacity Building: Learn, Unlearn and Relearn: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building

Leadership and Team Building: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams,

Decision Making and Negotiation: Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts

Stress and Time Management: Stress, Sources of Stress, Ways to Cope with Stress

Text book:

1. Soft Skills: an Integrated Approach to Maximise Personality, Gajendra S. Chauhan, Sangeeta Sharma,Wiley India

Additional References:

1. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press

2. Business Communication, Shalini Kalia, Shailja Agrawal, Wiley India
3. Soft Skills - Enhancing Employability, M. S. Rao, I. K. International
4. Cornerstone: Developing Soft Skills, Sherfield, Pearson India

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Design & Analysis of Algorithms**

Program Code: **Course Code: USCS201**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used.
- Students should be able to appreciate the use of various data structures as per need
- To select, decide and apply appropriate design principle by understanding the requirements of any real life problems

Unit I

Introduction to algorithms - What is algorithm, analysis of algorithm, Types of complexity, Running time analysis, How to Compare Algorithms, Rate of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega-Ω Notation, Theta-Θ Notation, Asymptotic Analysis, Performance characteristics of algorithms, Estimating running time / number of steps of executions on paper, Idea of Computability

Introduction to Data Structures - What is data structure, types, Introduction to Array(1-d & 2-d), Stack and List data structures, operations on these data structures, advantages disadvantages and applications of these data structures like solving linear equations,

Polynomial Representation, Infix-to-Postfix conversion

Unit II

Recursion - What is recursion, Recursion vs Iteration, recursion applications like Factorial of a number, Fibonacci series & their comparative analysis with respect to iterative version, Tower of hanoi problem

Basic Sorting Techniques - Bubble, Selection and Insertion Sort & their comparative analysis

Searching Techniques - Linear Search and its types, Binary Search and their comparative analysis

Selection Techniques - Selection by Sorting, Partition-based Selection Algorithm, Finding the Kth Smallest Elements in Sorted Order & their comparative analysis

String Algorithms - Pattern matching in strings, Brute Force Method & their comparative analysis

Unit III

Algorithm Design Techniques - Introduction to various types of classifications/design criteria and design techniques

Greedy Technique - Concept, Advantages & Disadvantages, Applications, Implementation using problems like - file merging problem

Divide-n-Conquer - Concept, Advantages & Disadvantages, Applications, Implementation using problems like - merge sort, Strassen's Matrix Multiplication

Dynamic Programming - Concept, Advantages & Disadvantages, Applications, Implementation using problems like - Fibonacci series, Factorial of a number, Longest Common subsequence

Backtracking Programming - Concept, Advantages & Disadvantages, Applications, Implementation using problems like N-Queen Problem

Text book:

1. “Data Structure and Algorithm Using Python”, Rance D. Necaise, Wiley India Edition, 2016.
2. “Data Structures and Algorithms Made Easy”, NarasimhaKarumanchi, CareerMonk Publications, 2016.
3. “Introduction to Algorithms”, Thomas H. Cormen, 3rd Edition, PHI.

Additional References:

1. “Introduction to the Design and Analysis of Algorithms”, Anany Levitin, Pearson, 3rd Edition, 2011.
2. “Design and Analysis of Algorithms”, S. Sridhar, Oxford University Press, 2014.

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Advanced Python**

Programming

Program Code: **Course Code: USCS202**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- Ability to implement OOP concepts in Python including Inheritance and Polymorphism
- Ability to work with files and perform operations on it using Python.
- Ability to implement regular expression and concept of threads for developing efficient program
- Ability to implement exception handling in Python applications for error handling.
- Knowledge of working with databases, designing GUI in Python and implement networking in Python

Unit I

Working with files: Files, opening and closing a file, working with text files containing strings, knowing whether a file exists or not, working with binary files, the „with" statement, the seek() and tell() methods, random accessing of binary files, zipping and unzipping files, working with directories, running other programs from python program

Regular expressions: What is a regular expression?, sequence characters in regular expressions, quantifiers in regular expressions, special characters in regular expressions, using regular expression on files, retrieving information from an html file,

Threads in python: Difference between process and thread, types of threads, benefits of threads, creating threads, single tasking and multitasking, thread synchronization, deadlock in threads, daemon threads

Date and time in python: Date and time now, combining date and time, formatting dates and times, finding durations using "time delta", comparing two dates, sorting dates, stopping execution temporarily, knowing the time taken by a program, calendar module

Unit II

Database in python: Using SQL with python, retrieving rows from a table, inserting rows into a table, deleting rows from a table, updating rows in a table, creating database tables through python, Exception handling in databases.

Exceptions in python: Errors in a python program, compile & run-time errors, logical error, exceptions-exception handling, types of exceptions, the except block, the assert statement, user-defined exceptions, logging the exceptions

Networking: Protocols,server-client architecture, tcp/ip and udp communication

Graphical user interface: Creating a GUI in python, Widget classes, Working with Fonts and Colours, working with Frames, Layout manager, Event handling

Unit III

OOPs in python: Features of Object Oriented Programming system (oops)classes and objects, encapsulation, abstraction, inheritance, polymorphism, constructors and destructors

Classes and objects: Creating a class, the self-variable, types of variables, namespaces, types of methods, instance methods, class methods, static methods, passing members of one class to another class, inner classes Inheritance and polymorphism: Inheritance in python, types of inheritance- single inheritance, multilevel inheritance, hierarchical inheritance, multiple inheritance, constructors in inheritance, overriding super class constructors and methods, the super() method, method resolution order (mro), polymorphism, duck typing, operator overloading, method overloading, method overriding,

Abstract classes and interfaces: Abstract class, abstract method, interfaces in python, abstract classes vs. Interfaces

Text book:

1. Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018
2. Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020

Additional References:

1. Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, SakisKasampalis, Packt Publishing, 2019
2. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018

3. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
4. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017
5. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Introduction to OOPs using C++**

Program Code: **Course Code: USCS203**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- Work with numeric, character and textual data and arrays.
- Understand the importance of OOP approach over procedural language. Understand how to model classes and relationships using UML.
- Apply the concepts of OOPS like encapsulation, inheritance and polymorphism. Handle basic file operations.

Unit I

Introduction to Programming Concepts: Object oriented programming paradigm, basic concepts of object oriented programming, benefits of object oriented programming, object oriented languages, applications of object oriented programming.

Tokens-keywords, identifiers, constants-integer, real, character and string constants, backslash constants, features of C++ and its basic structure, simple C++ program without class, compiling and running C++ program.

Data Types, Data Input Output and Operators: Basic data types, variables, rules for naming variables, programming constants, the type cast operator, implicit and explicit type casting, cout and cin statements, operators, precedence of operators.

Decision Making, Loops, Arrays and Strings: Conditional statements-if, if...else, switch loops- while, do...while, for, types of arrays and string and string manipulations

Unified Modeling Language (UML): Introduction to UML & class diagrams.

Classes, Abstraction & Encapsulation: Classes and objects, Dot Operator, data members, member functions, passing data to functions, scope and visibility of variables in function.

Unit II

Constructors and Destructors: Default constructor, parameterized constructor, copy constructor, private constructor, destructors.

Working with objects:Accessor - mutator methods, static data and static function, access specifiers, array of objects.

Polymorphism - Binding-static binding & overloading, constructor overloading function overloading, operator overloading, overloading unary and binary operators.

Modelling Relationships in Class Diagrams: Association, Aggregation- Composition and examples covering these principles

Unit III

Inheritance: Defining base class and its derived class, access specifiers, types of inheritance-single, multiple, hierarchical, multilevel, hybrid inheritance, friend function and friend class, constructors in derived classes.

Modelling Relationships: Generalization-Specialization and examples covering these principles

Run time Polymorphism - Dynamic Binding, Function overriding, virtual function, pure virtual function, virtual base class, abstract class.

Pointers: Introduction to pointers, * and & operators, assigning addresses to pointer variables, accessing values using pointers, pointers to objects & this pointer, pointers to derived classes

File Handling: File Stream classes, opening and closing file-file opening modes, text file handling, binary file handling.

Applying OOP to solve real life applications: To cover case studies like library management, order management etc. to design classes covering all relationships

Text book:

1. Object Oriented Programming with C++, Balagurusamy E., 8th Edition, McGraw Hill Education India.
2. 2. UML & C++: A Practical Guide to Object Oriented Development, Lee/Tepfenhart, Pearson Education, 2nd Edition2015

Additional References:

1. Mastering C++ by Venugopal, Publisher: McGraw-Hill Education, 2017
2. Let Us C++ by KanetkarYashwant, Publisher: BPB Publications, 2020
3. Object Oriented Analysis and Design by Timothy Budd TMH, 2001

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Database Systems**

Program Code: **Course Code: USCS204**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- To appreciate the importance of database design.
- Analyze database requirements and determine the entities involved in the system and their relationship to one another.
- Write simple queries to MySQL related to String, Maths and Date Functions.
- Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands.

- Understand the normalization and its role in the database design process. Handle data permissions.
- Create indexes and understands the role of Indexes in optimization search**.**

Unit I

Introduction to DBMS – Database, DBMS – Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture

Data models - Client/Server Architecture, Object Based Logical Model, Record Based Logical Model (relational, hierarchical, network)

Entity Relationship Model - Entities, attributes, entity sets, relations, relationship sets, Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER)

ER to Table- Entity to Table, Relationship to tables with and without key constraints.

DDL Statements - Creating Databases, Using Databases, datatypes, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables

DML Statements – Viewing the structure of a table insert, update, delete, Select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions (count, min, max, avg, sum), group by clause, having clause

Unit II

Relational data model– Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint

Relational Algebra operations (selection, projection, set operations union, intersection, difference, cross product, Joins –conditional, equi join and natural joins, division)

Functions – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse)

Joining Tables – inner join, outer join (left outer, right outer, full outer)

Subqueries – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries

Unit III

Schema refinement and Normal forms: Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition.

Database Protection: Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control, Backing Up and Restoring databases

Views (creating, altering dropping, renaming and manipulating views)

DCL Statements (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges), Transaction control commands – Commit, Rollback

Index Structures of Files: Introduction, Primary index, Clustering Index, Multilevel indexes

Text book:

1. "Fundamentals of Database System", ElmasriRamez, NavatheShamkant, Pearson Education, Seventh edition, 2017
2. "Database Management Systems", Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, 2014
3. "Murach's MySQL", Joel Murach, 3rd Edition, 3rd Edition, 2019

Additional References:

1. "Database System Concepts", Abraham Silberschatz,HenryF.Korth,S.Sudarshan, McGraw Hill, 2017
2. "MySQL: The Complete Reference", VikramVaswani , McGraw Hill, 2017
3. "Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease", AshwinPajankar, BPB Publications, 2020

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Calculus**

Program Code: **Course Code: USCS205**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- Develop mathematical skills and enhance thinking power of learners.
- Understand mathematical concepts like limit, continuity, derivative, integration of functions, partial derivatives.
- Appreciate real world applications which use the learned concepts.
- Skill to formulate a problem through Mathematical modelling and simulation

Unit I

DERIVATIVES AND ITS APPLICATIONS: Review of Basic Concepts: Functions, limit of a function, continuity of a function, derivative function.

Derivative In Graphing And Applications: Increase, Decrease, Concavity, Relative Extreme; Graphing Polynomials, Rational Functions, Cusps and Vertical Tangents. Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Newton‟s Method.

Unit II

INTEGRATION AND ITS APPLICATIONS: Integration: An Overview of the Area Problem, Indefinite Integral, Definition of Area as a Limit; Sigma Notation, Definite Integral, Evaluating Definite Integrals by Substitution, Numerical Integration: Simpson‟s Rule.

Applications of Integration: Area between two curves, Length of a plane curve.

Mathematical Modeling with Differential Equations: Modeling with Differential Equations, Separation of Variables, Slope Fields, Euler‟s Method, First-Order Differential Equations and Applications.

Unit III

PARTIAL DERIVATIVES AND ITS APPLICATIONS: Functions of Several Variables: Functions of two or more variables, Limits and Continuity of functions of two or three variables.

Partial Derivatives: Partial Derivatives, Differentiability, Differentials, and Local Linearity, Chain Rule, Implicit Differentiation, Directional Derivatives and Gradients,

Applications ofPartial Derivatives: Tangent Planes and Normal Vectors, Maxima and Minima of Functions of Two Variables.

Text book:

1. Calculus: Early transcendental (10th Edition): Howard Anton, IrlBivens, Stephen Davis, John Wiley & sons, 2012.

Additional References:

1. Calculus and analytic geometry (9th edition): George B Thomas, Ross L Finney, Addison Wesley, 1995
2. Calculus: Early Transcendentals (8th Edition): James Stewart, Brooks Cole, 2015.
3. Calculus (10th Edition): Ron Larson, Bruce H. Edwards, Cengage Learning, 2013.
4. Thomas' Calculus (13th Edition): George B. Thomas, Maurice D. Weir, Joel R. Hass, Pearson, 2014.

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: Statistical Methods**

Program Code: **Course Code: USCS206**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- Calculate probability, conditional probability and independence.
- Apply the given discrete and continuous distributions whenever necessary.
- Define null hypothesis, alternative hypothesis, level of significance, test statistic and p value.
- Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
- Apply non-parametric test whenever necessary. Conduct and interpret one-way and two-way ANOVA.

Unit I

Probability: Random experiment, sample space, events types and operations of events, Probability definition: classical, axiomatic, Elementary Theorems of probability (without proof). Conditional probability, „Bayes" theorem, independence, Examples on Probability. Random Variables: Concept and definition of a discrete random variable and continuous random variable. Probability mass function, Probability density function and cumulative distribution function of discrete and continuous random variable, Properties of cumulative distribution function.

Unit II

Mathematical Expectation and Variance: Expectation of a function, Variance and S.D of a random variable, properties.

Standard Probability distributions: Introduction, properties, examples and applications of each of the following distributions: Binomial distribution, Normal distribution, Chi-square distribution, t distribution, F distribution

Unit III

Hypothesis testing: One sided, Two sided hypothesis, critical region, p- value, tests based on t, Normal and F, confidence intervals.

Analysis of Variance: One-way, two-way analysis of variance.

Non-parametric tests: Need of non-parametric tests, Sign test, Wilicoxon‟s signed rank test, run test, Kruskal-Walis tests, Chi square test.

Text book:

1. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.

Additional References:

1. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, Ed. 3, McGraw Hill Book Company.

2. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, New York.

3. Hogg, R.V. and Craig R.G. (1989). Introduction to Mathematical Statistics, Ed. MacMillan Publishing Co., New York.

4. Walpole R. E., Myers R. H. and Myers S. L. (1985), Probability and Statistics for Engineers and Scientists

5. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: F.Y.B. Sc. CS **Course: E-Commerce & Digital Marketing**

Program Code: **Course Code: USCS207**

(Choice Based and Credit System with effect from the academic year 2021-22)

Year : 2021-22 **Semester : II**

Programme Outcomes:

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.

- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.

To engage in independent and life-long learning in the background of rapid changing IT industry

Course Outcomes:

After successful completion of this course, students would be able to

- Understand the core concepts of E-Commerce.
- Understand the various online payment techniques
- Understand the core concepts of digital marketing and the role of digital marketing in business.
- Apply digital marketing strategies to increase sales and growth of business
- Apply digital marketing through different channels and platforms
- Understand the significance of Web Analytics and Google Analytics and apply the same.

Unit I

Introduction to E-Commerce and E- Business: Definition and competing in the digital economy, Impact of E-Commerce on Business Models, Factors Driving e-commerce and e-Business Models, Economics and social impact of e-Business, opportunities and Challenges, e-Commerce vs m- Commerce, Different e-Commerce Models (B2B, B2C, C2B, C2C, B2E), e- Commerce Applications: e-Trading, e-Learning, e-Shopping, Virtual Reality & Consumer Experience, Legal and Ethical issues in e-Commerce.

Overview of Electronic Payment systems: Types of Electronic payment schemes (Credit cards, Debit cards, Smartcards, Internet banking), E- checks, E-Cash Concepts and applications of EDI and Limitation

Introduction & origin of Digital Marketing: Traditional v/s Digital Marketing. Digital Marketing Strategy, The P-O-E-M Framework, Segmenting & Customizing Messages, The Digital landscape, Digital Advertising Market in India. Skills required in Digital Marketing. Digital Marketing Plan.

Unit II

Social Media Marketing: Meaning, Purpose, types of social media websites, Social Media Engagement, Target audience, Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools, LinkedIn Marketing: Importance of LinkedIn Marketing, Framing LinkedIn Strategy, Lead Generation through LinkedIn, Content Strategy, Analytics and Targeting, Twitter Marketing: Framing content strategy, Twitter Advertising Campaigns, YouTube Marketing: Video optimization, Promoting on YouTube, Monetization, YouTube Analytics

Email Marketing: Types of Emails, Mailing List, Email Marketing tools, Email Deliverability & Email Marketing automation

Mobile Marketing: Introduction, Mobile Usage, Mobile Advertising, Mobile Marketing Types, Mobile Marketing Features, Mobile Campaign Development, Mobile Advertising Analytics

Content Marketing: Introduction, Content marketing statistics, Types of Content, Types of Blog posts, Content Creation, Content optimization, Content Management & Distribution, Content Marketing Strategy, Content creation tools and apps, Challenges of Content Marketing.

Unit III

Search Engine Optimization: Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimize website, On-page and off-page optimization

Search Engine Marketing: Introduction to SEM, Introduction to Ad Words - Google Ad Words, Ad Words fundamentals, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation, Display marketing, Buying Models: Cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA).

Web Analytics: Purpose, History, Goals & objectives, Web Analytic tools & Methods. Web Analytics Mistakes and Pitfalls.

Google Analytics: Basics of Google Analytics, Installing Google Analytics in website, Parameters of Google Analytics, Reporting and Analysis

Text book:

1. "E-Commerce Strategy, Technologies and Applications", Whitley, David, Tata McGraw Hill, 2017
2. Digital Marketing, Seema Gupta, McGraw Hill Education, 2nd Edition

Additional References:

1. E-Commerce by S. Pankaj, A.P.H. Publication, New Delhi
2. Fundamentals of Digital Marketing, Punit Singh Bhatia, Pearson, 2nd Edition
3. "Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation", Damian Ryan, Calvin Jone. Kogan Page, 4th Edition

: Question Paper Pattern :

Evaluation Scheme

I. Internal Evaluation for Theory Courses – 25 Marks

(i) Mid-Term Class Test– 15Marks

It should be conducted using any learning management system such as Moodle (Modular object-oriented dynamic learning environment)

The test should have 15 MCQ's which should be solved in a time duration of 30 minutes.

(ii) Assignment/ Case study/ Presentations– 10 Marks

Assignment / Case Study Report / Presentation can be uploaded on any learning management system.

II. External Examination for Theory Courses – 75 Marks

Duration: 2.5 Hours

Theory question paper pattern:

	All questions are compulsory.		
Question	Based on	Options	Marks
Q.1	Unit I	*Any 4 out of 6*	20
Q.2	Unit II	*Any 4 out of 6*	20
Q.3	Unit III	*Any 4 out of 6*	20
Q.4	Unit I,II and III	*Any 5 out of 6*	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question maybe sub-divided into subquestions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subjectcarries50 Marks 40 marks + 05 marks (journal) + 05 marks (viva)
- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam
- The final submission and evaluation of journal in electronic form using a Learning Management System / Platform can be promoted by college.

SYLLABUS AND PROGRAMME / COURSE OUTCOMES

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Theory of Computation

Program Code: **Course Code:** USCS301

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1. Understand Grammar and Languages
2. Learn about Automata theory and its application in Language Design.
3. Learn about Turing Machines and Pushdown Automata
4. Understand Linear Bound Automata and its applications

UNIT-I
Automata Theory: Defining Automaton, Finite Automaton, Transitios and Its properties, Acceptability by Finite Automaton, Nondeterministic Finite State Machines, DFA and NDFA equivalence, Mealy and Moore Machines, Minimizing Automata. Formal Languges: Defining Grammar, Derivations, Languges generated by Grammar, Comsky Classification of Grammar and Languages, Recursive Enumerable Sets, Operations on Languages, Languages and Automata

UNIT-II
Regular Sets and Regular Grammar: Regular Grammar, Regular Expressions, Finite automata and Regular Expressions, Pumping Lemma and its Applications, Closure Properties, Regular Sets and Regular Grammar Context Free Languages: Context-free Languages, Derivation Tree, Ambiguity of Grammar, CFG simplification, Normal Forms, Pumping Lemma for CFG Pushdown Automata: Definitions, Acceptance by PDA, PDA and CFG Linear Bound Automata: The Linear Bound Automata Model, Linear Bound Automata and Languages.

UNIT-III
Turing Machines: Turing Machine Definition, Representations, Acceptability by Turing Machines, Designing and Description of Turing Machines, Turing Machine Construction, Variants of Turing Machine, Undecidability: The Church-Turing thesis, Universal Turing Machine, Halting Problem, Introduction to Unsolvable Problems

Textbook(s): 1) Theory of Computer Science, K. L. P Mishra, Chandrasekharan, PHI,3rd Edition 2) Introduction to Computer Theory, Daniel Cohen, Wiley,2nd Edition 3) Introductory Theory of Computer Science, E.V. Krishnamurthy,Affiliated East-West Press.
Additional Reference(s): 1) Theory of Computation, Kavi Mahesh, Wiley India 2)

Elements of The Theory of Computation, Lewis, Papadimitriou, PHI 3) Introduction to Languages and the Theory of Computation, John E Martin, McGraw-Hill Education 4) Introduction to Theory of Computation, Michel Sipser, Thomson

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Core Java
Program Code: **Course Code:** USCS302
(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1. Object oriented programming concepts using Java.
2 Knowledge of input, its processing and getting suitable output.
2. Understand, design, implement and evaluate classes and applets. 4. Knowledge and implementation of AWT package

UNIT-I
The Java Language: Features of Java, Java programming format, Java Tokens, Java Statements, Java Data Types, Typecasting, Arrays OOPS: Introduction, Class, Object, Static Keywords, Constructors, this Key Word, Inheritance, super Key Word, Polymorphism (overloading and overriding), Abstraction, Encapsulation, Abstract Classes, Interfaces String Manipulations: String, String Buffer, String Tokenizer Packages: Introduction to predefined packages (java.lang, java.util, java.io, java.sql, java.swing), User Defined Packages, Access specifiers

UNIT-II
Exception Handling: Introduction, Pre-Defined Exceptions, Try-Catch-Finally, Throws, throw, User Defined Exception examples Multithreading: Thread Creations, Thread Life Cycle, Life Cycle Methods, Synchronization, Wait() notify() notify all() methods I/O Streams: Introduction, Byte-oriented streams, Character- oriented streams, File, Random access File, Serialization Networking: Introduction, Socket, Server socket, Client –Server Communication

UNIT-III
Wrapper Classes: Introduction, Byte, Short, Integer, Long, Float, Double, Character, Boolean classes Collection Framework: Introduction, util Package interfaces, List, Set, Map, List interface & its classes, Set interface & its classes, Map interface & its classes
Inner Classes: Introduction, Member inner class, Static inner class, Local inner class, Anonymous inner class AWT: Introduction, Components, Event-Delegation-Model, Listeners, Layouts, Individual components Label, Button, CheckBox, Radio Button,

Choice, List, Menu, Text Field, Text Area
Textbook(s): 1) Herbert Schildt, Java The Complete Reference, Ninth Edition, McGraw-Hill Education, 2014 **Additional Reference(s):** 1) E. Balagurusamy, Programming with Java, Tata McGraw-Hill Education India, 2014 2) Programming in JAVA, 2nd Ed, Sachin Malhotra & Saurabh Choudhary, Oxford Press 3) The Java Tutorials: http://docs.oracle.com/javase/tutorial/

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Operating System
Program Code: **Course Code:** USCS303
(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1. To provide a understanding of operating system, its structures and functioning
2. Develop and master understanding of algorithms used by operating systems for various purposes.

UNIT-I
Introduction and Operating-Systems Structures: Definition of Operating system, Operating System's role, Operating-System Operations, Functions of Operating System, Computing Environments Operating-System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, Operating-System Structure Processes: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication
Threads: Overview, Multicore Programming, Multithreading Models

UNIT-II
Process Synchronization: General structure of a typical process, race condition, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, SRTF, Priority, RR, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling), Thread Scheduling Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-III
Main Memory: Background, Logical address space, Physical address space, MMU, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing Mass-Storage Structure: Overview,

Disk Structure, Disk Scheduling, Disk Management File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management

Textbook(s): 1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley,8th Edition

Additional Reference(s): 1. Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill 2. Naresh Chauhan, Principles of Operating Systems, Oxford Press 3. Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, 4e Fourth Edition, Pearson Education, 2016

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Database Management Systems

Program Code: **Course Code:** USCS304

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1.Master concepts of stored procedure and triggers and its use.
2. Learn about using PL/SQL for data management
3. Understand concepts and implementations of transaction management and crash recovery

UNIT-I

Stored Procedures: Types and benefits of stored procedures, creating stored procedures, executing stored procedures, altering stored procedures, viewing stored procedures. Triggers: Concept of triggers, Implementing triggers – creating triggers, Insert, delete, and update triggers, nested triggers, viewing, deleting and modifying triggers, and enforcing data integrity through triggers. Sequences: creating sequences, referencing, altering and dropping a sequence. File Organization and Indexing: Cluster, Primary and secondary indexing, Index data structure: hash and Tree based indexing, Comparison of file organization: cost model, Heap files, sorted files, clustered files. Creating, dropping and maintaining indexes

UNIT-II

Fundamentals of PL/SQL: Defining variables and constants, PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, PL/SQL Datatypes: Number Types, Character Types, Boolean Type, Datetime and Interval Types.

Overview of PL/SQL Control Structures: Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IFTHEN-ELSIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP, Sequential Control: GOTO and NULL Statements

UNIT-III

Transaction Management: ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem , Read-Write Locks, Deadlocks Handling, Two Phase Locking protocol. DCL Statements: Defining a transaction, Making Changes Permanent with COMMIT, Undoing Changes with ROLLBACK, Undoing Partial Changes with SAVEPOINT and ROLLBACK Crash Recovery: ARIES algorithm. The log based recovery, recovery related structures like transaction and dirty page table, Write-ahead log protocol, check points, recovery from a system crash, Redo and Undo phasest

Textbook(s): 1) Ramakrishnam, Gehrke, Database Management Systems, Bayross, McGraw-Hill,3rd Edition 2) Abraham Silberschatz, Henry F. Korth,S. Sudarshan , Database System Concepts, 6th Edition 3) Ivan Bayross, "SQL,PL/SQL -The Programming language of Oracle", B.P.B. Publications

Additional Reference(s): 1) Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education 2) Robert Sheldon, Geoff Moes, Begning MySQL, Wrox Press. 3) Joel Murach, Murach's MySQL, Murach

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Combinatorics and Graph Theory
Program Code: **Course Code:** USCS305
(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1. Appreciate beauty of combinatorics and how combinatorial problems naturally arise in many settings.
2. Understand the combinatorial features in real world situations and Computer Science applications.
3. Apply combinatorial and graph theoretical concepts to understand Computer Science concepts and apply them to solve problems

UNIT-I

Introduction to Combinatorics: Enumeration, Combinatorics and Graph Theory/ Number Theory/Geometry and Optimization, Sudoku Puzzles. Strings, Sets, and

Binomial Coefficients: Strings- A First Look, Combinations, Combinatorial, The Ubiquitous Nature of Binomial Coefficients, The Binomial, Multinomial Coefficients. Induction: Introduction, The Positive Integers are Well Ordered, The Meaning of Statements, Binomial Coefficients Revisited, Solving Combinatorial Problems Recursively, Mathematical Induction, and Inductive Definitions Proofs by Induction. Strong Induction

UNIT-II

Graph Theory: Basic Notation and Terminology, Multigraphs: Loops and Multiple Edges, Eulerian and Hamiltonian Graphs, Graph Coloring, Planar Counting, Labeled Trees, A Digression into Complexity Theory. Applying Probability to Combinatorics, Small Ramsey Numbers, Estimating Ramsey Numbers, Applying Probability to Ramsey Theory, Ramsey's Theorem The Probabilistic Method

UNIT-III

Network Flows: Basic Notation and Terminology, Flows and Cuts, Augmenting Paths, The Ford-Fulkerson Labeling Algorithm,
A Concrete Example, Integer Solutions of Linear Programming Problems. Combinatorial Applications of Network Flows: Introduction, Matching in Bipartite Graphs, Chain partitioning, Pólya's Enumeration Theorem: Coloring the Vertices of a Square.

Textbook(s): 1) Applied Combinatorics, Mitchel T. Keller and William T. Trotter, 2016, http://www.rellek.net/appcomb.

Additional Reference(s): 1) Applied Combinatorics, sixth.edition, Alan Tucker, Wiley; (2016) 2) Graph Theory and Combinatorics, Ralph P. Grimaldi, Pearson Education; Fifth edition (2012) 3) Combinatorics and Graph Theory, John Harris, Jeffry L. Hirst, Springer(2010). 4) Graph Theory: Modeling, Applications and Algorithms, Agnarsson, Pearson Education India (2008).

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Physical Computing and IoT Programming
Program Code: **Course Code:** USCS306
(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1. Enable learners to understand System On Chip Architectures.
2. Introduction and preparing Raspberry Pi with hardware and installation.
3. Learn physical interfaces and electronics of Raspberry Pi and program them using practical's
4. Learn how to make consumer grade IoT safe and secure with proper use of protocols.

UNIT-I

SoC and Raspberry Pi System on Chip: What is System on chip? Structure of System on Chip. SoC products: FPGA, GPU, APU, Compute Units. ARM 8 Architecture: SoC on ARM 8. ARM 8 Architecture Introduction Introduction to Raspberry Pi: Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. Raspberry Pi Boot: Learn how this small SoC boots without BIOS. Configuring boot sequences and hardware.

UNIT-II

Programming Raspberry Pi Raspberry Pi and Linux: About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands Programing interfaces: Introduction to Node.js, Python. Raspberry Pi Interfaces: UART, GPIO, I2C, SPI Useful Implementations: Cross Compilation, Pulse Width Modulation, SPI for Camera.

UNIT-III

Introduction to IoT: What is IoT? IoT examples, Simple IoT LED Program. IoT and Protocols IoT Security: HTTP, UPnp, CoAP, MQTT, XMPP. IoT Service as a Platform: Clayster, Thinger.io, SenseIoT, carriots and Node RED. IoT Security and Interoperability: Risks, Modes of Attacks, Tools for Security and Interoperability.

Textbook(s): 1) Learning Internet of Things, Peter Waher, Packt Publishing(2015) 2) Mastering the Raspberry Pi, Warren Gay, Apress(2014)

Additional Reference(s): 1) Abusing the Internet of Things, Nitesh Dhanjani, O'Reilly

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Skill Enhancement: Web Programming

Program Code: **Course Code:** USCS307

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : III**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1.To design valid, well-formed, scalable, and meaningful pages using emerging technologies. 2. Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites 3. To develop and implement client-side and server-side scripting language programs. 4. To develop and implement Database Driven Websites. 5. Design and apply XML to create a markup language for data and document centric applications.

UNIT-I

HTML5: Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, Tables in HTML, Images on a Web Page, Image Formats, Image Maps, Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for

inserting Audio / Video on a web page CSS: Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element

UNIT-II

JavaScript: Using JavaScript in an HTML Document, Programming Fundamentals of JavaScript – Variables, Operators, Control Flow Statements, Popup Boxes, Functions – Defining and Invoking a Function, Defining Function arguments, Defining a Return Statement, Calling Functions with Timer, JavaScript Objects - String, RegExp, Math, Date, Browser Objects - Window, Navigator, History, Location, Document, Cookies, Document Object Model, Form Validation using JavaScript XML: Comparing XML with HTML, Advantages and Disadvantages of XML,Structure of an XML Document, XML Entity References, DTD, XSLT: XSLT Elements and Attributes - xsl:template, xsl:apply-templates, xsl:import, xsl:call-template, xsl:include, xsl:element, xsl:attribute, e xsl:attribute-set, xsl:value-of

UNIT-III

AJAX: AJAX Web Application Model, How AJAX Works, XMLHttpRequest Object – Properties and Methods, Handling asynchronous requests using AJAX PHP: Variables and Operators, Program Flow, Arrays, Working with Files and Directories, Working with Databases, Working with Cookies, Sessions and Headers Introduction to jQuery: Fundamentals, Selectors, methods to access HTML attributes, methods for traversing, manipulators, events, effects

Text Book(s): 1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press 2) Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India. 3) PHP: A Beginners Guide, Vikram Vaswani, TMH

Additional Reference(s): 1) HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY 2) Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd. 3) Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly 4) PHP, MySQL, JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade Wiley

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Fundamentals of Algorithms

Program Code: **Course Code:** USCS401

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1. Understand the concepts of algorithms for designing good program

2. Implement algorithms using Python

UNIT-I

Introduction to algorithm, Why to analysis algorithm, Running time analysis, How to Compare Algorithms, Rate of Growth, Commonly Used Rates of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega-Ω Notation, Theta-Θ Notation, Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Performance characteristics of algorithms, Master Theorem for Divide and Conquer, Divide and Conquer Master Theorem: Problems & Solutions, Master Theorem for Subtract and Conquer Recurrences, Method of Guessing and Confirming

UNIT-II

Tree algorithms: What is a Tree? Glossary, Binary Trees, Types of Binary Trees, Properties of Binary Trees, Binary Tree Traversals, Generic Trees (N-ary Trees), Threaded Binary Tree Traversals, Expression Trees, Binary Search Trees (BSTs), Balanced Binary Search Trees, AVL (Adelson-Velskii and Landis) Trees Graph Algorithms: Introduction, Glossary, Applications of Graphs, Graph Representation, Graph Traversals, Topological Sort, Shortest Path Algorithms, Minimal Spanning Tree Selection Algorithms: What are Selection Algorithms? Selection by Sorting, Partition-based Selection Algorithm, Linear Selection Algorithm - Median of Medians Algorithm, Finding the K Smallest Elements in Sorted Order

UNIT-III

Algorithms Design Techniques: Introduction, Classification, Classification by Implementation Method, Classification by Design Method Greedy Algorithms: Introduction, Greedy Strategy, Elements of Greedy Algorithms, Advantages and Disadvantages of Greedy Method, Greedy Applications, Understanding Greedy Technique Divide and Conquer Algorithms: Introduction, What is Divide and Conquer Strategy? Divide and Conquer Visualization, Understanding Divide and Conquer, Advantages of Divide and Conquer, Disadvantages of Divide and Conquer, Master Theorem, Divide and Conquer Applications Dynamic Programming: Introduction, What is Dynamic Programming Strategy? Properties of Dynamic Programming Strategy, Problems which can be solved using Dynamic Programming, Dynamic Programming Approaches, Examples of Dynamic Programming Algorithms, Understanding Dynamic Programming, Longest Common Subsequence

Textbook(s): 1. Data Structure and Algorithmic Thinking with Python, Narasimha Karumanchi , CareerMonk Publications, 2016 2. Introduction to Algorithm, Thomas H Cormen, PHI

Additional References(s): 1. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, 2016, Wiley 2. Fundamentals of Computer Algorithms, Sartaj Sahni and Sanguthevar Rajasekaran Ellis Horowitz, Universities Press

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Advanced JAVA

Program Code: **Course Code:** USCS402

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1. Understand the concepts related to Java Technology
2. Explore and understand use of Java Server Programminghms for designing good program
3. Implement algorithms using Python

UNIT-I

Swing: Need for swing components, Difference between AWT and swing, Components hierarchy, Panes, Swing components: Jlabel, JTextField and JPasswordField, JTextAres, JButton, JCheckBox, JRadioButton, JComboBox and JList JDBC: Introduction, JDBC Architecture, Types of Drivers, Statement, ResultSet, Read Only ResultSet, Updatable ResultSet, Forward Only ResultSet, Scrollable ResultSet, PreparedStatement, Connection Modes, SavePoint, Batch Updations, CallableStatement, BLOB & CLOB

UNIT-II

Servlets: Introduction, Web application Architecture, Http Protocol & Http Methods, Web Server & Web Container, Servlet Interface, GenericServlet, HttpServlet, Servlet Life Cycle, ServletConfig, ServletContext, Servlet Communication, Session Tracking Mechanisms JSP: Introduction, JSP LifeCycle, JSP Implicit Objects & Scopes, JSP Directives, JSP Scripting Elements, JSP Actions: Standard actions and customized actions,

UNIT-III

Java Beans: Introduction, JavaBeans Properties, Examples Struts 2: Basic MVC Architecture, Struts 2 framework features, Struts 2 MVC pattern, Request life cycle, Examples, Configuration Files, Actions, Interceptors, Results & Result Types, Value Stack/OGNL JSON: Overview, Syntax, DataTypes, Objects, Schema, Comparison with XML, JSON with Java

Textbook(s): 1) Cay S. Horstmann, Gary Cornell, Core Java™ 2: Volume II– Advanced Features Prentice Hall PTR,9th Edition 2) Herbert Schildt, Java2: The Complete Reference, Tata McGraw-Hill,5th Edition 3) Joe Wigglesworth and Paula McMillan, Java Programming: Advanced Topics, Thomson Course Technology (SPD) ,3rd Edition

Additional Reference(s): 1) Advanced Java Programming, Uttam K. Roy, Oxford

University Press 2) The Java Tutorials: http://docs.oracle.com/javase/tutorial/) 3) The Java Tutorials of Sun Microsystems Inc

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Computer Networks
Program Code: **Course Code:** USCS403
(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1. Learner will be able to understand the concepts of networking, which are important for them to be known as a 'networking professionals'.
2. Useful to proceed with industrial requirements and International vendor certifications

UNIT-I
Introduction Network Models: Introduction to data communication, Components, Data Representation, Data Flow, Networks, Network Criteria, Physical Structures, Network types, Local Area Network, Wide Area Network, Switching, The Internet, Accessing the Internet, standards and administration Internet Standards. Network Models, Protocol layering, Scenarios, Principles of Protocol Layering, Logical Connections, TCP/IP Protocol Suite, Layered Architecture, Layers in the TCP/IP Protocol Suite, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing. Detailed introduction to Physical Layer, Detailed introduction to Data-Link Layer, Detailed introduction to Network Layer, Detailed introduction to Transport Layer, Detailed introduction to Application Layer. Data and Signals, Analog and Digital Data, Analog and Digital Signals, Sine Wave Phase, Wavelength, Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signal, Bit Rate, Bit Length, Transmission of Digital Signals, Transmission Impairments, Attenuation, Distortion, Noise, Data Rate Limits, Performance, Bandwidth, Throughput, Latency (Delay)

UNIT-II
Introduction to Physical Layer and Data-Link Layer: Digital Transmission digital-to-digital conversion, Line Coding, Line Coding Schemes, analog-to-digital conversion, Pulse Code Modulation (PCM), Transmission Modes, Parallel Transmission, Serial Transmission. Analog Transmission, digital-to-analog Conversion, Aspects of Digital-to-Analog Conversion, Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, analog-to-analog Conversion, Amplitude Modulation (AM), Frequency

Modulation (FM), Phase Modulation (PM), Multiplexing, Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Time-Division Multiplexing. Transmission Media, Guided Media, Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable. Switching, Three Methods of Switching , Circuit Switched Networks, Packet Switching, Introduction to Data-Link Layer, Nodes and Links, Services, Two Sub-layers, Three Types of addresses, Address Resolution Protocol (ARP). Error Detection and Correction, introduction, Types of Errors, Redundancy, Detection versus Correction

UNIT-III

Network layer, Transport Layer Media Access Control (MAC), random access, CSMA, CSMA/CD, CSMA/CA, controlled access, Reservation, Polling, Token Passing, channelization, FDMA, TDMA, CDMA. Connecting Devices and Virtual LANs, connecting devices, Hubs, Link-Layer

Switches, Routers, Introduction to Network Layer, network layer services, Packetizing, Routing and Forwarding, Other Services, IPv4 addresses, Address Space, Classful Addressing. Unicast Routing, General Idea, Least-Cost Routing, Routing Algorithms, Distance-Vector Routing, Link-State Routing, Path-Vector Routing, Introduction to Transport Layer, Transport-Layer Services, Connectionless and Connection-Oriented Protocols. Transport-Layer Protocols, Service, Port Numbers, User Datagram Protocol, User Datagram, UDP Services, UDP Applications, Transmission Control Protocol, TCP Services, TCP Features, Segment.

Textbook(s): 1) Data Communications and Networking, Behrouz A. Forouzan, Fifth Edition, TMH, 2013. 2) Computer Network, Andrew S. Tanenbaum, David J. Wetherall, Fifth Edition, Pearson Education, 2011.

Additional Reference(s): 1) Computer Network, Bhushan Trivedi, Oxford University Press 2) Data and Computer Communication, William Stallings, PHI

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Software Engineering

Program Code: **Course Code:** USCS404

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:

The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:

1.Learner will be able to understand the concepts of Software Engineering

UNIT-I

Introduction: The Nature of Software, Software Engineering, The Software Process, Generic Process Model, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Component-Based Development,

The Unified Process Phases, Agile Development- Agility, Agile Process, Extreme Programming Requirement Analysis and System Modeling: Requirements Engineering, Eliciting Requirements, SRS Validation, Components of SRS, Characteristics of SRS , Object-oriented design using the UML - Class diagram, Object diagram, Use case diagram, Sequence diagram, Collaboration diagram, State chart diagram, Activity diagram, Component diagram, Deployment diagram

UNIT-II

System Design: System/Software Design, Architectural Design, Low-Level Design Coupling and Cohesion, Functional-Oriented Versus The Object-Oriented Approach, Design Specifications, Verification for Design, Monitoring and Control for Design Software Measurement and Metrics: Product Metrics – Measures, Metrics, and Indicators, Function-Based Metrics, Metrics for Object-Oriented Design, Operation-Oriented Metrics, User Interface Design Metrics, Metrics for Source Code, Halstead Metrics Applied to Testing, Metrics for Maintenance, Cyclomatic Complexity, Software Measurement - Size-Oriented, Function-Oriented Metrics, Metrics for Software Quality Software Project Management: Estimation in Project Planning Process –Software Scope And Feasibility, Resource Estimation, Empirical Estimation Models – COCOMO II, Estimation for Agile Development, The Make/Buy Decision, Project Scheduling - Basic Principles, Relationship Between People and Effort, Effort Distribution, Time-Line Charts

UNIT-III

Risk Management - Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan Software Quality Assurance: Elements of SQA, SQA Tasks, Goals, and Metrics, Formal Approaches to SQA, Six Sigma, Software Reliability, The ISO 9000 Quality Standards, Capability Maturity Model Software Testing : Verification and Validation, Introduction to Testing, Testing Principles, Testing Objectives, Test Oracles, Levels of Testing, White-Box Testing/Structural Testing, Functional/Black-Box Testing, Test Plan, Test-Case Design

Text book(s): 1) Software Engineering, A Practitioner's Approach, Roger S, Pressman.(2014)

Additional Reference(s): 1) Software Engineering, Ian Sommerville, Pearson Education 2) Software Engineering: Principles and Practices",Deepak Jain,OXFORD University Press, 3) Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI 4) Software Engineering: Principles and Practices, Hans Van Vliet, John Wiley & Sons 5) A Concise Introduction to Software Engineering, Pankaj Jalote, Springer

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**Linear Algebra using Python

Program Code: **Course Code:** USCS405

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1. Appreciate the relevance of linear algebra in the field of computer science.
2. Understand the concepts through program implementation
3. Instill a computational thinking while learning linear algebra.

UNIT-I
Field: Introduction to complex numbers, numbers in Python , Abstracting over fields, Playing with GF(2), Vector Space: Vectors are functions, Vector addition, Scalar-vector multiplication, Combining vector addition and scalar multiplication, Dictionary-based representations of vectors, Dot-product, Solving a triangular system of linear equations. Linear combination, Span, The geometry of sets of vectors, Vector spaces, Linear systems, homogeneous and otherwise

UNIT-II
Matrix: Matrices as vectors, Transpose, Matrix-vector and vector-matrix multiplication in terms of linear combinations, Matrix-vector multiplication in terms of dot-products, Null space, Computing sparse matrix-vector product, Linear functions, Matrix-matrix multiplication, Inner product and outer product,From function inverse to matrix inverse
Basis: Coordinate systems, Two greedy algorithms for finding a set of generators, Minimum Spanning Forest and GF(2), Linear dependence, Basis , Unique representation, Change of basis, first look, Computational problems involving finding a basis Dimension: Dimension and rank, Direct sum, Dimension and linear functions, The annihilator

UNIT-III
Gaussian elimination: Echelon form, Gaussian elimination over GF(2), Solving a matrix-vector equation using Gaussian elimination, Finding a basis for the null space, Factoring integers, Inner Product: The inner product for vectors over the reals, Orthogonality, Orthogonalization: Projection orthogonal to multiple vectors, Projecting orthogonal to mutually orthogonal vectors, Building an orthogonal set of generators, Orthogonal complement, Eigenvector: Modeling discrete dynamic processes, Diagonalization of the Fibonacci matrix, Eigenvalues and eigenvectors, Coordinate representation in terms of eigenvectors, The Internet worm, Existence of eigenvalues, Markov chains, Modeling a web surfer: PageRank.

Textbook(s): 1) Coding the Matrix Linear Algebra through Applications to Computer Science Edition 1, PHILIP N. KLEIN, Newtonian Press (2013)

Additional References: 1) Linear Algebra and Probability for Computer Science Applications, Ernest Davis, A K Peters/CRC Press (2012). 2) Linear Algebra and Its Applications, Gilbert Strang, Cengage Learning, 4th Edition (2007). 3) Linear Algebra and Its Applications, David C Lay, Pearson Education India; 3rd Edition (2002)

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc **Course:**.NET Technologies

Program Code: **Course Code:** USCS406

(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1.Understand the .NET framework 2. Develop a proficiency in the C# programming language 3. Proficiently develop ASP.NET web applications using C# 4. Use ADO.NET for data persistence in a web application.

UNIT-I
The .NET Framework:.NET Languages, Common Language Runtime, .NET Class Library C# Language Basics: Comments, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods, Classes, Value Types and Reference Types, Namespaces and Assemblies, Inheritance, Static Members, Casting Objects, Partial Classes ASP.NET: Creating Websites, Anatomy of a Web Form - Page Directive, Doctype, Writing Code - Code-Behind Class, Adding Event Handlers, Anatomy of an ASP.NET Application - ASP.NET File Types, ASP.NET Web Folders, HTML Server Controls - View State, HTML Control Classes, HTML Control Events, HtmlControl Base Class, HtmlContainerControl Class, HtmlInputControl Class, Page Class, global.asax File, web.config File

UNIT-II
Web Controls: Web Control Classes, WebControl Base Class, List Controls, Table Controls, Web Control Events and AutoPostBack, Page Life Cycle State Management: ViewState, Cross-Page Posting, Query String, Cookies, Session State, Configuring Session State, Application State Validation: Validation Controls, Server-Side Validation, Client-Side Validation, HTML5 Validation, Manual Validation, Validation with Regular Expressions Rich Controls: Calendar Control, AdRotator Control, MultiView Control Themes and Master Pages: How Themes Work, Applying a Simple Theme,Handling Theme Conflicts, Simple Master Page and Content Page, Connecting Master pages and Content Pages, Master Page with Multiple Content Regions, Master Pages and Relative Paths Website Navigation: Site Maps, URL Mapping and Routing, SiteMapPath Control, TreeView Control, Menu Control

UNIT-III
ADO.NET: Data Provider Model, Direct Data Access - Creating a Connection, Select Command, DataReader, Disconnected Data Access Data Binding: Introduction, Single-Value Data Binding, Repeated-Value Data Binding, Data Source Controls – SqlDataSource Data Controls: GridView, DetailsView, FormView Working with XML: XML Classes – XMLTextWriter, XMLTextReader Caching: When to Use

Caching, Output Caching, Data Caching LINQ: Understanding LINQ, LINQ Basics, ASP.NET AJAX: ScriptManager, Partial Refreshes, Progress Notification, Timed Refreshes

Textbook(s): 1) Beginning ASP.NET 4.5 in C#, Matthew MacDonald, Apress(2012)
Additional Reference(s): 1) The Complete Reference ASP .NET, MacDonald, Tata McGraw Hill 2) Beginning ASP.NET 4 in C# and VB Imar Spanajaars, WROX

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: S.Y.B.Sc Course:.Skill Enhancement: Android Developer Fundamentals
Program Code: **Course Code:** USCS407
(As per the Credit Based Semester and Grading System with effect from the academic year 2017-18)

Year : 2021-22 **Semester : IV**

Programme Outcomes:
The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Course Outcomes:
1. Understand the requirements of Mobile programming environment.
2. Learn about basic methods, tools and techniques for developing Apps
3. Explore and practice App development on Android Platform
4. Develop working prototypes of working systems for various uses in daily lives..

UNIT-I
What is Android? Obtaining the required tools, creating first android app, understanding the components of screen, adapting display orientation, action bar, Activities and Intents, Activity Lifecycle and Saving State, Basic Views: TextView, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, ProgressBar View, AutoCompleteTextView, TimePicker View, DatePicker View, ListView View, Spinner View

UNIT-II
User Input Controls, Menus, Screen Navigation, RecyclerView, Drawables, Themes and Styles, Material design, Providing resources for adaptive layouts, AsyncTask and AsyncTaskLoader, Connecting to the Internet, Broadcast receivers, Services, Notifications, Alarm managers, Transferring data efficiently

UNIT-III
Data - saving, retrieving, and loading: Overview to storing data, Shared preferences, SQLite primer, store data using SQLite database, ContentProviders, loaders to load and display data, Permissions, performance and security, Firebase and AdMob, Publish your app

Textbook(s): 1) "Beginning Android 4 Application Development", Wei-Meng Lee, March 2012, WROX.
Additional Reference(s): 1) https://developers.google.com/training/courses/android-fundamentals 2) https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-c ourse-practicals/details

Question Paper Pattern:

I. Internal Exam - 25 Marks

(i) Test – 20 Marks

20 marks Test – Duration 40 mins It will be conducted either using any open source learning management system like Moodle (Modular object-oriented dynamic learning environment)

OR

A test based on an equivalent online course on the contents of the concerned course (subject) offered by or build using MOOC (Massive Open Online Course) platform.

(ii) 5 Marks – Active participation in routine class instructional deliveries Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

II. External Exam– 75 Marks

III. Practical Exam – 50 Marks - Each course carry 50 Marks : 40 marks + 05 marks (journal) + 05 marks (viva) - Minimum 75 % practical from each paper are required to be completed and written in the journal.

(Certified Journal is compulsory for appearing at the time of Practical Exam)
****

SYLLABUS AND PROGRAMME / COURSE OUTCOMES

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Linux Server Administration

Program Code: **Course Code:** USCS502

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : V**

Programme Outcomes:
The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:
Learner will be able to develop Linux based systems and maintain. Learner will be able to install appropriate service on Linux server as per requirement. Learner will have proficiency in Linux server administration.

Unit I
Introduction: Technical Summary of Linux Distributions, Managing Software Single-Host Administration: Managing Users and Groups, Booting and shutting down processes, File Systems, Core System Services, Process of configuring, compiling, Linux Kernel Networking and Security: TCP/IP for System Administrators, basic network Configuration, Linux Firewall (Netfilter), System and network security

Unit II
Internet Services: Domain Name System (DNS), File Transfer Protocol (FTP), Apache web server, Simple Mail Transfer Protocol (SMTP), Post Office Protocol and Internet Mail Access Protocol (POP and IMAP), Secure Shell (SSH), Network Authentication, OpenLDAP Server, Samba and LDAP, Network authentication system (Kerberos), Domain Name Service (DNS), Security

Unit III
Intranet Services: Network File System (NFS), Samba, Distributed File Systems (DFS), Network Information Service (NIS), Lightweight Directory Access Protocol (LDAP), Dynamic Host Configuration Protocol (DHCP), MySQL, LAMP Applications File Servers, Email Services, Chat Applications, Virtual Private Networking.

Text book:
1) Linux Administration: A Beginner's Guide, Wale Soyinka, Seventh Edition, McGraw-Hill Education, 2016 2) Ubuntu Server Guide, Ubuntu Documentation Team, 2016

Additional References:
1) Mastering Ubuntu Server, Jay LaCroix, PACKT Publisher, 2016

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Software Testing and Quality Assurance

Program Code: **Course Code:** USCS503

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : V**

Programme Outcomes:
The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:
Understand various software testing methods and strategies. Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software. Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance.

Unit I
Software Testing and Introduction to quality : Introduction, Nature of errors, an example for Testing, Definition of Quality , QA, QC, QM and SQA , Software Development Life Cycle, Software Quality Factors Verification and Validation : Definition of V &V , Different types of V & V Mechanisms, Concepts of Software Reviews, Inspection and Walkthrough Software Testing Techniques : Testing Fundamentals, Test Case Design, White Box Testing and its types, Black Box Testing and its types

Unit II
Software Testing Strategies : Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, System Testing Software Metrics : Concept and Developing Metrics, Different types of Metrics, Complexity metrics Defect Management: Definition of Defects, Defect Management Process, Defect Reporting, Metrics Related to Defects, Using Defects for Process Improvement

Unit III
Software Quality Assurance : Quality Concepts, Quality Movement, Background Issues, SQA activities, Software Reviews, Formal Technical Reviews, Formal approaches to SQA, Statistical Quality Assurance, Software Reliability, The ISO 9000 Quality Standards, , SQA Plan , Six sigma, Informal Reviews 15L Quality Improvement : Introduction, Pareto Diagrams, Cause-effect Diagrams, Scatter Diagrams, Run charts Quality Costs : Defining Quality Costs, Types of Quality Costs, Quality Cost Measurement, Utilizing Quality Costs for Decision-Making

Text book:
1. Software Engineering for Students, A Programming Approach, Douglas Bell, 4 th Edition,, Pearson Education, 2005

2. Software Engineering – A Practitioners Approach, Roger S. Pressman, 5 th Edition, Tata McGraw Hill, 2001
3. Quality Management, Donna C. S. Summers, 5 th Edition, Prentice-Hall, 2010.
4. Total Quality Management, Dale H. Besterfield, 3 rd Edition, Prentice Hall, 2003.

Additional References:

1. Software engineering: An Engineering approach, J.F. Peters, W. Pedrycz , John Wiley,2004
2. Software Testing and Quality Assurance Theory and Practice, Kshirsagar Naik, Priyadarshi Tripathy , John Wiley & Sons, Inc. , Publication, 2008
3. Software Engineering and Testing, B. B. Agarwal, S. P. Tayal, M. Gupta, Jones and Bartlett Publishers, 2010

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Information and Network Security

Program Code: **Course Code:** USCS504

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : V**

Programme Outcomes:
The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:
Understand the principles and practices of cryptographic techniques. Understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for a given application. Understand various protocols for network security to protect against the threats in a network

Unit I
Introduction: Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, AES (round details not expected), Multiple Encryption and Triple DES, Block Cipher Modes of Operation, Stream Ciphers Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems, The RSA Algorithm

Unit II
Key Management: Public-Key Cryptosystems, Key Management, Diffie-Hellman Key Exchange Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs, Secure Hash Algorithm, HMAC Digital Signatures and Authentication: Digital Signatures, Authentication Protocols, Digital Signature Standard Authentication Applications: Kerberos, X.509 Authentication, Public-Key Infrastructure

Unit III
Electronic Mail Security: Pretty Good Privacy, S/MIME IP Security: Overview, Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management Web Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction Intrusion: Intruders, Intrusion Techniques, Intrusion

Detection Malicious Software: Viruses and Related Threats, Virus Countermeasures, DDOS Firewalls: Firewall Design Principles, Types of Firewalls

Text book:

1) Cryptography and Network Security: Principles and Practice 5th Edition, William Stallings, Pearson,2010

Additional References:

1) Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill, 2013.
2) Cryptography and Network, Behrouz A Fourouzan, Debdeep Mukhopadhyay, 2 nd Edition,TMH,2011

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Web Services

Program Code: **Course Code:** USCS506

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2020-21 **Semester : V**

Programme Outcomes:

The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:

Emphasis on SOAP based web services and associated standards such as WSDL. Design SOAP based / RESTful / WCF services Deal with Security and QoS issues of Web Services

Unit I

Web services basics : What Are Web Services? Types of Web Services Distributed computing infrastructure, overview of XML, SOAP, Building Web Services with JAX-WS, Registering and Discovering Web Services, Service Oriented Architecture, Web Services Development Life Cycle, Developing and consuming simple Web Services across platform

Unit II

The REST Architectural style : Introducing HTTP, The core architectural elements of a RESTful system, Description and discovery of RESTful web services, Java tools and frameworks for building RESTful web services, JSON message format and tools and frameworks around JSON, Build RESTful web services with JAX-RS APIs, The Description and Discovery of RESTful Web Services, Design guidelines for building RESTful web services, Secure RESTful web services

Unit III

Developing Service-Oriented Applications with WCF : What Is Windows Communication Foundation, Fundamental Windows Communication Foundation Concepts, Windows Communication Foundation Architecture, WCF and .NET Framework Client Profile, Basic WCF Programming, WCF Feature Details. Web Service QoS

Text book:

1) Web Services: Principles and Technology, Michael P. Papazoglou, Pearson Education Limited, 2008

2) 2) RESTful Java Web Services, Jobinesh Purushothaman, PACKT Publishing,2 nd Edition, 2015 3) Developing Service-Oriented Applications with WCF, Microsoft, 2017 https://docs.microsoft.com/en-us/dotnet/framework/wcf/index

Additional References:

1) Leonard Richardson and Sam Ruby, RESTful Web Services, O'Reilly, 2007
2) The Java EE 6Tutorial, Oracle, 2013

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Game Programming

Program Code: **Course Code:** USCS507

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : V**

Programme Outcomes:
The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:
Learner should study Graphics and gamming concepts with present working style of developers where everything remains on internet and they need to review it, understand it, be a part of community and learn.

Unit I

Mathematics for Computer Graphics, DirectX Kickstart: Cartesian Coordinate system: The Cartesian XY-plane, Function Graphs, Geometric Shapes, Polygonal Shapes, Areas of Shapes, Theorem of Pythagoras in 2D, Coordinates, Theorem of Pythagoras in 3D, 3D Polygons, Euler's Rule Vectors: Vector Manipulation, multiplying a Vector by a Scalar, Vector Addition and Subtraction, Position Vectors, Unit Vectors, Cartesian Vectors, Vector Multiplication, Scalar Product, Example of the Dot Product, The Dot Product in Lighting Calculations, The Dot Product in Back-Face Detection, The Vector Product, The Right-Hand Rule, deriving a Unit Normal Vector for a Triangle Areas, Calculating 2D Areas Transformations: 2D Transformations, Matrices, Homogeneous Coordinates, 3D Transformations, Change of Axes, Direction Cosines, rotating a Point about an Arbitrary Axis, Transforming Vectors, Determinants, Perspective Projection, Interpolation DirectX: Understanding GPU and GPU architectures. How they are different from CPU Architectures? Understanding how to solve by GPU?

Unit II

DirectX Pipeline and Programming: Introduction To DirectX 11: COM, Textures and Resources

Formats, The swap chain and Page flipping, Depth Buffering, Texture Resource Views, Multisampling Theory and MS in Direct3D, Feature Levels Direct3D 11 Rendering Pipeline: Overview, Input Assembler Stage (IA), Vertex Shader Stage (VS), The Tessellation Stage (TS), Geometry Shader Stage (GS), Pixel Shader Stage (PS), Output merger Stage (OM) Understanding Meshes or Objects, Texturing, Lighting, Blending. Interpolation and Character Animation: Trigonometry: The Trigonometric Ratios, Inverse Trigonometric Ratios, Trigonometric Relationships, The Sine Rule, The Cosine Rule, Compound Angles, Perimeter Relationships Interpolation: Linear Interpolant, Non-Linear Interpolation, Trigonometric Interpolation, Cubic Interpolation, Interpolating Vectors, Interpolating Quaternions Curves: Circle, Bezier, B-Splines Analytic Geometry: Review of Geometry, 2D Analytic Geometry, Intersection Points, Point in Triangle, and Intersection of circle with straight line.

Unit III

Introduction to Rendering Engines: Understanding the current market Rendering Engines. Understanding AR, VR and MR.Depth Mappers, Mobile Phones, Smart Glasses, HMD's Unity Engine: Multi-platform publishing, VR + AR: Introduction and working in Unity, 2D, Graphics, Physics, Scripting, Animation, Timeline, Multiplayer and Networking, UI, Navigation and Pathfinding, XR, Publishing. Scripting: Scripting Overview, Scripting Tools and Event Overview XR: VR, AR, MR, Conceptual Differences. SDK, Devices

Text book:

1) Mathematics for Computer Graphics, John Vince, Springer-Verlag London, 5th Edition,2017
2) Mathematics for 3D Game Programming and Computer Graphic, Eric Lengyel, Delmar Cengage Learning, Delmar Cengage Learning,2011
3) Introduction To 3D Game Programming With Directx® 11,Frank D Luna, Mercury Learning And Information,2012.
4) https://docs.unity3d.com/Manual/index.html - Free

Additional References:

1) Computer Graphics, C Version, Donald Hern and Pauline Baker, Pearson Education, 2nd Edition, 1997
2) HLSL Development Cookbook, Doron Feinstein, PACKT Publishing,2013

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Cloud Computing

Program Code: **Course Code:** USCS602

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : VI**

Programme Outcomes:

The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:

After successfully completion of this course, learner should be able to articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing using open source technology. Learner should be able to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. They should explain the core issues of cloud computing such as

security, privacy, and interoperability.

Unit I

Introduction to Cloud Computing, Characteristics and benefits of Cloud Computing, Basic concepts of Distributed Systems, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing. Elements of Parallel Computing. Elements of Distributed Computing. Technologies for Distributed Computing. Cloud Computing Architecture. The cloud reference model. Infrastructure as a service. Platform as a service. Software as a service. Types of clouds.

Unit II

Characteristics of Virtualized Environments. Taxonomy of Virtualization Techniques. Virtualization and Cloud Computing. Pros and Cons of Virtualization. Virtualization using KVM, Creating virtual machines, oVirt - management tool for virtualization environment. Open challenges of Cloud Computing

Unit III

Introduction to OpenStack, OpenStack test-drive, Basic OpenStack operations, OpenStack CLI and APIs, Tenant model operations, Quotas, Private cloud building blocks, Controller deployment, Networking deployment, Block Storage deployment, Compute deployment, deploying and utilizing OpenStack in production environments, Building a production environment, Application orchestration using OpenStack Heat

Text book:

1) Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi, Tata McGraw Hill Education Private Limited, 2013
2) 2) OpenStack in Action, V. K. CODY BUMGARDNER, Manning Publications Co, 2016

Additional References:

1) OpenStack Essentials, Dan Radez, PACKT Publishing, 2015
2) OpenStack Operations Guide, Tom Fifield, Diane Fleming, Anne Gentle, Lorin Hochstein, Jonathan Proulx, Everett Toews, and Joe Topjian, O'Reilly Media, Inc., 2014
3) https://www.openstack.org

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Cyber Forensics

Program Code: **Course Code:** USCS603

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : VI**

Programme Outcomes:

The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Outcomes:

The student will be able to plan and prepare for all stages of an investigation - detection, initial response and management interaction, investigate various media to collect evidence, report them in a way that would be acceptable in the court of law.

Unit I

Computer Forensics : Introduction to Computer Forensics and standard procedure, Incident Verification and System Identification ,Recovery of Erased and damaged data, Disk Imaging and

Preservation, Data Encryption and Compression, Automated Search Techniques, Forensics Software Network Forensic : Introduction to Network Forensics and tracking network traffic, Reviewing Network Logs, Network Forensics Tools, Performing Live Acquisitions, Order of Volatility, Standard Procedure Cell Phone and Mobile Device Forensics: Overview, Acquisition Procedures for Cell Phones and Mobile Devices

Unit II

Internet Forensic : Introduction to Internet Forensics, World Wide Web Threats, Hacking and Illegal access, Obscene and Incident transmission, Domain Name Ownership Investigation, Reconstructing past internet activities and events E-mail Forensics : e-mail analysis, e-mail headers and spoofing, Laws against e-mail Crime, Messenger Forensics: Yahoo Messenger Social Media Forensics: Social Media Investigations Browser Forensics: Cookie Storage and Analysis, Analyzing Cache and temporary internet files, Web browsing activity reconstruction

Unit III

Investigation, Evidence presentation and Legal aspects of Digital Forensics: Authorization to collect the evidence , Acquisition of Evidence, Authentication of the evidence, Analysis of the evidence, Reporting on the findings, Testimony Introduction to Legal aspects of Digital Forensics: Laws & regulations, Information Technology Act, Giving Evidence in court, Case Study – Cyber Crime cases, Case Study – Cyber Crime cases

Text book:

1. Guide to computer forensics and investigations, Bill Nelson, Amelia Philips and Christopher Steuart, course technology,5th Edition,2015

Additional References:

1. Incident Response and computer forensics, Kevin Mandia, Chris Prosise, Tata McGrawHill,2nd Edition,2003

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Information Retrieval

Program Code: **Course Code:** USCS604

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : VI**

Programme Outcomes:

The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

After completion of this course, learner should get an understanding of the field of information retrieval and its relationship to search engines. It will give the learner an understanding to apply information retrieval models

Unit I

Introduction to Information Retrieval: Introduction, History of IR, Components of IR, and Issues related to IR, Boolean retrieval, Dictionaries and tolerant retrieval.

Unit II

Link Analysis and Specialized Search: Link Analysis, hubs and authorities, Page Rank and HITS algorithms, Similarity, Hadoop & Map Reduce, Evaluation, Personalized search, Collaborative

filtering and content-based recommendation of documents and products, handling “invisible” Web, Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.

Unit III

Web Search Engine: Web search overview, web structure, the user, paid placement, search engine optimization/spam, Web size measurement, search engine optimization/spam, Web Search Architectures. XML retrieval: Basic XML concepts, Challenges in XML retrieval, A vector space model for XML retrieval, Evaluation of XML retrieval, Text-centric versus data-centric XML retrieval

Text book:

1) Introduction to Information Retrieval, C. Manning, P. Raghavan, and H. Schütze, Cambridge University Press, 2008
2) 2) Modern Information Retrieval: The Concepts and Technology behind Search, Ricardo Baeza -Yates and Berthier Ribeiro – Neto, 2 nd Edition, ACM Press Books 2011.
3) 3) Search Engines: Information Retrieval in Practice, Bruce Croft, Donald Metzler and Trevor Strohman, 1 st Edition, Pearson, 2009.

Additional References:

1) Information Retrieval Implementing and Evaluating Search Engines, Stefan Büttcher, Charles L. A. Clarke and Gordon V. Cormack, The MIT Press; Reprint edition (February 12, 2016)

S.P.Mandal’s
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Data Science

Program Code: **Course Code:** USCS606

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : VI**

Programme Outcomes:

The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

After completion of this course, the students should be able to understand & comprehend the problem; and should be able to define suitable statistical method to be adopted.

Unit I

Introduction to Data Science: What is Data? Different kinds of data, Introduction to high level programming language + Integrated Development Environment (IDE), Exploratory Data Analysis (EDA) + Data Visualization, Different types of data sources, Data Management: Data Collection, Data cleaning/extraction, Data analysis & Modeling

Unit II

Data Curation: Query languages and Operations to specify and transform data, Structured/schema

based systems as users and acquirers of data Semi-structured systems as users and acquirers of data, Unstructured systems in the acquisition and structuring of data, Security and ethical considerations in relation to authenticating and authorizing access to data on remote systems, Software development tools, Large scale data systems, Amazon Web Services (AWS)

Unit III

Statistical Modelling and Machine Learning: Introduction to model selection: Regularization, bias/variance tradeoff e.g. parsimony, AIC, BIC, Cross validation, Ridge regressions and penalized regression e.g. LASSO Data transformations: Dimension reduction, Feature extraction, Smoothing and aggregating Supervised Learning: Regression, linear models, Regression trees, Time-series Analysis, Forecasting, Classification: classification trees, Logistic regression, separating hyperplanes, k-NN Unsupervised Learning: Principal Components Analysis (PCA), k-means clustering, Hierarchical clustering, Ensemble methods

Text book:

1) Doing Data Science, Rachel Schutt and Cathy O'Neil, O'Reilly,2013
2) 2) Mastering Machine Learning with R, Cory Lesmeister, PACKT Publication,2015

Additional References:

1) Hands-On Programming with R, Garrett Grolemund,1st Edition, 2014
2) An Introduction to Statistical Learning, James, G., Witten, D., Hastie, T., Tibshirani, R.,Springer,2015

S.P.Mandal's
KANKAVLI COLLEGE,KANKAVLI
(Affiliated to University of Mumbai)
Syllabus

Programme: T.Y.B. Sc. CS **Course:** Ethical Hacking

Program Code: **Course Code:** USCS607

(As per the Credit Based Semester and Grading System with effect from the academic year 2018-19

Year : 2021-22 **Semester : VI**

Programme Outcomes:

The objective of this syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Learner will know to identify security vulnerabilities and weaknesses in the target applications. They will also know to test and exploit systems using various tools and understand the impact of hacking in real time machines

Unit I

Information Security : Attacks and Vulnerabilities Introduction to information security : Asset, Access Control, CIA, Authentication, Authorization, Risk, Threat, Vulnerability, Attack, Attack Surface, Malware, Security-Functionality-Ease of Use Triangle Types of malware :Worms, viruses,

Trojans, Spyware, Rootkits Types of vulnerabilities : OWASP Top 10 : cross-site scripting (XSS), cross site request forgery (CSRF/XSRF), SQL injection, input parameter manipulation, broken authentication, sensitive information disclosure, XML External Entities, Broken access control, Security Misconfiguration, Using components with known vulnerabilities, Insufficient Logging and monitoring, OWASP Mobile Top 10, CVE Database Types of attacks and their common prevention mechanisms : Keystroke Logging, Denial of Service (DoS /DDoS), Waterhole attack, brute force, phishing and fake WAP, Eavesdropping, Man-in-the-middle, Session Hijacking, Clickjacking, Cookie Theft, URL Obfuscation, buffer overflow, DNS poisoning, ARP poisoning, Identity Theft, IoT Attacks, BOTs and BOTNETs Case-studies : Recent attacks – Yahoo, Adult Friend Finder, eBay, Equifax, WannaCry, Target Stores, Uber, JP Morgan Chase, Bad Rabbit

Unit II

Ethical Hacking – I (Introduction and pre-attack) Introduction: Black Hat vs. Gray Hat vs. White Hat (Ethical) hacking, Why is Ethical hacking needed?, How is Ethical hacking different from security auditing and digital forensics?, Signing NDA, Compliance and Regulatory concerns, Black box vs. White box vs. Black box, Vulnerability assessment and Penetration Testing. Approach : Planning - Threat Modeling, set up security verification standards, Set up security testing plan – When, which systems/apps, understanding functionality, black/gray/white, authenticated vs. unauthenticated, internal vs. external PT, Information gathering, Perform Manual and automated (Tools: WebInspect/Qualys, Nessus, Proxies, Metasploit) VA and PT, How WebInspect/Qualys tools work: Crawling/Spidering, requests forging, pattern matching to known vulnerability database and Analyzing results, Preparing report, Fixing security gaps following the report Enterprise strategy : Repeated PT, approval by security testing team, Continuous Application Security Testing, Phases: Reconnaissance/foot-printing/Enumeration, Phases: Scanning, Sniffing

Unit III

Ethical Hacking :Enterprise Security Phases : Gaining and Maintaining Access : Systems hacking – Windows and Linux – Metasploit and Kali Linux, Keylogging, Buffer Overflows, Privilege Escalation, Network hacking - ARP Poisoning, Password Cracking, WEP Vulnerabilities, MAC Spoofing, MAC Flooding, IPSpoofing, SYN Flooding, Smurf attack, Applications hacking : SMTP/Email-based attacks, VOIP vulnerabilities, Directory traversal, Input Manipulation, Brute force attack, Unsecured login mechanisms, SQL injection, XSS, Mobile apps security, Malware analysis : Netcat Trojan, wrapping definition, reverse engineering Phases : Covering your tracks : Steganography, Event Logs alteration Additional Security Mechanisms : IDS/IPS, Honeypots and evasion techniques, Secure Code Reviews (Fortify tool, OWASP Secure Coding Guidelines)

Text book:

1) Certified Ethical Hacker Study Guide v9, Sean-Philip Oriyano, Sybex; Study Guide Edition,2016
2) 2) CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2007

Additional References:

1) Certified Ethical Hacker: Michael Gregg, Pearson Education,1st Edition, 2013 2) Certified Ethical Hacker: Matt Walker, TMH,2011 3) http://www.pentest-standard.org/index.php/PTES_Technical_Guidelines 4) https://www.owasp.org/index.php/Category:OWASP_Top_Ten_2017_Project 5) https://www.owasp.org/index.php/Mobile_Top_10_2016-Top_10 6) https://www.owasp.org/index.php/OWASP_Testing_Guide_v4_Table_of_Contents 7) https://www.owasp.org/index.php/OWASP_Secure_Coding_Practices_-_Quick_Reference_ Guide 8) https://cve.mitre.org/ 9) https://access.redhat.com/blogs/766093/posts/2914051 10) http://resources.infosecinstitute.com/applications-threat-modeling/#gref 11) http://www.vulnerabilityassessment.co.uk/Penetration%20Test.html

: Question Paper Pattern :

Scheme of Examination

1. Theory:

I. Internal 25 Marks :

a) Test – 20 Marks

20 marks Test – Duration 40 mins It will be conducted either using any open source learning management system like Moodle (Modular object-oriented dynamic learning environment)

OR

A test based on an equivalent online course on the contents of the concerned course (subject) offered by or build using MOOC (Massive Open Online Course) platform.

b) 5 Marks – Active participation in routine class instructional deliveries Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

II. External 75 Marks as per University Guidelines

Practical and Project Examination:

There will be separate Practical examination for Elective-I, II, Skill enhansement and project of these Elective-I 100, Elective-II: 100 and Skill Enhansement: 50 and Project Implementation: 50.

In the Practical Examination of Elective-I and II, the student has to perform practical on each of the subjects chosen. The Marking Scheme for each of the Elective is given below:

	Subject Code	Experiment-I	Experiment-II	Total Marks
Elective-I	USCSP501/ USCSP601	Experiment-40+Journal-5 +viva-5 Total:50M	Experiment-40+Journal-5+viva5 Total:50M	100 M
Elective-II	USCSP502/ USCSP602	Experiment-40+Journal-5 +viva-5 Total:50M	xperiment-40+Journal-5+viva5 Total:50M	100 M
Project Implement ation	USCSP503/ USCSP603	**Project Evaluation Scheme		50 M
Skill Enhancem ent	USCSP504/ USCSP604	Experiment-40+Journal:5+viva-5 Total-50M		50 M
Total Marks				300M