MINUTES OF THE MEETING OF THE BOARD OF STUDIES IN COMPUTER SCIENCE HELD ON OCTOBER 11, 2023 AT 10.00 a.m.

Vide Chowgule College Notice BOS/2023-24/133(C)/731 dated 16 September 2023 meeting of this Board of Studies (BoS) was convened on October 11th, 2023 at 10.00 a.m. in Block Laboratory-I of Computer Science Department, Parvatibai Chowgule College of Arts and Science (Autonomous), Margao-Goa. Since the number of members present represented the quorum, the BoS began its proceedings.

Minutes are presented in the format.

Members present in person:

1. Dr. Sameena Falleiro - Chairperson
2. Dr. Kissan Gauns Dessai – Academic Council Nominee
3. Mr Vinay Praveen Mahale – Alumni Representative
4. Mr. Kumaresh V.C – Member
5. Dr. Shaila Ghanti – Member
6. Mr. D. Prabakaran – Member
7. Mr. Alberto Ian Barreto – Member
8. Ms. Judith Dias Barreto – Member
9. Mrs. Suchitra Bhat – Member
10. Ms. Dikshita Aroskar – Member Secretary
11. Mr. Mahesh Matha – Member
12. Mr. Gajanan Nial – Member
13. Mr. Amogh Raiturkar – Member
14. Mrs. Sanas Shaikh – Member
15. Mr. Gauresh Tari – Member
16. Mr. Mitendra Alve – Member

Members absent with intimation:

1. Dr. Sharad Sinha – Academic Council Nominee

Members absent without intimation:

1. Dr. J.A. Lakshminarayana – Vice Chancellor, Goa University Nominee
2. Mr. Jervis Pereira – Industry Representative

Proceedings:

The members of the Board of Studies (BoS) were welcomed by the Chairperson Dr. Sameena Falleiro. The Member Secretary Ms. Dikshita Aroskar introduced and explained the agenda for this meeting and the Board transacted the following business:

Agenda :

1. To approve the UG syllabus Semester III & IV for BSc in Computer Science under NEP 2020.
2. To approve the Multidisciplinary, Skill Enhancement, Vocational Education & Training , Ability Enhancement (Modern Indian Language) Syllabus under NEP 2020.
3. To review the syllabus of the PGDCA programme.
4. To approve the Semester III & IV syllabus for MSc-IT Programme.
5. To approve the UG syllabus Semester III & IV for BVoc in Software Development under NEP 2020.
6. A.O.B.

AGENDA 1:

1. To approve the UG syllabus for Semester III and IV under NEP 2020

The syllabus for the Discipline Specific Core courses, UG-COM-201: Data Structures; UG-COM-202:Object Oriented Programming to be offered at Semester III and UG-COM-203:Computer Architecture; UG-COM-204: Operating System; UG-COM-205:Mobile Application Development; UG-COM-206: Software Engineering to be offered at Semester IV was discussed and deliberated.

On deliberation it was suggested that the courses COM-203:Computer Architecture; UG-COM-204: Operating System be offered as a single course titled Computer Architecture and Operating System. It was also suggested that UG-COM-205:Mobile Application Development be offered as a vocational course in place of the earlier suggested UG-COM-VOC-1: Web Design.

To cater to the foundational knowledge of a computer science student as well as to cater to the needs of the industry, the following courses were recommended for inclusion as Discipline Specific Core courses in semester IV: Mathematical Foundations for Computer Science and Web Development with PHP.

This was further deliberated and syllabus was approved by the members of the board (Annexure A).

It was also suggested that COM-202:Object Oriented Programming be offered to the minors.

AGENDA 2:

2. **To approve the syllabus of Multidisciplinary, Skill Enhancement, Vocational Education & Training under NEP 2020.**

Syllabi for the Multidisciplinary course (MDC):UG-COM-MDC4: Fundamentals of Data Science and Skill Enhancement course (SEC):UG-COM-SEC3:UI/UX Design to be offered at semester III was discussed, deliberated, and on the suggestion of the BoS members, it was decided to change the nomenclature of UG-COM-MDC4: Fundamentals of Data Science to UG-COM-MDC4: Fundamentals of Data Analysis.

The syllabus for the same was approved by the members of the board (Annexure A):

I. UG-COM-MDC4: Fundamentals of Data Analysis
II. UG-COM-SEC3:UI/UX Design

Syllabi for the Vocational Course (VOC) which is to be offered at Semester IV as minuted earlier, was approved by the members of the board (Annexure A):

III. UG-COM-VOC-1: Mobile Application Development

AGENDA 3:

3. **To review the syllabus of the PGDCA programme :** Deferred from the agenda.

AGENDA 4:

4. **To approve the Semester III & IV syllabus for MSc-IT Programme.**

The syllabus for the List of Discipline Specific Electives III & IV courses PGMP-IT-DSE-501 : Data Mining; PGMP-IT-DSE-502 Information Retrieval; PGMP-IT-DSE-503 Information Security; PGMP-IT-DSE-504 Parallel and Distributed Computing; PGMP-IT-DSE-505 Soft Computing; PGMP-IT-DSE-506 Digital Image Processing; and List of Discipline Specific Research Electives I & II PGMP-IT-DSRE-501 Research Methodology; PGMP-IT-DSRE-502 Data Analytics; PGMP-IT-DSRE-503 Modeling and Simulation; PGMP-IT-DSRE-504 Blockchain Technologies; PGMP-IT-DSRE-505 Natural Language Processing; PGMP-IT-DSRE-506 Neural Networks and Deep Learning was discussed, deliberated and approved by the members of the board (Annexure B).

The syllabus for the List of Discipline Specific Research Electives I & II courses PGPM-IT-DSRE-501: Research Methodology; PGPM-IT-DSRE-502: Data Analytics; PGPM-IT-DSRE-503: Modelind and Simulation; PGPM-IT-DSRE-504 : Blockchain Technologies; PGPM-IT-DSRE-505 : Natural Language Processing; PGPM-IT-DSRE-506 : Neural Networks and Deep Learning and PGPM-IT-DSRE-507 : Educational Technology was discussed, deliberated and approved by the members of the board (Annexure B).

It was recommended by the board to offer PGPM-IT-DSRE-507 : Educational Technology as a Generic Electives for Students of other PG Programmes instead of being offered as Discipline Specific Research Electives

List of Generic Electives for Students of other PG Programmes PGMP-IT-GE-501 Programming using Python;PGMP-IT-GE-502 Introduction to Web Designing; PGMP-IT-GE-503 Content Management System and PGMP-IT-GE-504 Educational Technologies was discussed, deliberated and approved by the members of the board (Annexure B).

The board members have proposed that it would be more beneficial to offer Discipline-Specific Elective courses as a combination of three credits of theory and one credit of practical, rather than offering them solely as theory-based courses.

AGENDA 5:

5. **To approve the UG syllabus Semester III & IV for BVoc in Software Development under NEP 2020.**

The syllabus for semester III and IV for BVoc programme was discussed, deliberated and approved by the members of the board the same is presented in annexure A.

AGENDA 6:

6. **A.O.B.**

1. SEC Courses : The board members recommended the inclusion of Skill Enhancement Courses (SEC) in areas such as Content Management System (CMS) and Web Design.
2. The board members suggested that the proposed changes to the structure of semester III and IV should be implemented for the current batch of students.

PART A: Resolutions (Annexure A and B)

1. Resolution was passed to approve the syllabi for Discipline Specific Courses to be offered at Semester III and IV of BSc Computer Science program under the approved new Programme structure and passed a resolution to incorporate it for the batch of students enrolled under NEP 2020.
2. Resolution was passed to approve the syllabi for Multi-Disciplinary Courses and Skill Enhancement Courses to be offered at Semester III and a Vocational Course (VOC) to be offered at Semester IV under the approved new Programme structure and passed a resolution to incorporate it for the batch of students enrolled under NEP 2020.
3. Resolution was passed to approve the syllabi at Semester III and IV for MSc IT programme.
4. Resolution was passed to approve the syllabi at Semester III and IV for BVoc programme under the approved new Programme structure and passed a resolution to incorporate it for the batch of students enrolled under NEP 2020.

PART B:

Important points/recommendations of BoS that require consideration/approval of Academic Council:

1. To seek approval for the syllabi for Discipline Specific Courses and changes proposed by the BOS in courses to be offered at Semester III and IV for BSc Computer Science Program and to incorporate the same for the current batch of students enrolled under NEP 2020.
2. To seek approval for the syllabi for Multi-Disciplinary Courses and Skill Enhancement Courses to be offered at Semester III and a Vocational Course (VOC) to be offered at Semester IV under the approved new Programme structure.
3. To seek approval for the syllabi to be offered at Semester III and IV for MSc IT programme.
4. To seek approval for the syllabi to be offered at Semester III and IV for BVoc Software Development programme.

The Chairman thanked the members of the Board of Studies in Computer Science for their valuable contribution and active participation in the meeting.

The meeting ended with a vote of thanks to the Chair.

The foregoing minutes of the meeting were circulated by the Chairman, Board of Studies in Computer Science after the conclusion of the BoS meeting.

The following members of the Board of Studies were present for the meeting:

1. Dr. Sameena Falleiro - Chairperson
2. Dr. Kissan Gauns Dessai – Academic Council Nominee
3. Mr Vinay Praveen Mahale – Alumni Representative
4. Mr. Kumaresh V.C – Member
5. Dr. Shaila Ghanti – Member
6. Mr. D. Prabakaran – Member
7. Mr. Alberto Ian Barreto – Member
8. Ms. Judith Dias Barreto – Member
9. Mrs. Suchitra Bhat – Member
10. Ms. Dikshita Aroskar – Member Secretary
11. Mr. Mahesh Matha – Member
12. Mr. Gajanan Nial – Member
13. Mr. Amogh Raiturkar – Member
14. Mrs. Sanas Shaikh – Member
15. Mr. Gauresh Tari – Member
16. Mr. Mitendra Alve – Member

Members absent with intimation:

1. Dr. Sharad Sinha – Academic Council Nominee

Members absent without intimation:

1. Dr. J.A. Lakshminarayana – Vice Chancellor, Goa University Nominee
2. Mr. Jervis Pereira – Industry Representative

Ms. Dikshita Aroskar
(Member Secretary)

Dr. Sameena Falleiro
(Chairperson, Board of Studies, Computer Science)

Date: 16 October 2023.

PART C: The remarks of the Dean of Academics:

a. The minutes are in order.
b. The minutes may be placed before the Academic Council with remark, if any.
c. Important points of the minutes which need clear policy decision of the Academic Council to be recorded.

Date: 16-10-2023

Signature of the Dean of Academics:

Dr. Meghana S. Devli

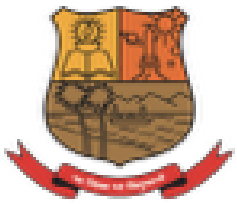
PART D: The remarks of the Members Secretary of the Academic Council:

a. The minutes are in order.
b. The minutes may be placed before the Academic Council with remark, if any.
c. Important points of the minutes which need clear policy decision of the Academic Council to be recorded.

Date: 19/10/23

Signature of the Member Secretary,
Academic Council

Mr. V. C. Kumaresh



Parvatibai Chowgule College of Arts and Science
(Autonomous)

Accredited by NAAC with Grade 'A+'
Best Affiliated College-Goa University Silver Jubilee Year Award

DEPARTMENT OF COMPUTER SCIENCE

COURSE STRUCTURE AND SYLLABUS WEF FROM AY 2023-2024

B.Sc. DEGREE COURSE IN COMPUTER SCIENCE (WITH HONOURS)
(4-year course structure)

DEPARTMENT OF COMPUTER SCIENCE

PROPOSED NEP STRUCTURE
WEF FROM AY 2023-2024
B.Sc IN COMPUTER SCIENCE (WITH HONOURS)
(4-year course structure)

SEM	Major subject/ discipline (3T+1P)	Minor Stream (Disc./Voc) (3T+1P)	(MDC for Others) (2T + 1P)	VAC (2 credits)	SEC (2T+1P)	INTERNSHIP
I	UG-COM-101 Introduction to Programming	UG-COM-101 Introduction to Programming	UG-COM-MDC1 Office Automation	UG-COM-VAC1 Cyber Security	UG-COM-SEC1 Programming with R	
			UG-COM-MDC2 Introduction to Python Programming			
II	UG-COM-102 Database Management	UG-COM-102 Database Management	UG-COM-MDC4 Introduction to R Programming	UG-COM-VAC-1 Cyber Security	UG-COM-SEC2 Programming In Python	
			UG-COM-MDC2 Introduction to Python Programming			
III	UG-COM-201: Data Structures	UG-COM-201: Data Structures	UG-COM-MDC5 Fundamentals of Data Analysis		UG-COM-SEC3:UI/UX Design	
	UG-COM-202: Object Oriented Programming	UG-COM-202: Object Oriented Programming				
IV	UG-COM-203: Computer Architecture and Operating System	UG-COM-VOC-1: Mobile Application Development				
	UG-COM-204:					

	Mathematical Foundations for Computer Science					
	UG-COM-205: Web Development with php					
	UG-COM-206: Software Engineering					
V	UG-COM-301: Full Stack Development	UG-COM-VOC -2: Digital Marketing				Internship (4 credits)
	UG-COM-302: IOT					
	UG-COM-303:C omputer Networks					
VI	UG-COM-304:D ata Science	UG-COM-VOC -3:Software Testing(voc)				
	UG-COM-305:C loud Computing					
	UG-COM-306:A I					
	UG-COM-PRJ:P roject					
VII	UG-COM-401: Design and Analysis of Algorithms	UG-COM-405: Image Processing				
	UG-COM-402: Software Architecture, Design Patterns and Frameworks					
	UG-COM-403: Advanced					

	DBMS					
	UG-COM-404: Machine Learning					
VIII	UG-COM-406: Compiler Design	UG-COM-410: Network Security				
	UG-COM-407: Deep Learning					
	UG-COM-408: NLP					
	UG-COM-409: Educational Technology					

SEMESTER III

DISCIPLINE SPECIFIC CORES

Course Title: Data Structures
Course Code: UG-COM-201
Marks: 75
Credits: 3
Duration:45 Hrs

Course Prerequisite: Nil

Course Objectives:

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Course outcomes:

Upon completion of the course students will be able to:

CO1 : Define relevant standard algorithms for various data structures. Learn various applications of data structures.
CO2 : Implementation of data structures.
CO3 : Use various data structures for sorting and searching.
CO4 : Analyze and compare algorithms for efficiency using Big-O notation.
CO5 : Formulate new solutions for programming problems.

SYLLABUS

UNIT I: [15 HRS]

Introduction to data structures:

Concept, Data type, Data object, ADT, Need of Data Structure, Types of Data Structure.

Algorithm Analysis:

Algorithm – definition, characteristics, Space complexity, time complexity, Asymptotic notation (Big O).

LinkedList:

Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List, polynomial manipulation, Generalized linked list – concept & representation.

Stacks:

Introduction, Representation-static & dynamic, Operations

UNIT II **[15HRS]**

Stack Applications:

Application - infix to postfix & prefix, postfix evaluation, Simulating recursion using stack.

Queues:

Introduction, Representation -static & dynamic, Operations, Circular queue, priority queue (with implementation), Concept of doubly ended queue.

Trees:

Concept & Terminologies, Binary tree, binary search tree, Representation – static & dynamic, Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes, non recursive inorder traversal, Expression Tree. Introduction to AVL Trees

UNIT III **[15HRS]**

M-Way Search Trees: Introduction, B Tree, B+ Tree.

Searching and Sorting:

Use of various data structures for searching and sorting, selection sort, merge sort, quick sort, heap sort and hashing.

Graph:

Concept & terminologies, Graph Representation – Adjacency matrix, adjacency list,Traversals – BFS & DFS, Application of BFS, DFS – Shortest path, Backtracking.

REFERENCES:

MANDATORY:

1.Horowitz,E., Sahni,S. (2008). Fundamentals of Data Structures in C, University Press.

SUPPLEMENTARY:

1.LangsamYedidyah, Augenstein J. Moshe, Tenenbaum M.A aron ,(2018),Data Structure using C, Pearson Education.
2. Richard.G, Behrouz.F, Data Structures: A Pseudocode Approch with C, Cengage Learning.

WEB BASED:

1. https://www.tutorialspoint.com/data_structures_algorithms
2. https://www.w3schools.in/data-structures-tutorial
3.https://www.studytonight.com/data-structures/
4.https://www.programiz.com/dsa
5. https://www.geeksforgeeks.org/data-structures/
6. https://www.javatpoint.com/data-structure-tutorial
7. E Book - https://www.scribd.com/doc/261233741/Data-Structures-Through-C-Yashavant-Kanetkar

Practical: Data Structures
Credit: 1
Marks: 25
Duration: 30 Hrs

Programs using C language that covers the following concepts:

1. Stack: Static/Dynamic stack implementation.
2. Stack: infix to postfix.
3. Stack: Evaluation of Postfix expression.
4. Queues: Static and Dynamic
5. Queue :Implementation
6. Implementation of Circular queue
7. List: Singly LinkedList
8. List: Doubly LinkedList
9. List: Circular Linked List
10. Linked List: Polynomial addition
11. Trees: Binary Search Tree: create, add, delete, display nodes.
12. Trees: BST traversal.
13. Graph: Representation of Graphs, Graph Traversals.
    Graph: DFS,BFS.

Course Title: Object Oriented Programming
Course Code: UG-COM-202
Marks: 75
Credits: 3
Duration: 45 Hrs

Course Prerequisites: Nil

Course Objectives:

- To teach the basic concepts and techniques which form the object oriented programming paradigm.
- To introduce object oriented programming (OOP) using Java.

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

CO1: Apply fundamental object-oriented concepts in problem solving.
CO2: Analyze problem scenario and identify classes/objects, their properties/functionalities and associations.
CO3: Analyze the problem scenario based on UML diagrams and develop the system.
CO4: Implement the object oriented model in any object oriented language.

SYLLABUS:

UNIT I: Introduction [15 HRS]

Principles of OOP

Programming paradigms. Basic concepts in OOP. OOP: major principles - encapsulation, abstraction, inheritance, polymorphism. Benefits of OOP. Applications of OOP.

Introduction to Java
Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, java. Math class, Arrays in java.

UNIT II Principles of OOP [15 HRS]

Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, object serialization, Inbuilt classes like String, Character, String Buffer, File, this reference.

Inheritance and Polymorphism:
Inheritance in java, Super and subclass, Overriding, java.lang. Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, java.util package.

UNIT III: Exceptions, Multi-threading and GUI programming: [15 HRS]
Event and GUI programming

Design patterns – what and why? It's classification. Introduce the Observer design pattern.
Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout.

Managers:
Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle.

Multithreading in java
Multithreading in java, Thread life cycle and methods, Runnable interface, Thread synchronization.

Exception handling
Exception handling – what and why? Try and catch blocks. Multiple catch blocks. Nested try, finally block, throw keyword, throw keyword. Custom Exception. Introduction to the Collections Framework.

REFERENCES:

MANDATORY:
1.Deitel, P., & Deitel, H. (2011). Java How to program. Prentice Hall Press.

SUPPLEMENTARY:

1. Naughton.P, Schildt.H, (2000), Java 2 – The Complete Reference TMH publications
2. Patrick,N. (1997). The Java Handbook –TMH publications
3. Mughal, K. A., & Rasmussen, R. W. (2003). A programmer's guide to Java certification: a comprehensive primer. Addison-Wesley Professional.
4. Flanagan, D. (2004). Java examples in a nutshell.
5. Arnold, G., H.(2005)“The Java Programming Language” Addison-Wesley Professional.

WEB BASED:
1.www.javapoint.com
2.www.tutorialspoint.com
3.www.gurugg.com
docs.logout.org > Programmation >Java>Programming with Java_A primer

Practicals: Object Oriented Programming
Credit: 1
Marks: 25
Duration: 30 Hrs

Programs using Java language that covers the following concepts:
1) Classes and instances
2) Working with the java.Math class
3) Inheritance
4) Composition v/s inheritance
5) Polymorphism, abstract classes and interfaces
6) Algorithm and Data Structures
7) Utilizing the java.util package
8) Event handling and GUI
9) Applets
10) I/O programming
11) Exception handling
12) Multi-threading
13) Collections framework

SEMESTER IV

DISCIPLINE SPECIFIC CORES

Course Title: Computer Architecture and Operating Systems
Course Code: UG-COM-203
Marks: 75
Credits: 3
Duration: 45 Hrs

Course Prerequisites: Nil

Course Objectives:

- Study of Processor architecture, memory and I/O subsystems including basic Assembly Language Programming.
- To Understand the Basic objectives, functions and types of Operating System
- To study various aspects of operating system like Process Management, Memory
- Management, Storage management etc.
- To understand different algorithms used for CPU scheduling, Memory allocation.

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

CLO1: Explain the detailed function of a typical Computer system and its components.
CLO2: Identify the functions of operating system
CLO3: Analyze the process, its states and process scheduling algorithms
CLO4 :Explain deadlocks and synchronization, memory management, and disk scheduling. .
CLO5: Implement Assembly Language Program and Shell Script for a given task.
CLO6: Implement algorithm of CPU Scheduling, Memory Scheduling.

SYLLABUS:

UNIT I: Computer System and Components: [20 HRS]

Processor:Function and structure of a computer, Interconnection of components, Performance of a computer. Computer Architecture – Princeton (Von Neumann) and Harvard architecture.Architecture of 8086 processor - Registers, ALU and Control unit, Data path in a CPU.Instruction cycle, Organization of a control unit – Block Diagram of Hardwired andMicroprogrammed control unit. Instruction set architectures – CISC and RISC architectures. Memory Subsystem: Characteristics of memory system, the memory hierarchy, Semiconductormemories, Types of ROM & RAM, Cache memory unit.
Input/Output Subsystem: General block diagram of External device and I/O module, Programmed I/O, Interrupt driven I/O, DMA, I/O channels and I/O processors.

UNIT II: Operating system overview and Process Management [15 HRS]

Overview: Operating system Objectives and Functions, Evolution of operating system, major achievements.
Process Management: Process Definition, Process Control Block, Process States, Operations on Process; Interprocess communication, Process Scheduling, Scheduling Criteria, Scheduling Algorithms,
Process Coordination: Process Synchronization, Principles, Mutual Exclusion, The Critical-Section Problem, Peterson's Solution.
Deadlocks- system models, Deadlock characterization, Deadlock Handling Methods, Prevention, Avoidance, Detection, Recovery from Deadlock.

UNIT III: Memory Management and Storage Management [10HRS]
Memory Management: Introduction, Swapping, Contiguous Memory Allocation, Paging, PageTable, Segmentation, Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing
Secondary Storage Structure : Overview, disk structure, Disk attachment, Disk scheduling.

REFERENCES:

MANDATORY:
1. Stallings, W. (2003). Computer organization and architecture: designing for performance. Pearson Education India.
2. Silberchatz, A., Galvin, ,& Gagne. (2008). Operating System Concepts (8th ed.). Wiley publication.

SUPPLEMENTARY:

1. Stallings, W. (2001). Operating systems: Internals and design principles.(6th ed.). Upper Saddle River, N.J: Prentice Hall.
2. David A. Patterson and John L. Hennessy (2021), Computer Organization and Design: The Hardware/Software Interface, Elsevier
3. Douglas V. Hall, (2012), Microprocessors and its Interfacing, McGraw Hill Education (India) Private Limited
4. Sumitabha Das , UNIX Concepts and Applications, Tata McGraw-Hill

WEB BASED:

1. http://williamstallings.com/ComputerOrganization/
2. https://www.tutorialspoint.com/computer_fundamentals/index.htm
3. https://www.geeksforgeeks.org/operating-systems/

Video Links and Animations

1. 4.https://www.youtube.com/watch?v=WP3uDglbPiI
1. 5.http://williamstallings.com/OS-Animation/Animations.html
2. 6.Linux Tutorials for Practical

3. 7.https://www.tutorialspoint.com/unix/index.htm

Practicals: Computer Architecture and Operating Systems
Credit: 1
Marks: 25
Duration: 30 Hrs

1. Study of Motherboard, Peripherals and the Computer System:O.S. Installation (DualBoot): BIOS; Manage disk partitions: understand MBR-style partitions, (primary, extended, logical); list/create/delete partitions; Manage logical volumes: create/remove physical volumes, create/delete logical volumes, Boot loader.Installation of drivers; updating softwarepackages DOS Commands, Tools for Computer Management (Disk Management, Disk Cleanup, Defragmentation, Performance Monitor, System Restore etc). [1]

Assembly language programs for 8086 using MASM / compatible assembler or Simulator, either in Windows or Linux.

1. Study of addressing modes. [1]
1. Programs for data transfer and arithmetic operations and logical operations [1]
2. Study of Basic commands of Linux [1]
3. Shell Programming in Unix/Linux, arithmetic operations, loops. [1]
4. .Shell Programming – advanced [1]
5. Filters and Pipes in LINUX. [2]
6. Implementation of Inbuilt Linux/UNIX commands like cp, rename etc. [1]
7. Implementation of CPU scheduling policies. [1]
8. 10.Implementation of Memory allocation Techniques. [1]

Course Title: Mathematical Foundations for Computer Science
Course Code: UG-COM-204
Marks: 75
Credits: 3
Duration: 45 Hrs

Course Prerequisites: Basic Knowledge of Programming.

Course Objectives:
- To introduce students to the fundamental concepts of systems of linear equations and matrices.
- Enable students to be able to apply mathematical principles to solve real-world problems.

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

CO1: Represent and solve linear systems using matrices and elementary row operations.
CO2: Compute eigenvalues, eigenvectors, and understand their relevance in various problems in Computer Science.
CO3: Use interpolation methods to estimate values between data points.
CO4: Define and work with vector spaces, subspaces, and basis, emphasizing their role in computer graphics and linear algebra applications.
CO5: Compute eigenvalues and eigenvectors of matrices, particularly in the context of data analysis, machine learning, and optimization.

SYLLABUS:

UNIT I: Systems of Linear Equations and Matrices, Linear Combinations and Linear Independence [10 HRS]

Matrices and its representations, Types of Matrices, Matrix Operations, The Inverse of a Square Matrix, Matrix Equations, Elementary Row Operations, Applications of Matrices in Computer Science, Adjoint of matrix and Rank.

Systems of Linear Equations, Applications of Systems of Linear Equations, Linear Combinations and Linear Independence. Linear Dependence and Consistency of Systems.

UNIT II: Vector Spaces, Linear Transformations, Eigenvalues and Eigenvectors [15 HRS]

Definition of a Vector Space, Subspaces, Basis and Dimension, Coordinates and Change of Basis Linear Transformations, The Null Space and Range, Isomorphisms, Matrix Representation of Linear Transformations, Similarity. Eigenvalues and Eigenvectors, Diagonalization.

UNIT III: Interpolation, Numerical Integration, algebraic and transcendental equation [20 HRS]

Introduction; Various methods of interpolation; Various methods of curve fitting; Newton's method of forward interpolation formula; Newton's method of backward interpolation formula. Lagrange's formula.
General quadrature formula; Trapezoidal rule; Simpson's one-third rule; Simpson's three-eighth rule; Weddle's rule.

Graphical method; Bisection method; Method of false position; Secant method; Newton-Raphson method. Linear equations; Characteristics roots and vectors.

REFERENCES:

MANDATORY:

1. Iyengar,S.N.,(2010) Matrices, Anmol Publications.
2. Defranza, J., & Gagliardi, D. (2015). Introduction to Linear Algebra with applications. Waveland Press.
3. Goel,B., & Mittal,S. (1998) Numerical Analysis, Pragati Prakashan,

SUPPLEMENTARY:

1. Chatterjee,P. (1996) Numerical Analysis, RajhansPrakashanMandir.
2. Krishnamurthy,V. (1976) Introduction to Linear Algebra, Affiliated East-West Press.

WEB BASED:

1.https://www.cse.iitb.ac.in
2. https://www.wolframalpha.com/
2. https://www.khanacademy.org/
3. https://web.stanford.edu/class/cs357/

Practicals: Mathematical Foundation of Computer Science
Credit: 1
Marks: 25
Duration: 30 Hrs

Programs using Java language that covers the following concepts:

1. Implementing Matrices
2. Performing Basic Matrix Operations.
3. Performing Elementary Row operations
4. Finding the rank of a matrix.
5. Finding solutions of a system of equations using Matrices.
6. Matrix Representation of Linear Transformations.
7. Finding the Eigenvalues and Eigenvectors.
8. Implementing Newton's forward formula to estimate a value.
9. Implementing Newton's backward formula to estimate a value.
10. Estimate a value using Lagrange's formula.
11. Apply Simpson's three-eighth rule to find the value of integration.
12. Apply Newton-Raphson method OR secant method to estimate the root of a equation

Course Title: Web Development with PHP-MYSQL
Course Code: UG-COM-205
Marks: 75
Credits: 3
Duration: 45 Hrs

Course Prerequisites: Basic Knowledge of HTML and CSS, Programing and Database Management.

Course Objectives:
- To Provide students with a foundational understanding of web development and the role of PHP and MySQL in building dynamic websites.
- Enable students to create dynamic web pages using PHP, including displaying data from a database, processing user input, handling sessions and generating dynamic content.
- Cover user authentication and authorization mechanisms to secure web applications, including user registration and login systems.

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

CO1: Demonstrate a fundamental understanding of PHP, including its syntax and basic principles.
CO2: Conduct CRUD (Create, Read, Update, Delete) operations with PHP and MySQL, involving the retrieval, insertion, updating, and deletion of data.
CO3: Design and build user registration and login systems, applying password hashing and security measures for user authentication.
CO4: Implement security best practices in PHP web development, including input validation and sanitation, to protect against common threats like Cross-Site Scripting (XSS) and SQL injection.

SYLLABUS:

Unit I : Introduction to PHP [15 HRS]
Introduction to PHP- PHP syntax and basics, Setting up a local development environment.
PHP Variables, Data types (integers, strings, arrays), Operators (arithmetic, comparison, logical). Control Structures-Conditional statements (if, else, switch), Loops (for, while, foreach). Functions and Includes - Defining and using functions, Including external files.

Unit II : Database Connectivity with PHP [15 HRS]
MySQL Database Basics - Creating databases and tables, Data types and constraints. Connecting to MySQL - PHP database connections, Error handling for database connections. CRUD Operations with PHP and MySQL - SELECT, INSERT, UPDATE, DELETE operations, Prepared statements for security.

Unit III : Building Dynamic Web Pages using best practices in security [15 HRS]
Form Handling with PHP - Creating HTML forms, Processing form data with PHP. Displaying Database Data - Retrieving and displaying data from the database, Pagination and sorting. User

Authentication - Building user registration and login systems, Password hashing and security. Security and Best Practices - Input validation and sanitation, Cross-site scripting (XSS) and SQL injection prevention.

REFERENCES:

MANDATORY:

1. Larry Ullman. (2018). "PHP and MySQL for Dynamic Web Sites." Peachpit Press.
2. Janet Valade. (2016). "PHP 7 for Dummies." For Dummies.
3. Robin Nixon. (2018). "Learning PHP, MySQL & JavaScript." O'Reilly Media.

SUPPLEMENTARY:

1. Luke Welling and Laura Thomson. (2016). "PHP and MySQL Web Development." Addison-Wesley.
2. Chris Snyder, Michael Southwell, and Tom Myer. (2005). "PHP Security." O'Reilly Media.
3. Bryan Sullivan and Vincent Liu. (2011). "Web Application Security, A Beginner's Guide." McGraw-Hill Education.

WEB BASED:

1. https://www.php.net/
2. https://www.w3schools.com/php/
3. https://phptherightway.com/
4. https://www.tutorialrepublic.com/php-tutorial/php-mysql-crud-application.php
5. https://www.geeksforgeeks.org/how-to-design-username-and-password-using-html-and-php/

Practicals : Web Development with php
Credit : 1
Marks : 25
Duration: 30 Hrs

List of suggested PRACTICALS :

1. Set up a local development environment for PHP web development and configure it.
2. Define and utilize functions in PHP, and incorporate external files into PHP scripts using includes.
3. Establish connections between PHP and MySQL databases and handle potential errors effectively during database interactions.
4. Create HTML forms for user input and develop PHP scripts to handle form submissions securely.
5. Conduct CRUD (Create, Read, Update, Delete) operations with PHP and MySQL, involving the retrieval, insertion, updating, and deletion of data.
6. Implement prepared statements to enhance security and prevent SQL injection vulnerabilities in PHP and MySQL interactions.
7. Design and build user registration and login systems, applying password hashing and security measures for user authentication.

Course Title: Software Engineering
Course Code: UG-COM-206
Marks: 75
Credits: 3
Duration: 45 Hrs

Course Prerequisites: Nil

Course Objectives:
- To understand the various software development methodologies and estimation of software projects.
- To analyze and design software projects.
- To study the various phases of a S/W Development Project.

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

CO1: Understand the various Software Development Methodologies.
CO2: Apply Estimation techniques to live projects.
CO3: Analyze Software Projects.
CO4: Design Software Projects.

SYLLABUS:

UNIT I: [15 HRS]
SOFTWARE PROCESS:
Characteristics of software process.
Software Development Processes and Methodologies: waterfall, prototyping, iterative, spiral, unified process. Benefits of iterative and incremental approach with emphasis on Unified process, CASE Tools, Agile methodologies.

PROJECT MANAGEMENT:
Planning a Software Project – Cost estimation, Project Scheduling, Software configuration management plans, Quality Assurance plans, Project Monitoring plans and Risk Management. Techniques such as Interviewing, Requirement Workshop, brainstorming, prototyping. Characteristics of SRS.

UNIT II: [15 HRS]
OOAD and UML:
OOAD: Definition; object oriented analysis; object oriented design and modeling; Assigning responsibilities.

UML: Main UML diagrams – Class diagram, sequence diagram, activity diagram, use case diagram. Use case model – use case diagram, use case descriptions, use case realization using sequence and activity diagrams. Supplementary requirements. Advanced use case model features.

Requirements: Functional and non-functional
System Design : Class diagram, sequence diagram, activity diagram, state chart diagram, deployment diagram. Brief introduction to other UML diagrams.

SOFTWARE ARCHITECTURE PATTERNS:
Major Architectural Styles (patterns) like Layered Architecture, Pipe and Filter, Shared (Central)Data Store, Event Driven, Model-View-Controller (MVC), "Distributed & Emerging" Service Oriented Architecture (SOA) and Elementary GRASP Patterns.

UNIT III **[15 HRS]**

HUMAN COMPUTER INTERACTION:
HCI Definition; User categories, Interface Design-Internal & External Interface design, user interface design, Interface design guidelines.

CODING:
Coding styles, standards, peer reviews, checklist.

TESTING:
Testing Fundamental, Functional Testing, Structural Testing, Testing Object-Oriented Programs, Testing Process and Metrics.

DOCUMENTATION and MAINTENANCE:
Need for Software Documentation. Types of documentation, Need for Maintenance; Types of Maintenance.

REENGINEERING:
Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, The Economics of Reengineering.

REFERENCES:

MANDATORY:

1. Pressman, R. S. (2005). Software engineering: a practitioner's approach. Palgrave Macmillan.
2. Larman C.,(2015) Applying UML and patterns. Addison Wesley.
3. Bourque, P., & Fairley, R. E. (2014). Guide to the software engineering body of knowledge (SWEBOK (R)): Version 3.0. IEEE Computer Society Press.

SUPPLEMENTARY:

1.Jalote, P. (2012). An integrated approach to software engineering. Springer Science & Business Media.
2. Sommerville I.,(2015) Software Engineering .Adison Wesley.
3. Fowler, M. (2003). UML Distilled: A Brief Guide to the Standard Modelling Object Language. Object Technology Series, 3rd edition, Addison-Wesley.

WEB BASED:
1.https://www.tutorialspoint.com/software_engineering
2.https://www.w3schools.in/sdlc-tutorial
3.https://www.geeksforgeeks.org/software-engineering
4.https://www.javatpoint.com/software-engineering-tutorial

Practicals : Software Engineering
Credit : 1
Marks : 25
Duration: 30 Hrs

List of suggested PRACTICALS :
For a given project/case study
1) Requirements Gathering Techniques [2P]
2) Gantt Chart [2P]
3) USE Case diagram and Use Case descriptions for the Use Cases [3P]
4) Class Diagram [2P]
5) Sequence Diagram [2P]
6) Activity Diagram [2P]
7) State Chart Diagram [2P]

SEMESTER III

MULTIDISCIPLINARY COURSE

Course Title: Fundamentals of Data Analysis
Course Code: UG-COM-MDC5
Marks: 50
Credits: 2
Duration:30 Hrs

Course Prerequisite: Nil

Course Objectives:

- Develop skills to manipulate and analyze data.
- Create data visualizations to communicate insights.

Course outcomes:

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

CLO1: Apply data collection methods and techniques for importing, cleaning, and structuring data in Excel.

CLO2: Demonstrate the ability to create effective data presentations using various graphs, charts, and plots

CLO3: Utilize basic tools for EDA, including summary statistics, and gain an understanding of the philosophy behind EDA

CLO4: Create interactive dashboards and charts for effective data exploration and presentation.

SYLLABUS

UNIT I **[15 HRS]**

Introduction to Data Analysis : Importance of Data Analysis in Various Disciplines, Types of Data (Categorical, Numerical, Text), Data Sources and Collection Methods, Overview of Excel for Data Analysis.

Data Preprocessing and Cleaning : Data Cleaning Techniques, Handling Missing Data, Outlier Detection and Treatment, Data Transformation and Scaling Importing Data into Excel, Data Cleaning in Excel, Data Transformation Techniques, Structuring Data Tables for Analysis.

Probability and Statistics

Probability Distributions (e.g., Normal, Binomial), Descriptive Statistics (Mean, Median, Variance, Standard Deviation), Inferential Statistics (Hypothesis Testing, Confidence Intervals), Populations and samples, statistical modeling, fitting a model.

UNIT II **[15 HRS]**

Exploratory Data Analysis (EDA)

EDA Principles and Objectives, Univariate Analysis, Bivariate Analysis, Multivariate Analysis

Data Visualization

Introduction to Data Visualization : Effective Data Presentation, Graphs, Charts, and Plots, Visualization Libraries (e.g., Matplotlib, Seaborn)

Basic tools(plots, graphs and summary statistics) of Exploratory Data Analysis, Philosophy of EDA , Creating Dashboards and Interactive Charts, Introduction to Data Visualization tools such as power BI or Tableau.

REFERENCES:

MANDATORY:

1. Foster Provost and Tom Fawcett. (2013). "Data Science for Business." O'Reilly Media.

SUPPLEMENTARY:

1. Wes McKinney. (2012). "Python for Data Analysis." O'Reilly Media.
2. Molly Monsey and Paul Sochan. (2017). "Tableau For Dummies." For Dummies.

WEB BASED:

1. https://public.tableau.com/app/discover/viz-of-the-day
2. https://powerbi.microsoft.com/en-us/blog/
3. https://d3js.org/

Practicals: Fundamentals of Data Analysis

Credit: 01

Marks: 25

Duration: 30 Hours

List of practical :

1. **Data Cleaning in excel -** Import a dataset into Excel, Identify missing values and handle them, Detect outliers and decide on an appropriate treatment and Convert data types .
2. **Data Transformation and Structuring:** Normalize numerical data, Create new variables (e.g., calculate a new column based on existing columns), Pivot data to reshape it for analysis, Merge or join datasets using Excel functions.
3. **Descriptive Statistics:** Calculate and interpret measures of central tendency (mean, median) and dispersion (variance, standard deviation) for a dataset, Create summary statistics tables using Excel functions.
4. **Basic Data Visualization:**Create various types of Excel charts (bar, line, pie) for given datasets, Customize chart elements (titles, labels, legends, colors) to improve clarity, Compare and contrast different chart types for effective data presentation.
5. **Exploratory Data Analysis (EDA):** Generate histograms and box plots to visualize data distributions, Create scatter plots to explore relationships between variables, Perform multivariate analysis, such as correlation matrices or heatmaps, to identify patterns.
6. **Advanced Data Visualization:** Develop interactive Excel dashboards with slicers, pivot charts, and dynamic components. Integrate Excel with Power BI and create a simple Power BI report.
7. **Dashboard Development:** Design a data dashboard with multiple charts and slicers, Link interactive elements to update charts dynamically, Present data insights effectively through the dashboard.
8. **Mini Project:** Students can choose a dataset of interest or relevance to their domain, Apply data preprocessing, descriptive and inferential statistics, and data visualization techniques learned in the course, Prepare a report or presentation summarizing their findings and insights.

SKILL ENHANCEMENT COURSE

Course Title: UI/UX Design
Course Code: UG-COM-SEC3
Marks: 50
Credits: 2
Duration:30 Hrs

Course Objectives:

- To study the different aspects of UI/UX Design.
- To study computer interface design concepts.

Course Outcomes:

Upon completion of the course student will be able to:

CO1: Understand the principles of UI/UX design interaction with a computer System.
CO2: Understand the concept of a graphical user interface, and its design characteristics.
CO3: Apply fundamental design principles including typography, color theory, screen design and layouts.
CO4: To create interactive and intuitive user interfaces.

SYLLABUS:

UNIT I: Introduction to UI and UX Design: [15 HRS]

Explain the distinctions between UI and UX design. Understand the significance of UI/UX in digital product development.

Human-Computer Interaction: Importance of user Interface, Human characteristics, Human consideration, Human interaction speeds, Understanding business functions. User centered design, Persona.

Rapid Prototyping: Storyboarding. Paper Prototyping and Mockup, Video Prototyping, Creating and Comparing Alternatives.

Direct Manipulation: Heuristics (guidelines) for design.

Graphical User Interface Design: HCI guidelines, Windows: Navigation schemes selection of window; Selection of devices based and screen-based controls, Components, Text and messages, Icons, Multimedia, Colors., controls, help & error messages design.

UNIT II: Heuristic Evaluation and Visualization [15 HRS]

Web user interface design – Jessy James Garette five layers of user experience. Heuristic Evaluation: Heuristic Evaluation — Why and How?

Visualization, Amount of information, Focus and emphasis, Presentation information simply and meaningfully, Information retrieval on web, Statistical graphics.

REFERENCES:

Mandatory:

1. Cooper, A., Reimann, R., & Dubberly, H. (2003). About face 2.0: The essentials of interaction design. John Wiley & Sons, Inc..
2. Alan.D, Janet.F, Gregory D. and Russell,B. (2012) Human-Computer Interaction, Prentice Hall.D.T,(2018)
3. Web Technologies, Black Book, Dream Tech

Supplementary:

1. Shneiderman, B., & Plaisant, C. (2010). Designing the user interface: strategies for effective human- computer interaction. Pearson Education India.
2. Donald.A.N. (2010) The Design of Everyday Things Basic Books.

WEB BASED:

1. http://hcibib.org/
2. https://www.tutorialspoint.com/human_computer_interface/index.htm.
3. https://www.academia.edu/4955516/Wiley_The_Essential_Guide_to_User_Interface_Design_3rd_Edition_Apr_2007?auto=download.
4. https://www.slideshare.net/busaco/hci-2015-110-humancomputer-interaction-overview?qid=1c116f30-ec87-4eb4-a375-49b2bbe65d75&v=&b=&from_search=2
5. .https://www.w3schools.com
6. https://www.tutorialspoint.com/html/index.htm
7. https://www.tutorialspoint.com/css/index.htm
8. https://www.tutorialspoint.com/javascript/index.htm
9. https://www.tutorialspoint.com/jquery/index.htm
10. https://www.udemy.com/courses/development/web-development/

Practicals: UI/UX Design
Credit : 1
Marks : 25
Duration: 30 Hrs

List of practical

1. Paper Prototyping using templates (1)
2. Persona- conducting contextual interview and developing persona(1)
3. Storyboarding (1)
4. GUI design: Using HTML: (3)
5. Form design, menu design, help, error messages
6. Web UI design: Using CSS: (3)
7. Pages, navigation, controls, Page submission – Asynchronous
8. Report designs: Using Java Script and J Query: (4)
9. Validations
10. Visualization and infographics (1)
11. Heuristic Evaluation (1)
12. A Mini Project combining all the technologies learnt using a front-end development framework such as bootstrap is recommended.

SEMESTER IV

VOCATIONAL COURSE

Course Title: Mobile Application Development
Course Code: UG-COM-VOC-1
Marks: 75
Credits: 3
Duration:45 Hrs

Course Prerequisites: Object Oriented Programming

Course Objective:

- To develop applications for mobile devices, including smartphones and tablets.
- Introduce students to the current mobile platforms and mobile application development environments.
- Design and build a variety of apps on a popular platform throughout the course to reinforce learning and to develop real competency.

Course outcomes:

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

CO1: Explain the key components of Android applications, including activities, services, broadcast receivers, and content providers.
CO2: Analyze the principles of designing user interfaces for Android apps, including the use of XML layouts, views, and event handling.
CO3: Understand data storage options on Android, including SharedPreferences, SQLite databases, and file handling for data persistence.
CO4: Explore multimedia capabilities in Android, such as image handling, audio and video playback, and integration with the device camera.
C05: Deployment of Android Application on Google play store.

SYLLABUS

UNIT I: Introduction to Android Development [15 HRS]

Need of Mobile App, Different Kinds of Mobile Apps, Native vs. web app, Introduction to Android OS and its ecosystem, Comparing and Contrasting architectures of Android, iOS and Windows, Underlying OS(Darwin vs. Linux vs. Windows), Kernel structure and native level programming, Linux Kernel, Libraries, Android Runtime, Application Framework, Dalvik VM
Setting up the Android development environment, Building and running the first Android app

UNIT II: Android Components: [15 HRS]

Activities, Services, Broadcast Receivers, Creating Broadcast receiver, Receiving System Broadcast, Understanding Broadcast action, category and data, Sending Broadcast. Content Providers, Views,

layouts and Common UI components, Creating UI through code and XML, Activity life cycle, Intents-,Intent Filters, Intent-matching rules, Filters in your manifest. Communicating data among Activities. Selection components (Grid View, List View, Spinner), Adapters, Custom Adapters, Menus, Toast, Custom Toast, Dialogs, Status bar Notifications. Overview of services in Android, implementing a Service, Service lifecycle, Inter Process Communication (AIDL Services). Web Services and WebView - Consuming web services, Receiving HTTP Response (XML, JSON), Parsing JSON and XML, Using WebView.

UNIT III: Data Storage: [15 HRS]

Shared Preferences, Android File System, Internal storage, External storage. SQLite- Introducing SQLite, SQLite Open Helper and creating a database, Opening and closing a database, working with cursors, inserts, updates, and deletes.

Content Provider-Accessing built in content providers, Content provider MIME types, searching for content, Adding, changing, and removing content, creating content provider, Working with content files. Consuming RESTful APIs, Integrating Google Maps and location services, Preparing apps for distribution on Google Play.

REFERENCES:

MANDATORY:

1. Lee, W. M. (2010). Beginning iPad application development. John Wiley & Sons.
2. Satya. K, Pro Android 4 ; Dave MacLean (Apress).

SUPPLEMENTARY:

3. Burnette, E. (2009). Hello, Android introducing Google's mobile development platform 2nd.
4. Cinar, O. (2012). Android apps with Eclipse. Apress.
5. Dimarzio, J.F. Android- A Programmer’s Guide (Tata McGraw Hill)

WEB BASED:

1. http://developer.android.com/index.html
2. http://www.appinventor.org/
3. https://developer.android.com/
4. https://developer.android.com/guide/components/
5. https://developer.android.com/guide/topics/data

Practicals: Mobile Application Development
Credit: 1
Marks: 25
Duration: 30 Hrs

1. Installing the Development Environment, Configuring Android Stack.
2. Creating the First Android Application
3. Implement a simple application such as a Calculator using GUI components.
4. Review the earlier application making use of the advanced UI components such as Layouts.
5. Implementing intents
6. Implementing Services
7. Implementing Files and Shared Preferences
8. Implementing Data storage application to perform CRUD operations.
9. Consuming and integrating API's.
10. Deployment of Mini Project on Google play store.

Parvatibai Chowgule College of Arts and Science
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DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS FOR PROGRAMME IN Bachelor of Vocation (B. Voc.) in Software Development

(Implemented from the Academic Year 2023-2024 onwards)

B. Voc. in Software Development

Skill Development Qualification Pack - Application Developer - Web & Mobile (SSC/Q8403)

Syllabus (Semester – III)

Course Title : Object Oriented Programming
Course Code : CSD-SK7
Credits : 3
Marks : 75
Duration: 45 hrs

Prerequisite : Basic Understanding of Programming

Course Objectives:

- To learn the basic concepts and techniques of object oriented programming paradigm
- To introduce object oriented programming (OOP) using Java.

Course Learning Outcomes:
On successful completion of this course students will be able to:

CLO1 : Explain the benefits of object oriented design and understand when it is an appropriate methodology to use.
CLO2 : Differentiate between the top-down and bottom-up approach.
CLO3: Develop problem-solving and programming skills using the OOP concept.
CLO4 : Apply the concepts of object-oriented programming using Java.
CLO5: Design object oriented solutions for small systems involving multiple objects.
CLO6: Develop GUI for an application.

Syllabus:

Unit 1 **[15hrs]**

Principles of OOP

Programming Paradigms, Basic concepts, OOP: major principles - encapsulation, abstraction, inheritance, polymorphism. Benefits of OOP, Applications of OOP

Introduction to Java

Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, java.Math class, Arrays in java.

UNIT 2 **[15hrs]**

Objects and Classes

Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.

Inheritance and Polymorphism.

Inheritance in java, super and sub class, Overriding, java.lang.Object class, Polymorphism, Dynamic binding, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, java.util package.

UNIT 3 **[15hrs]**

Event driven and GUI programming

Windows and Layout Manipulation, Dialogs (Message, confirmation, input), Event Handling: Event sources, Listeners, Mouse and Keyboard Event Handling.

Exception Handling

Exception handling – what and why? Try and catch block. Multiple catch blocks. Nested try, finally block, throw keyword, throws keyword. Custom Exception.

Multithreading

Running and starting thread using Thread class. Thread priorities. Running multiple threads. The Runnable interface.Synchronization and inter thread communication.

REFERENCE

Mandatory Reading:

1. Matha, M. P. (2011). *Core Java: a comprehensive study*. PHI Learning.

Supplementary Reading:

1. Balaguruswamy, E. (2014). *Programming with Java-A Primer*. McGraw-Hill Professionals.

Web References:

1. www.tutorialspoint.com/java/index.htm
2. https://www.w3schools.com/java/java_intro.asp
3. https://www.geeksforgeeks.org/java/

Practical: Object Oriented Programming
Credit: 3
Duration: 45 hrs
Marks: 75

Programs using Java language that covers the following concepts:

1. Classes and instances (2P)
2. Working with the java.Math class (1P)
3. Inheritance (1P)
4. Polymorphism, abstract classes and interfaces (2P)
5. Utilising the java.util package (1P)
6. Collections framework (2P)
7. Event handling and GUI (2P)
8. Exception handling (2P)
9. Mini Project (2P)

****

Course Title: Computer Networks
Course Code: CSD-SK8
Marks: 75
Credits: 3
Duration: 45 hrs

Prerequisite Courses: Nil

Course Objectives:

- Gain Knowledge of the Reference models
- Understand basic concepts of data transmission medium, Compare various routing, transport protocols and Identify suitable protocol for a given network.

Course Learning Outcomes:
On successful completion of this course students will be able to:

CLO1: Select the most appropriate networking architecture and technologies for the given organization structure.
CLO2: Compare and contrast the layers in OSI model and TCP/IP.
CLO3: Explain the functionalities provided by each layer in the OSI model.
CLO4: Define the concept used for error handling in Datalink layer Develop client server programs for different applications.
CLO6: Design basic computer network

Syllabus

Unit 1 **[15hrs]**

Introduction and Data Link Layer

Basics of Computer Networks, Classification: transmission technology, scale; Applications; Data Communications: data, signal, bandwidth, bit interval and bit rate, Modes of Communication. Layered network architecture, Networks models: OSI model, TCP / IP protocol suite; Guided and Unguided Transmission media, Multiplexing: FDM, TDM. Switching: Circuit switching, message switching, Packet Switching. Data link control: Framing: Character Count, Character Stuffing, Bit Stuffing , Error Detection and correction, Flow and error control, HDLC; Multiple access: Random access – Controlled access , ALOHA, CSMA, CSMA/CD and CSMA/CA; Ethernet : IEEE standards, standard Ethernet, Fast Ethernet, Gigabit Ethernet; Connecting devices: repeater/hub, bridge, router and gateway, Backbone networks - Virtual LANS.

Unit 2 **[15 hrs]**

Network Layer

Functions of Network layer; Network Service types: Virtual Circuits, Datagrams; Logical addressing: IPv4, private and public IP addressing, special IP addresses, subnetting, IPV6 addressing Internet Protocol: Internetworking:IPv4, Fragmentation and reassembly , Address mapping : ARP, RARP, BOOTP, DHCP, ICMP . Routing: classification of routing, Shortest path routing, Distance Vector routing, Link State routing 4. Transport layer and Application layer

Unit 3 **[15 hrs]**

Transport and Application Layer

Process-to-Process delivery: User Datagram Protocol (UDP), Transmission Control Protocol(TCP), Quality of services (QoS); Application Layer: Domain Name System (DNS), E-mail, FTP, HTTP.5. Wireless Networks

REFERENCE

Mandatory Reading:

1. Andrew T, David J (2013). *Computer Networks* (5th ed.). India, Prentice-Hall,

Supplementary Reading:

1. Behrouz A (2011), *Data communication and Networking* (4th ed.). Amarica McGraw Hill Education.
2. James F, Keith R (2009). *Computer Networking - A Top-Down Approach Featuring the Internet* (5th ed.). Amarica, Pearson Education

Web References:

1. https://www.javatpoint.com/computer-network-tutorial
2. https://www.geeksforgeeks.org/computer-network-tutorials/
3. https://www.studytonight.com/computer-networks/
4. https://www.softwaretestinghelp.com/computer-networking-basics/

Practical: Computer Networks
Credits: 3
Duration: 45 hrs
Marks: 25

List of Practicals

1. Installing virtual machines, Ethernet cabling [1P]
2. Study of network commands ping, ipconfig, netstat, traceroute [1P]
3. Setting up of LAN Network [1P]
4. IP address manipulation -Extract network id and Host id given netmask [1P]
5. Mini Project / Packet capture tool/ packet generator tool [1P]
6. UDP Socket programming (c/c++/Java/ Perl/Python) [1P]
7. TCP Socket programming [1P]
8. Configuring routing tables [1P]
9. Configuring DHCP server/client [1P]
10. Configuring Telnet/SSH and ftp server. [1P]
11. Firewall Configuring [2P]
12. Write(C / C++/ Java / Perl / Python) program to implement Bit and Byte stuffing. [3p]

****

Course Title: Server Side programming
Course Code: CSD-SK9
Credits: 03
Marks: 75
Duration: 45hrs

Course Prerequisite: Object Oriented Programming

Course Objectives:

- Provide an in depth understanding of a server side language, and use it to develop applications
- Design and implement basic server-side scripts.
- Create responsive and interactive web applications using frameworks

Course Learning Outcomes:
On successful completion of this course students will be able to:

CLO1: Explain the core features and functionalities of PHP
CLO2: Design interactive web application using core PHP
CLO3: Develop basic server side script to interact with users and the database
CLO4: Build a web application using laravel framework
CLO5: Utilize MVC model

Syllabus

Unit 1 **[15hrs]**

Static vs. Dynamic web pages, Need for Server Side technologies, Multi Tier Web Architecture, file architecture of a web server, Variable Types, Constants, Decision Making-If...Else, ElseIf, Loop Types - For, while, do while, foreach, Array, string, functions, Object Oriented Concepts - Class, Object, member variable, member function, Inheritance, Polymorphism, overloading, Data Abstraction, Encapsulation. Constructor, Destructor.

Unit 2 **[15hrs]**

Use of PHP Tags, Tag Styles, Calling Functions, include, Processing GET and POST request, uploading files to server, cookies, sessions, Difference between MySQLi and PDO, database connection using PDO, CRUD - Create, Read, Update, Delete, records in database, pagination, login, difference between XML and AJAX, defining AJAX array, parse AJAX using JQuery, AJAX request, AJAX response.

Unit 3 **[15hrs]**

Introduction to Laravel, Routing in Laravel, MVC in Laravel, Caching in Laravel, Event subscribers in Laravel, Package Development, Templates, Creating an Application, Testing in Laravel, Database Configuration, Helpers in Laravel, Laravel Pagination, Laravel Security, Authentication Facade, Validation in Laravel, Eloquent ORM, Artisan Command Line Interface, Deploy Application using Laravel.

REFERENCE

Mandatory Reading:

1. Leon A, Zee S(2004), *Core PHP Programming* (3rd ed.).Prentice Hall Professional

2. Stauffer, M. (2019). *Laravel: Up & Running: A Framework for Building Modern PHP Apps*. O'Reilly Media.

Supplementary Reading:

1. Williams, H. E., & Lane, D. (2004). *Web Database Applications with PHP and MySQL: Building Effective Database-Driven Web Sites*. O'Reilly Media, Inc.
2. Brinzarea, B., & Hendrix, A. (2009). *Ajax and PHP: Building modern Web applications*. Packt Publishing Ltd.

Web References:

1. https://www.w3schools.com/php/
2. https://www.tutorialspoint.com/php/index.htm
3. https://laravel.com/docs/6.x
4. https://www.tutorialspoint.com/laravel/index.htm

Practical :Server Side programming
Marks: 75
Duration: 45hrs
Credits: 03

1. PHP Classes and instances,PHP Controls Structures [1P]
2. PHP Array Programming, Inheritance [1P]
3. CRUD using PHP database API's. [3P]
    a. Fetch data from a form, validate and insert in the database.
    b. Delete data in the database.
    c. Update data in the database
    d. Display data from the database.
4. Uploading files and session management. [1P]
5. Implementing MVC [2P]
6. Migrations in Laravel [1P]
7. Using Forms and Gathering Input in Laravel [1P]
8. Creating a registration & user login form in Larvael [1P]
9. Using Controllers and Routes for URLs and APIs in Laravel [1P]
10. Eloquent ORM in Laravel [1P]
11. Creating and Using Composer Packages [1P]
12. Security and Session [1P]

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Course Title: Reasoning Techniques
Course Code: SD-G20
Credits: **4**
Marks: 100
Duration: 60 Hours

Prerequisite Courses : NIL

Course Objective

- To build logical and reasoning aptitude is essential requirement in understanding various concepts and to solve problems effectively.

Course Learning Outcomes:
On successful completion of the course the students will

CLO1 :Create, solve and interpret basic data and logical models.

CLO2 :Make sound arguments based on reasoning and/or careful analysis of data.

CLO3 :Exhibit critical thinking by developing and expressing sound arguments from given premises to related conclusions

CLO4 : Effectively communicate the substance and meaning of logical problems and their solutions.

Syllabus:

Unit 1 **[15 hrs]**

Logic, Statements, Arguments, and Assumptions, Statements and Course of Action, Logical Venn Diagrams, Statements and Conclusions, Syllogism

Unit 2 **[15 hrs]**

Seating Arrangement, Ranking & Time Sequence Test, Blood Relations, Direction Sense Test, Conditions & Grouping, Simple & Coded Inequality, Decision Making, Clocks and Calendar, Situation Reaction Test

Unit 3 **[15 hrs]**

Decision-making, Judgment, Problem-solving, Analogies, Analysis, Differences, Discrimination Arithmetic series, Similarities, Verbal & figure classification, Space visualization, Observation Simple Problems on Data interpretation and Data sufficiency

Unit 4 **[15 hrs]**

Mathematical Logic: Introduction, Statements, Logical Connectives and Compound Statements: Negation, Conjunction, Disjunction, Implication, Converse and Inverse, logical Equivalence, Tautologies: Contradiction, Contingency, Algebra of Propositions, Argument, Predicate and Quantifiers.

REFERENCES

Mandatory Reading:

1. Arun Sharma, How to Prepare for Logical Reasoning for the CAT, 8th edition**,** McGraw Hill Education (India) Private Ltd.
2. A.K. Gupta, Logical and Analytical Reasoning, Ramesh Publishing House; 34th edition

3. Peeyush Bhardwaj, Analytical & Logical Reasoning for CAT & Other Management Entrance Tests, Arihant Publications; 4th edition
4. Rosen H. Kenneth, Discrete Mathematics and its Applications, Tata McGraw Hill, 7th edition

Supplementary Reading:

1. Ananta Ashisha, Data Interpretation & Data Sufficiency, Arihant Publications; Third edition
2. MK Pandey, Magical Book Series - Analytical Reasoning, BSC Publishing Co. Pvt. Ltd., 2017
3. Daniel kahneman, thinking fast and slow, Farrar, Straus and Giroux; Reprint edition
4. Dr. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, 2018, S. Chand Publication

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Course Title: Personality Development
Course Code: SD-G13
Credits: 4
Marks: 100
Duration: 60 Hours

Course Objectives:

- To understand the scope of personality and its development.
- To develop core skills for development of self.
- To cultivate interpersonal skills for a successful life.

Course Learning Outcomes:
On successful completion of the course the students will

CLO1 : Be able to make SWOT analysis, find causes of failure

CLO2 : Importance of self- motivation and Factors leading to demotivation

CLO3 : Do's and Don'ts to develop positive self-esteem, Low self-esteem, Managing diversity, Effective communication

CLO4 : Team work, Good manners and etiquette. Resume building, The art of participating in Group Discussion

Syllabus:

Unit 1 **[12 Hrs]**

Introduction to Personality Development

The concept of personality - Dimensions of personality – Five Factor Model- Theories of Freud and Erikson-Significance of personality development. The concept of success and failure: Success-Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis.

UNIT 2 **[12 Hrs]**

Attitude and Motivation

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Differences between personalities having positive and negative attitude. Concept of motivation - Significance – Internal and external motives - Importance of self- motivation- Factors leading to demotivation

Unit 3 **[12Hrs]**

Self-esteem

Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self - esteem - Positive and negative self - esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours – Lateral thinking.

UNIT 4 **[8 Hrs]**

Interpersonal Skills

-Hard Skills and Soft Skills. Effective Communication - Need or importance of effective communication -6 C's of effective communication: Managing Diversity.

UNIT 5 **[8 Hrs]**

Other Aspects of Personality Development

Body language - Problem-solving - Conflict and Stress Management – Decision making skills - Leadership and qualities of a successful leader – Character building -Team-work – Time management - Work ethics –Good manners and etiquette.

UNIT 6 **[8Hrs]**

Employability Quotient

Resume building- The art of participating in Group Discussion – Facing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

REFERENCES

Mandatory Reading:

1. Hurlock, E.B. Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall

Supplementary Reading:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill
2. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing,
3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing
4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill.
5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company.
6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House.
7. Smith, B . Body Language. Delhi: Rohan Book Company

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Course Title: Mathematical Foundation of Computer Science
Course Code: SD-G21
Credits: 2
Marks:50
Duration : 30

Prerequisite Courses : NIL

Course Objectives:

- To build mathematical foundations that are essential requirement in understanding various concepts related to computer science.

Course Learning Outcomes:

CLO1: Gain knowledge in Propositions through the use of Logics.
CLO2: Demonstrate an understanding of relations and functions and determine their properties.
CLO3: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
CLO4: Write an argument using logical notation and determine if the argument is valid or not.

Syllabus:

Unit 1: **[15 Hrs]**

Binary Numerical Systems, Matrix Operations and Basic Sets

1. Binary Number Systems:

Introduction to Boolean Number System, Decimal to binary conversion and vice versa, binary number representation (signed, 1's Complement and 2's Complement), binary addition and subtraction, binary to octal, hexadecimal conversion and vice versa, floating point representation.

2. Linear Algebra:

Introduction to Matrices and Linear Algebra, Adjacent, Inverse of a Matrix, Rank, Linear Equations, Characteristics roots and vertices.

3. Basics of Sets, Relations and Functions:

Introductions to sets, relations and functions, Venn diagram, set operations, relations and properties, closures, equivalence relations, partial ordering, function types, inverse of functions, composition of functions, recursive functions, growth functions.

Unit 2: **[15 Hrs]**

Boolean Systems and Operations

1. Boolean Algebra:

Introduction to Boolean Algebra, boolean functions, truth table, DeMorgan's theorem, logic gates, realization of boolean functions using logic gates, simplification using Karnaugh map.

2. Logic:

What is logic, propositional logic, first order logic, mathematical induction, deduction, proof by contradiction, program correctness.

REFERENCES

Mandatory Reading:

1. Rosen H. Kenneth, Discrete Mathematics and its Applications, Tata McGraw Hill, Seventh Edition, 2011.

Supplementary Reading:

1. Sarkar Kumar Swapan, A Textbook of Discrete Mathematics, S Chand & Company, 2005.

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B. Voc. in Software Development

Skill Development Qualification Pack - Application Developer - Web & Mobile (SSC/Q8403)

Syllabus (Semester – IV)

Course Title: Web Development Framework
Course Code:CSD-SK10
Marks: 75
Credits: 03
Duration: 45 hrs

Prerequisite Course:

- Web Design
- Object Oriented Paradigm
- Database Management System

Course Objective:-

- Use Web Frameworks and Libraries to develop interactive web applications.

Course Learning Outcomes:
On completion of the course student will be able to

CLO1: Use ReactJS to build rich and interactive front end applications.
CLO2: Use NodeJS to develop back end application to accept POST, GET, PUT, DELETE requests.
CLO3: Develop REST API's using NodeJS.
CLO4: Write non-blocking and blocking JavaScript code.
CLO5: Explain Framework and Libraries with respect Web Development.

Syllabus

Unit 1 **[15hrs]**

ReactJS

History of front end libraries, Motivation for using React, Thinking in React, One way binding, JSX + CSS modules, Virtual DOM, ES6

ReactJS:components

Component lifecycle, Component API, Render functions, State, Props, Mixins

Unit 2 **[15hrs]**

ReactJS:Interaction between components

Passing data from parent to child, Passing data from child to parent, Passing data between 2 components at the same level, Forms, Refs, React-Router, API integration

NodeJS: Introduction

Brief overview on the benefits of using Node.js and how Node.js is used in modern web development, Node and NPM, Introduction to setting up a Node.js project, Importing modules using npm, Using core modules to make HTTP requests and manipulate the file system.

Unit 3 **[15hrs]**

NodeJS: Express framework

Set up a web server, Implementing API routing, Implementing middle-ware, Implementing URL parameters.

NodeJS: MySQL module

Settings up a database and connecting it to a NodeJS server, Storing and retrieving data from the database.

REFERENCES

Mandatory Reading:

1. Brett McLaughlin (2011). *What Is Node ?* (1st ed) O'Reilly Media
2. Alex Banks (2017). *Learning React. (1st ed)* Shroff/O'Reilly

Reference Books:

1. Mario Casciaro (2016). Node.js Design Patterns (2nd ed) Packt Publishing Limited

Web References:

1. https://www.tutorialspoint.com/nodejs/index.htm
2. https://reactjs.org/docs/getting-started.html
3. https://www.youtube.com/watch?v=Ke90Tje7VS0

Practical: Web Development Framework
Marks: 75
Duration: 45hrs
Credits: 03

1. Creating a simple web server. (1P)
2. Connect to MySQL database. (1P)
3. CRUD using MySQL database API's. (4P)
    a. Fetch data from a form, validate and insert in the database.
    b. Delete data in the database.
    c. Update data in the database
    d. Display data from the database.
4. Uploading files. (1P)
5. Login functionality using sessions. (1P)
6. Using cookies to store website data. (1P)
7. Mini project. (3P)

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Course Title : Software Engineering
Course Code : CSD-SK11
Marks : 75
Credits : 3
Duration: 45hrs

Prerequisite Courses: NIL

Course Objectives:

- To Understand the various software development methodologies and estimation of software projects
- To analyze and design software projects
- To study the various phases of a S/W Development Project.

Course Learning Outcomes:
On successful completion of this course students will be able to:

CLO1 :Understand the various Software Development Methodologies
CLO2: Apply Estimation techniques to live projects
CLO3: Analyze Software Projects.
CLO4: Design Software Projects.

Syllabus:

Unit 1 **[15hrs]**

SOFTWARE PROCESS:

Characteristics of software process, Software Development Processes and Methodologies: waterfall, prototyping, iterative, spiral, unified process, Benefits of iterative and incremental approach with emphasis on Unified process, CASE Tools,Agile methodologies.

PROJECT MANAGEMENT:

Planning a Software Project Cost estimation, Project Scheduling, Software configuration, management plans, Quality Assurance plans, Project Monitoring plans and Risk Management. Techniques such as Interviewing , Requirement Workshop, brainstorming, prototyping. Characteristics of SRS

Unit 2 **[15hrs]**

OOAD and UML:

OOAD: Definition; object oriented analysis; object oriented design and modeling; Assigning responsibilities. UML: Main UML diagrams Class diagram , sequence diagram, activity diagram, use case diagram. Use case model use case diagram , use case descriptions, use case realization using sequence and activity diagrams. Supplementary requirements. Advanced use case model features. Requirements: Functional and non-functional System Design : Class diagram, sequence diagram, activity diagram, state chart diagram, deployment diagram. Brief introduction to other UML diagrams.

SOFTWARE ARCHITECTURE PATTERNS:

Major Architectural Styles (patterns) like Layered Architecture, Pipe and Filter, Shared (Central), Data Store, Event Driven, Model-View-Controller (MVC), Distributed & Emerging Service Oriented Architecture (SOA) and Elementary GRASP Patterns.

Unit 3 **[15hrs]**

HUMAN COMPUTER INTERACTION:

HCI Definition; User categories, Interface Design-Internal & External Interface design, user interface design, Interface design guidelines.

CODING:

Coding styles, standards, peer reviews, checklist.

TESTING:

Testing Fundamental, Functional Testing, Structural Testing, Testing Object-Oriented Programs, Testing Process and Metrics.

DOCUMENTATION and MAINTENANCE:

Need for Software Documentation. Types of documentation, Need for Maintenance; Types of Maintenance

RE ENGINEERING:

Business Process Re engineering, Software Re engineering, Reverse Engineering, Restructuring, Forward Engineering, The Economics of Re engineering

References:

Mandatory

1. Pressman R.S., (2017). *Software Engineering: A Practitioner's Approach*, 6th edition:McGrawHill
2. Larman C.,(2015). *Applying UML and patterns*, 3rd Edition: Addison Wesley

Supplementary

1. Jalote P., (2010) *An Integrated Approach to Software Engineering*, 3rd Edition :Narosa Publishing House
2. Sommerville I.,(2015) *Software Engineering*, 10th Edition:Adison Wesley
3. Fowler M., (2003) *UML Distilled*, 3rd Edition:Addison Wesley

Web References:

1. https://www.tutorialspoint.com/software_engineering
2. https://www.w3schools.in/sdlc-tutorial
3. https://www.geeksforgeeks.org/software-engineering
4. https://www.javatpoint.com/software-engineering-tutorial

Practical : Software Engineering
Credit : 3
Duration: 45hrs
Marks : 75

List of suggested PRACTICALS :

For a given project/case study

1) Requirements Gathering Techniques (2P)
2) Gantt Chart (2P)
3) USE Case diagram and Use Case descriptions for the Use Cases (3P)
4) Class Diagram (2P)
5) Sequence Diagram (2P)
6) Activity Diagram (2P)
7) State Chart Diagram (2P)

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Course Title: Mobile Application Development
Course Code: CSD-SK12
Credits: 3
Marks: 75
Duration : 45 Hours

Prerequisite Courses : Object Oriented Programming using Java

Course Objective:

- To develop applications for mobile devices, including smartphones and tablets, introduced to the current mobile platforms, mobile application development environments and mobile device input methods.

Course Learning Outcomes :
On successful completion of this course students will be able to:

CLO1: Define mobile platforms and their architectures.
CLO2: Compare development for different mobile platforms.
CLO3: Demonstrate the use of Android Components.
CLO4: Develop Mobile applications for Android Platform.
CLO5: Make use of SQLite database.
CLO6: Test Mobile applications for Android Platform.

Syllabus:

Unit 1 **[15hrs]**

Introduction to mobile devices
Mobile devices vs. desktop devices, Why we Need Mobile App, Different Kinds of Mobile Apps, ARM and intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment : App Store, Google Play, Windows Store, Native vs. web applications.

Android Overview
Introduction to Android.Overview of android stack, Introduction to OS layers, Android features. Linux Kernel, Libraries, Android Runtime, Application Framework, Dalvik VM

Mobile OS Architectures
Comparing and Contrasting architectures of Android, iOS and Windows, Underlying OS (Darwin vs. Linux vs. Windows), Kernel structure and native level programming, Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management, Security.

Android Components
Activities, Services, Broadcast Receivers ,Content Providers.

Unit 2 **[15hrs]**

Building UI with Activities
Activities, Views, layouts and Common UI components, Creating UI through code and XML, Activity life cycle, Intents, Communicating data among Activities.

Advanced UI
Selection components (GridView, ListView, Spinner), Adapters, Custom Adapters, Menus, Toast, Custom Toast,Dialogs, Status bar Notifications.

Intent Filters and Broadcast Receivers

Role of filters, Intent-matching rules, Filters in yor manifest, Filters in dynamic Broadcast Receivers, Creating Broadcast receiver, Receiving System Broadcast, Understanding Broadcast action, category and data, Sending Broadcast.

Unit 3 **[15hrs]**

Data Storage

Shared Preferences, Android File System, Internal storage, External storage. SQLite Introducing SQLite, SQLiteOpenHelper and creating a database, Opening and closing a database, Working with cursors, inserts, updates, and deletes

Services

Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication (AIDL Services). Web Services and WebView - Consuming web services, Receiving HTTP Response (XML, JSON), Parsing JSON and XML, Using WebView,

Firebase

Introduction to Firebase and cloud messaging, real time database, authentication.

References

Mandatory Readings:

1. Lee, W. M. (2012). *Beginning android 4 application Development*. John Wiley & Sons.

Supplementary Reading:

2. 1.Burnette, E. (2009). *Hello, Android introducing Google's mobile development platform 2nd*.

Web References:

1. http://developer.android.com
2. https://www.tutorialspoint.com/android/index.htm
3. https://abhiandroid.com/

Practical: Mobile Application Development
Credit: 3
Duration: 45hrs
Marks: 75

List of practicals

1. Getting Started with Android (1P)
2. Creating a basic Android Application (2P)
3. Making use of GUI components (2P)
4. Making use of advanced UI components. (1P)
5. Implementing Data storage application (2P)
6. Implementing Services/Multithreading/Multiprocessing (2P)
7. Firebase (2P)
8. Mini project (3P)

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Course Title: E-Commerce
Course Code: SD-G17
Marks: 100
Credits: 4
Duration : 60 hours

Course Objectives:

- This course aims to study the working of E-Commerce websites and the various background processes involved. As part of the course the student will study the activities associated with ecommerce like buying, selling and payment, understand the various technologies used in ecommerce websites and security mechanisms involved in e-commerce websites.

Course Learning Outcomes:
At the end of the course students will be able to :

CLO1: Understand various E-Commerce Strategies.
CLO2: Understand the Working of an E-Commerce Website.
CLO3: Evaluate the various Payment Mechanisms.

Syllabus

Unit 1 **[15 hrs]**

Introduction to Electronic E-Commerce [4Hrs]
The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, Electronic Commerce in Perspective.

The Value Chain [5Hrs]
Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains.

Competitive Advantage [6Hrs]
Competitive Advantage, Porter's Model, First Mover Advantage, Sustainable Competitive, Competitive Advantage using e-commerce

Unit 2 **[15 hrs]**

Business Strategy [8Hrs]
Introduction to Business Strategy: Michael Porter's 5 force analysis, Strategic Implications of IT, Technology, Business Environment, Business Capability, Existing Business Strategy, Strategy Formulation and Implementation Planning, e-Commerce Implementation - technical and business e-Commerce Evaluation, Auction methods.

Electronic Data Interchange [7Hrs]
EDI Definition, EDI Technology, EDI Standards, EDI Communications

Unit 3 **[16 hrs]**

Electronic Payment System [10Hrs]
Overview of the electronic payment technology; limitations of traditional payment instruments. Electronic or Digital Cash-Properties of Electronic Cash, Digital Cash in action. Electronic Checks-benefits of electronic checks, electronic checks in action, Online Credit Card-Based Systems-types of credit card payments, Secure Electronic Transactions (SET). Other Emerging Financial Instruments: POS (Point of Sale), E-Cash, Net Banking, Credit/Debit Cards and Electronic Benefits and Security Issues. Case Studies of the various modes of electronic payment of various types of websites.

E-Business [6Hrs]
EDI Application in business, E- Commerce Law, Forms of Agreement, Govt policies and Agenda. Case Study of Internet bookshops, Grocery supplies, software supplies and support, electronic

newspapers, Internet banking, Virtual auctions, online, share dealing. Business to Legal issues: Risks involved; Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.

Unit 4 **[10 hrs]**

Firewall and Internet Security [8Hrs]

Firewalls and Network Security: Types of firewalls, Firewall Security Policies, Emerging Firewall Management Issues. Transaction Security: Types of Online Transactions, Requirements for Transaction Security. Encryption and Transaction Security: Secret-Key encryption, Public-Key Encryption , Implementation and Management Issues. Digital Certificate. Security Threats to E Commerce, Virtual Organization, Business Transactions on Web.

Consumer E-Commerce [3Hrs]

Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.

M-Commerce [3Hrs]

Basic concept and applications, difference with E-Commerce, benefits of integration with ERPs.

References

Mandatory Readings:

1. E-COMMERCE Strategy, Technologies and Applications by David Whiteley; TataMcGrawHill.
2. Electronic Commerce A Manager's Guide by Ravi Kalakota and Andrew B. Whinston. Published by Pearson Education.

Supplementary Reading:

1. E-Commerce The Cutting Edge of Business by Kamlesh K Bajaj and Debjani Nag. Second Edition; Tata McGraw Hill.

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Course Title: Creative Thinking
Course Code: SD-G22
Credits: 2
Marks:50
Duration: 30

Prerequisite Courses : NIL

Course Objective

- This is a course on study of creative/lateral thinking and problem solving techniques those are essential to solve real world problems. Causal, deductive, and inductive arguments are described as well as the use of persuasion.

Course Learning Outcomes:
Upon completion of this course, students should be able to

CLO1: Identify the benefits of employing creative/lateral-thinking processes.

CLO2: Apply creative/lateral-thinking and problem-solving theories to real-world problems.

CLO3: Develop strategies to overcome the barriers that inhibit creative thinking.

CLO4: Identify strategies for creating an organizational culture that embraces and sustains creative-thinking practices

CLO5: Identify strategies to solve complex problems in a collaborative way.

CLO6: Apply creative/lateral-thinking principles to develop persuasive arguments that employ legal, moral, and aesthetic reasoning.

Syllabus

Unit 1 **[15 hrs]**

The way the mind works, Difference between lateral and vertical thinking, Attitudes towards lateral thinking, Basic nature of lateral thinking, The use of lateral thinking techniques, The generation of alternatives, Challenging assumptions, Innovation, Suspended judgement Design, Dominant ideas and crucial factors

Unit 2 **[15 hrs]**

Fractionation, The reversal method, Brainstorming Analogies, Choice of entry point and attention area, Random stimulation Concepts/divisions/polarization, The new word problem, Blocked by openness, Description/problem solving/design

REFERENCES

Mandatory Reading:

1. Edward De Bono, Lateral Thinking: Creativity Step by Step, Harper Perennial; Reissue edition (24 February 2015)
2. Ken Watanabe, Problem Solving 101: A simple book for smart people, Vermilion

Supplementary Reading:

1. R G Chaudhari, Training Techniques of Creative Problem Solving: Trainers Manual, Notion Press, Inc.; 1st edition

2. Mahon N, Basics Advertising 03: Ideation, AVA Publishing (October 26, 2011)
3. Brian Tracy, Creativity & Problem Solving: The Brian Tracy Success Library, Manjul Publishing House
4. Michael Sloan, The Art Of Problem Solving 101: Improve Your Critical Thinking And Decision Making Skills And Learn How To Solve Problems Creatively, Make Profits Easy LLC
5. Ruggiero, V. R., The art of thinking: A guide to critical and creative thought (11th ed.), Longman (2015).
6. Proctor, T., Creative Problem Solving for Managers: Developing Skills for Decision Making and Innovation, Routledge, 4th edition

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Course Title: Advanced Quantitative Techniques
Course Code: SD-G23
Credits: 4
Marks: 100
Duration: 60

Prerequisite Courses: NIL

Course Objective

- To build a mathematical foundation is an essential requirement in understanding various concepts.
- To understand appropriate statistical techniques for grouping, displaying, analyzing and interpreting statistical data

Course Learning Outcomes:
On successful completion of the course, the students will be able to

CLO1: Understand the basic principles of sets and operations in sets.

CLO2: Apply counting principles to determine probabilities.

CLO3: Demonstrate an understanding of matrices and determinants

CLO4: Apply basic statistical concepts & techniques for quantification of data.

CLO5: Independently calculate basic statistical parameters (measures of central tendency and dispersion, correlation and regression coefficients, indexes)

CLO6: Interpret the meaning of the calculated statistical indicators based on the acquired knowledge

Syllabus

Unit 1 **[15 Hrs]**

Set, Relation, and Functions

SETS: Sets, Subsets, Equal Sets, Universal Sets, Finite and Infinite Sets, Operation of Sets, Union, Intersection and Complement of sets, Cartesian product, Cardinality of Sets, Simple Applications.

RELATION: Properties of Relation, Equivalence Relation

FUNCTIONS: Domain and Range, Onto , Into and One-to One- Functions, Composite and Inverse functions, Hashing functions and Recursive Functions, growth of functions

Unit 2 **[15 Hrs]**

Counting Principles

Permutations; Combinations; Counting; Probability Summation; Basics of recurrence relations

Matrices and Determinants

Definition, Minors, Cofactors, Properties of Determinants MATRICES: Definition, Types of matrices, Multiplication of matrices, Adjoint, Inverse, Cramer's Rule, Rank of matrix, Dependence of vectors, Eigenvectors of a matrix

Unit 3 **[15 Hrs]**

Statistical Sampling and Central Tendency

Collection, classification, tabulation and presentation of data; the concept and methods of sampling, sample types Measures of central tendency - mean, median, mode, quartiles, deciles and percentiles and their applications in data analyses

Unit 4 **[15 Hrs]**

Measures of Dispersion and Relation

Measures of Dispersion- Range - Quartile Deviation – Mean Deviation - Standard Deviation. Coefficient of Variation Meaning and use of correlation – Types of correlation-Karl Pearson's correlation coefficient – Spearman's Rank correlation. Calculation of Correlation; Regression analysis, comparison between correlation and Regression – Regression Equations, Interpretation of Regression Co-efficients

Note: *It is recommended to use excel/spreadsheets for Unit4 and Unit5*

REFERENCES

Mandatory Reading:

1. Rosen H. Kenneth, Discrete Mathematics and its Applications, Tata McGraw Hill, 7th edition
2. Gupta. S. C. Fundamental of Statistics, Himalaya Publishing House, Mumbai, 6th edition
3. Kolman, Busby, Ross, Discrete Mathematical structures, Pearson

Supplementary Reading:

1. Sarkar Kumar Swapan, A Textbook of Discrete Mathematics, S Chand & Company, 2005.
2. J.K. Sharma, Discrete Mathematics, Macmillan India Ltd., Second Edition – 2005
3. Spiegel. M. R. and Stephens. J. L., Shaum's Outlines Statistics, Tata McGraw-Hill, India, 2011
4. Sanchetti D.C and Kapoor V.K .Statistics - Theory, Methods and Application, Sultan Chand & Sons , New Delhi, 7th edition, 2010.

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