Dev Sanskriti Vishwavidyalaya

Master of Computer Applications (MCA)

Semester-I

S. No	Board of Studies	Subject Code	Subject Name	Periods Per Week			Scheme of Examination				Total Marks	Credits
							Theory		Practical			
				L	T	P	EX	IN	EX	IN		
CORE SUBJECT												
1	Computer Applications	SMCAC 101	C++ and Data Structure	3	1	-	70	30	-	-	100	4
2	Computer Applications	SMCAC 102	Advance Data Base Management System	3	1	-	70	30	-	-	100	4
3	Computer Applications	SMCAC 103	Python Programming	3	1	-	70	30	-	-	100	4
4	Applied Maths	SMCAC 104	Mathematical Foundation of Computer Science	3	1	-	70	30	-	-	100	4
5	Computer Applications	SMCAC 105	Fundamentals of Computer Science	3	1	-	70	30	-	-	100	4
PRACTICALS												
6	Computer Applications	SMCAP 106	Python (Lab)	0	0	4	-	-	35	15	50	2
7	Computer Applications	SMCAP 107	C++ and Data Structure (Lab)	-	-	4	-	-	35	15	50	2
8	Computer Applications	SMCAP 108	Advance Data Base Management System (Lab)	-	-	5	-	-	35	15	50	3
9	Humanities	LMUC101	Life Management	-	-	2	-	-	35	15	50	-
	Total			15	05	15	350	150	140	60	700	27

L: Lecture T: Tutorial P: Practical ESE: End Semester Examination EX: External IN: Internal

Dev Sanskriti Vishwavidyalaya
Semester-I

Subject: C++ and Data structure
Maximum Marks: 70

Subject Code:SMCAC101
Minimum Marks: 28

Course Objectives:
1. To comprehend the fundamentals of object oriented programming, particularly in C++.
2. To use object oriented programming to implement data structures.
3. To introduce linear, non-linear data structures and their applications.

Course Outcomes:
1. Explain the concepts of Object oriented programming.
2. Write simple applications using C++.
3. Discuss the different methods of organizing large amount of data.

UNIT-I DATA ABSTRACTION & OVERLOADING: Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Overloading: Function overloading and Operator Overloading.

UNIT-II INHERITANCE & POLYMORPHISM: Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding.

UNIT-III LINEAR DATA STRUCTURES: Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists –Polynomial Manipulation – Stack ADT – Queue ADT – Evaluating arithmetic expressions

UNIT-IV NON-LINEAR DATA STRUCTURES: Trees – Binary Trees – Binary tree representation and traversals – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search – Connected components.

UNIT-V SORTING and SEARCHING: Searching, Hashing and Sorting: Requirement of a search algorithms; sequential search, binary search, indexed sequential search, interpolation search, Hashing- Basics, methods, collision, resolution of collision, chaining; Internal Sorting, External sorting - Selection sort, Bubble sort, Merge sort, quick sort, shell sort, heap sort.

TEXT BOOKS:
1. K.R. Venugopal, Raj Kumar and T. Ravi Shankar ,Mastering C++, TMH
2. Deitel and Deitel, "C++, How To Program", Fifth Edition, Pearson Education, 2005.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison Wesley, 2007.

REFERENCES:
1. Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
2. Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley. 2004.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.
4. BjarneStroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
    5. Ellis Horowitz, SartajSahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", Galgotia Publications, 2007.

Semester-I

Subject: Advance Database Management System   **Subject Code: SMCAC102**
Maximum Marks: 70   **Minimum Marks: 28**

Course Objectives:
1. To understand basic concepts of designing and building a database management system.
2. To familiarize student with syntax and implementation of Structured Query Language (SQL).
3. To make students understand the relational model and design relational database management system.
4. To provide detailed knowledge of transaction, concurrency and recovery strategies of DBMS.
5. To impart significance of normalization in DBMS and different normalization techniques.

Course Outcome:
1. Students will be able to design a database based on the given requirements.
2. Students will be able to make projects with knowledge of subject provided to them.
3. Students will be able to write Standard Query Language statements.
4. Students are expected to apply normalization techniques on given database

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UNIT-I   **Basic concepts, Database & Database Users**: Characteristics of the Database approach, Advantages of using DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model – Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization.

UNIT-II   **Relational Model, Languages & Systems:** Relational Data Model Concepts and Constraints. Relational Algebra – select, project, set theoretic, join operations. Overview of Relational Calculus. SQL - A Relational Database Language. Data Definition commands, View and Queries, transaction commands, Specifying Constraints & Indexes in SQL.

UNIT-III   **Relational Data Base Design:** Function Dependencies &Normalization for Relational Databases. Informal design guidelines for relation schemas, Functional Dependencies. Normal forms based on primary keys (INF, 2NF, 3NF& BCNF). Lossless join & Dependency preserving decomposition. Multivalued dependencies, join dependencies (4NF & 5NF), Denormalization.

UNIT-IV   **Advanced Transaction Processing**: Basic concept; ACID properties; transaction state; implementation of atomicity and durability; Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions,WeakLevelsofConsistency,TransactionWorkFlows,TransactionProcessing Monitors.

UNIT-V   Trigger sin SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Compensation and DatabasesRecovery.WEB Database: Accessing Databases through WEB, WEB Servers, XML Databases. Data Warehousing: Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries.

Text Books:
1. Elmsari and Navathe, "Fundamental of Database System", Addison Wesley. NewYork.
2. H.Korth& A. Silberschatz, "DATABASE SYSTEM CONCEPTS", TMH.

References:
1. Date. CJ, "An Introduction to Database System", Narosa Publishing House. New Delhi.
2. Desai, B, "An Introduction to Database Concepts", Galgotia Publications. New Delhi.
3. Ullman. J.D, "Principles of Database Systems", Galgotia Publications, New Delhi
4. R. Ramakrishnan, "Database Management Systems", 1998, McGraw Hill International Editions

Subject: Python Programming

Subject Code: SMCAC103

Maximum Marks: 70

Minimum Marks: 28

Course objectives:
1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python.
3. To develop the skill of designing Graphical user Interfaces in Python.
4. To develop the ability to write database applications in Python.

Course outcomes:
1. Understand and comprehend the basics of python programming.
2. Demonstrate the principles of structured programming and be able to describe, design,
3. implement, and test structured programs using currently accepted methodology.
4. Explain the use of the built-in data structures list, sets, tuples and dictionary.
5. Make use of functions and its applications.
6. Identify real-world applications using oops, files and exception handling provided by python.

UNIT-I Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNI II: Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-else-else, for, while, break, continue, pass.

UNIT III: Data Structures-Lists- Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences, Comprehensions.

UNIT IV: Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Modules: Creating modules, import statement, from. Import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages.

UNITV: Object Oriented Programming OOP in Python: Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, **Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User defined Exceptions, Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics, **Testing:** Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text books
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:
1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson
3. Introduction to Python, Kenneth A. Lambert, Cengage

Dev Sanskriti Vishwavidyalaya
Semester-I

Subject: Mathematical Foundations of Computer Science
Maximum Marks: 70

Subject Code: SMCAC 104
Minimum Marks: 28

Course Objectives:
1. To make student learn the logical structure of statement, Boolean algebra and its valid applications.
2. To make students learn concepts of relations and functions.
3. To make students learn Cartesian product of sets and grammars
4. To make students understand the concepts of graphs and their matrix representation.
5. To make students learn the basic concepts of Graph theory and its application in coding.

Course Outcome:
1. Students will be able to analyze the logical structure of statements symbolically including the proper use of logical connectives, applications of Boolean algebra in circuits and karnaugh map.
2. Students will be able to determine whether a relation is reflective, symmetric and transitive. They will be able to apply the different types of functions and Hash diagram.
3. Students will be able to construct inductively defined sets and recursive function. Also they will construct the grammars.
4. Student will be able to understand the basics of Graph Theory and trees.
5. Student will be able to understand the basics of Group Theory and coding.

UNIT–I Mathematical Logic & Boolean Algebra: Statements & Notations, Connectives, Normal Forms, Basic concepts of Boolean Algebra, Boolean functions, Applications of Boolean Algebra in Switching Circuits, Logic circuits, Karnaugh maps, methods for simplification of Boolean expressions.

UNIT–II Ordered Structures, Relations & Functions: Tuples, Lists, Strings & Languages, Numerals, Relations, Properties of Relations, Partial order Relation, Lattices. Functions, Properties of Functions, Composition of Functions, The map function & some useful functions.

UNIT–III Construction Techniques & Grammars : Inductively defined sets, Numbers, Strings, Lists, Binary Trees, Cartesian product of sets, Recursive functions and Procedures, Grammars.

UNIT–IV Graph Theory : Basic concepts of Graph Theory, Paths and Circuits, Trees and Fundamentals Circuits, Matrix Representation of Graphs, Directed Graphs.

UNIT–V Group Theory & Coding: Basic concepts of Group Theory, Homomorphism & Isomorphism of Groups, Cosets and Langrage's Theorem , Elements of Coding Theory, Group codes, Decoding, Hamming Matrices, Parity check & Generator Matrices.

Text Books:
1. Discrete Structure, and Logic and Computability, James L. Hein, Narosa Pub. House. 3rd Edition.
2. Discrete Mathematical Structures with Applications to Computer Science, Trem blay, J.P. & M anohar .R., Tata M cG raw Hill. 2000

Reference Books:
1. Discrete and Combinatorial Mathematics, Ralph, Grimaldi, Pearson Education.5th edition.
2. Graph Theory with Applications to Engineering & Computer Science, N. Deo, Prentice Hall. 2004.
3. Discrete Mathematical Structures, Kolman, B, Busby, R.C.Ross, S.C. Pearson Education. 2006.
4. Elements of Discrete Mathematics, Liu, C.L. 2006Tata McG raw Hill, 2nd edition.

Subject: Fundamentals of Computer Science   **Subject Code: SMCAC 105**
Maximum Marks: 70   **Minimum Marks: 28**

Course Outcome:
1. Student will be familiar with fundamentals of computers and organization of computer.
2. Student will be familiar with basic concepts of computer programming languages.
3. Student will be familiar with different digital components used in Computers and the organization and design of digital computer.
4. Students will learn about the Combinational Circuit.
5. Students will learn about the basic concepts of Principles of Computer Design

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Course Objectives:
1. To understand the basic concepts of computer and organization of a computer
2. To understand the basic concepts of computer programming languages.
3. To make the students aware about the data representation, digital components of the computer hardware.
4. To make the students aware about the Combinational Circuit.
5. To understand the basic concepts of Principles of Computer Design

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UNIT-I Introduction to Computer and Hardware: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc) Organization of computers, Input and output devices, Storage devices and file organization system. Concept of Data and Information, Data processing, History of Computers.

UNIT-II Programming Concepts: Programming Languages. Introduction to Programming, Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart, Pseudo code and Source code with examples. Syntax and Logical Errors in compilation, object and executable code

UNIT-III Data Representation and Digital Components: Number system (decimal, BCD, octal, hexadecimal) and conversions, r and r-1's complement, Fixed and Floating point representation, Binary codes: Excess-3, ASCII, EBCDIC, Error detection codes. Boolean Algebra, Map simplification K-Map, Logic Gates.

UNIT-IV Combinational Circuit: Half and Full Adder, Decoder and Multiplexer; Sequential Circuit: Flip-Flop (SR, D, JK, Master-Slave), Registers, Computer registers. Counter, Register Transfer Language (RTL) and Micro-operation : Arithmetic, Logic and Shift micro operation Instruction code.

UNIT-V Principles of Computer Design: Computer instructions, Timing and control, Instruction Cycle and Interrupt Cycle, Memory reference instructions, Input-output and interrupt, Design of basic computer , Instruction format, Addressing modes.

Text Books:
1. Computers Today, S.K. Basadra, Galgotia Publication.2nd edition.
2. Internet for Every One, Alexis Leon and Mathews Leon, Tech World.2008 print.
3. Computer System Architecture, Morris Mano ,PHI, 3rd Edition)
4. Computer Organization and Architecture, William Stalling (PHI), 2000.

Reference Books:
1. Introduction to Computers, P.K. Sinha ,BPB Publication, 6th edition.
2. Fundamentals of Computers, V. Rajaraman, Prentice Hall of India,4th edition
3. Computer organization and Architecture, J.P. Hayes (TMH), 3rd Edition.
4. Digital Computer Logic Design , Morris Mano ,PHI,3rd Edition
5. Computer System Architecture and organization, Dr.M. Usha, T. S. Shrikant, Wiley publication.

Dev Sanskriti Vishwavidya
Semester-I

Subject: Programming Laboratory in Python
Maximum Marks: 50

Module-1: Python basic, Data types, Typecasting, Data type conversions, String operations, Slicing, Stride, String Methods. Python programming fundamentals-conditions & Branching.

1. Input a welcome message and display it.
2. Input two numbers and display the larger / smaller number.
3. Input three numbers and display the largest / smallest number.
4. Determine whether a number is a perfect number, an Armstrong number or a palindrome.
5. Input a number and check if the number is a prime or composite number.
6. Count and display the number of vowels, consonants, uppercase, lowercase characters in string.
7. Input a string and determine whether it is a palindrome or not; convert the case of characters in a string.

Module-2: Tuple, Lists, Set, Dictionaries Tuple indexing, Slicing, Nesting, List indexing, List functions-extend, append, delete, split. List Aliasing, List Clone. Set –creating set, Set Operations. Dictionaries.

1. Find the largest/smallest number in a list/tuple
2. Input a list of numbers and swap elements at the even location with the elements at the odd location.
3. Input a list/tuple of elements, search for a given element in the list/tuple.
4. Input a list of numbers and test if a number is equal to the sum of the cubes of its digits. Find the smallest and largest such number from the given list of numbers.
5. Create a dictionary with the roll number, name and marks of n students in a class and display the names of students who have marks above 75.
6. To print the highest and lowest values in the dictionary.

Module-3: Objects and classes, working with Data in Python-Reading files, writing files, Copying file.

1. Read a text file line by line and display each word separated by #. Read a text file and display the number of vowels/ consonants/ uppercase/ lowercase characters in the file.
2. Create a binary file with name and roll number. Search for a given roll number and display the name, if not found display appropriate message.
3. Create a binary file with roll number, name and marks. Input a roll number and update the marks.
4. Remove all the lines that contain the character `a' in a file and write it to another file.

Module-4 Data Handling with Pandas

Loading data with Pandas, access rows and columns, various methods

1. Create a panda's series from a dictionary of values and array
2. Given a Series, print all the elements that are above the 75th percentile.
3. Create Data Frame quarterly sales where each row contains the item category, item name, and expenditure. Group the rows by the category and print the total expenditure per category.
4. Create a data frame for examination result and display row labels, column labels data types of each column and the dimensions
5. Filter out rows based on different criteria such as duplicate rows. 6. Importing and exporting data between pandas and CSV file.

Semester-I

Subject: Programming Laboratory in C++ and Data Structure
Maximum Marks: 50

Subject Code: SMCAP 107
Minimum Marks: 17

1. A book shop maintains the inventory of books that one being sold at the shop. He list includes details such as authors, title, price, publisher and stock position. Whenever a customer wants a book, the sales person input the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is then the system displays the book details and requests for the number of copies required.

2. Write a program which will show the order of execution of constructor, destructor, static data member, static function and member functions.

3. Create class Distance having private data feet(type integer), inches(type float) and function getdist() and showdist() . Overload + operator to add two distance values and > operator to compare them.

4. Create a class called employee containing protected data name(20 characters), employee number(long integer). Also write its constructor and destructor functions. Create two derived classes called hourly _employee containing private data rate and hours and salary_ employee containing basic salary and allowances as data members. The class employee is inherited as public by these derived classes. Write appropriate functions in each class to calculate total salary of each employee and to display name, number and total salary.

5. Create a class dimension containing three float type data and a constructor to accept values, also declare a pure virtual function area() in it. Now create three derived classes rectangle, square and triangle, each inheriting dimension as public. Define corresponding constructors and redefine virtual function area() in each to give area of respective figure. A main() program should create suitable objects to implement this inheritance.

6. Create a class STRING that contains a character array as a data member. Overload + and = operators respectively to concatenate and compare strings.

7. Create two classes DM and DB respectively represent the distance in meters, centimeters and distance in feet, inches. Write a program that can read values for the class objects and add one object DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display.

8. Write a program to define a class 2DPoint that represents a point in a 2D plane by its x and y coordinates. The class will contain constructors and member function distance() that can calculate the distance between the point to any other point in the plane. Drive a new class 3DPoint from the class 2DPoint that will add a new member, the z coordinate. Override the function distance() that calculate the distance between two points in the space.

9. Write a program containing a possible exception. Use a try block to throw it and a catch block to handle it properly.

Data Structure

1. Write a program to implement a stack and it's operations.

2. Write a program to implement a linear queue, circular queue using an array.

3. Write a program to convert an infix expression into its equivalent postfix expression using a stack.

4. Write a program to evaluate a postfix expression using a stack.

5. Write a program to create and display a linked list of integers.

6. Write a program to create a linked list and define functions to add a node (at the beginning, end and middle), delete a node, search a node and display all the nodes.

7. Write a program to create two linked list and append one list at the end of another using function.

8. Write a program to implement a stack and queue of strings using a linked list.

9. Write a program to implement a priority queue using linked list.

10. Write a program to define functions to add a node (at the beginning, end and middle), delete a node, search a node and display all the nodes in a header circular linked list.

11. Write a program to implement a circular queue over a circular linked list.

12. Write a program to create and display a doubly linked list.

13. Write a program to define the following functions to add a node (at the beginning, end and middle), delete a node (from the beginning, end and middle) from a doubly linked list.

14. Write a program to create and display a doubly circular linked list.

15. Write programs to sort an array of integers using the techniques of Selection sort, Bubble sort, Insertion sort, Quick sort, Shell sort, Heap sort.

16. Write a program to search for a particular element in an unsorted array of integers using linear search technique.

17. Write a program to demonstrate the technique of Binary search on a sorted array of integers.

18. Write a program to create binary search tree and traverse the tree in preorder, in-order and postorder technique. (Use recursive algorithms for traversals).

19. Write a program to traverse a graph in Depth first technique using a Stack.

Dev Sanskriti Vishwavidyalaya
Semester-I

Subject: Programming Laboratory in DBMS

Maximum Marks: 50

Subject Code: SMCAP108

Minimum Marks: 17

List of Experiments/Programmes:-

1. Design and manage table using DML, DDL and DCL commands. Perform select query to work onEMP and DEPT table of scott/tiger log in.

2. Query to implement primary and foreign key concept.

3. Retrieval of Database - select: where, distinct, in, between-and, like, is null, group by-having, order by, column: (format, heading, justify, wrap trunc), nested queries: (any, all, in, not in, exists).

4. Query to demonstrate inner outer and full join.

3. Views (create, update, drop), sequences (create, alter, drop), synonyms (create, drop),index (create, drop)

4. Transaction control (commit, rollback, save point)

5. Data control (grant, revoke)

6. Write a PL/SQL code to find whether the entered number is odd or even.

7. Write a PL/SQL code to generate multiplication table.

8. Write a PL/SQL code to find largest of 3 number.

9. Write a PL/SQL code to compute the factorial & a given number.

10. Write procedure to display any word and display it n number of times.

11. Create a salary table with attributions EmPno, Ename, Grade, Gross Salary & write a explicit cursor to display emp number & grade of salary table.

Dev Sanskriti Vishwavidyalaya
Semester-I

Subject: Life Skill Management
Maximum Marks: 50

Subject Code: SMCAP101
Minimum Marks: 20

LEARNING OUTCOME:

- ➢ To mould positive mindset in the students
- ➢ To respect and accept oneself and others
- ➢ To be an achiever irrespective of various barriers
- ➢ To mould responsible citizens
- ➢ To value and cherish one's life

Module 1:

Personal and Academic Skills: Personal Development: Integrity, Commitment, Discipline, Impact of thinking and Paradigm Shift, Four D's of Achievement and Eight Important activities of the day, The Best Investment and Having a Mentor

Module 2:

Interpersonal Skills: Five Competencies of Interpersonal Skills, Friendship – Peer Group Influence, Developing and sustaining Interpersonal Skills, Responsibility in relationship.

Module 3:

Intrapersonal Skills: Mental conditioning and analyzing perception, Self concept and Self discovery, Techniques of Intrapersonal Skills, Handling depression

Module 4:

Emotional Intelligence Skills: Definition of Emotional Intelligence, Relevance of Emotions and Emotional Intelligence, Emotional Quotient and Developing Emotional Quotient, Understanding the Positive Side of Negative Feeling

Module 5:

Physical, Mental and Spiritual Fitness: Importance of regular exercise program, Mental Agility, Memory Power, Spirituality a Guiding Light; Setting and Achieving Goals: Setting Goals, Determining the Major Definite Purpose, Guidelines to Set Goals, Five Keys to Achieving Goals.

Dev Sanskriti Vishwavidyalaya

Master of Computer Applications (MCA)

Semester-II

S. No	Board of Studies	Subject Code	Subject Name	Periods Per Week			Scheme of Examination				Total Marks	Credits
							Theory		Practical			
			CORE SUBJECT	L	T	P	EX	IN	EX	IN		
1	Computer Applications	SMCAC 201	Programming with Java	3	1	-	70	30	-	-	100	4
2	Computer Applications	SMCAC 202	Computer Network	3	1	-	70	30	-	-	100	4
3	Computer Applications	SMCAC 203	Artificial Intelligence	3	1	-	70	30	-	-	100	4
4	Computer Applications	SMCAC 204	Operating System with Unix	3	1	-	70	30	-	-	100	4
5	REFER TABLE-I		ELECTIVE-I	3	1	-	70	30	-	-	100	4
			PRACTICALS									
6	Computer Applications	SMCAP 206	Java (Lab)	0	0	4	-	-	35	15	50	2
7	Computer Applications	SMCAP 207	Unix (Lab)	-	-	4	-	-	35	15	50	2
8	Computer Applications	SMCAP 208	Computer network (Lab)	-	-	5	-	-	35	15	50	3
9	Humanities	LMUC 201	Life management	-	-	2	-	-	35	15	50	-
	Total			**15**	**05**	**15**	**350**	**150**	**140**	**60**	**700**	**27**

L:Lecture T: Tutorial P:Practical ESE : End Semester Examination Ex:External IN: Internal

Table-I (Elective-I)

S.No	Board of Studies	Subject Code	Subject Name Elective-I (Management)
1	Management	SMCAE 205 (01)	Accounting and Financial Management
2	Management	SMCAE 205 (02)	Supply Chain Management
3	Management	SMCAE 205 (03)	Managerial Economics
4	Management	SMCAE 205 (04)	Enterprise Resource Planning
5	Management	SMCAE 205 (05)	Management Information System
6	Management	SMCAE 205 (06)	Digital Marketing

Subject   : **Programming with Java**   **Subject Code :SMCAC 201**
Maximum Marks   : **70**   **Minimum Marks : 28**

Course Objectives:
1. To learn fundamental concept of Java programming.
2. To learn handling of runtime error "Exception" and Multithreading.
3. To learn File handling, network programming and distributed client/server based application development.
4. To learn event handling and I/O Interface design.
5. To learn web development using and server side coding.

Course Outcomes:
1. Students will be able to write core Java programme, able to handle runtime error, able to create multithreads.
2. Student will be able to handle File through Java APIs.
3. Students will obtain skill to network programming by using Java network APIs, TCP/IP Socket and distributed application development using RMI.
4. Students will be able to create I/O interface using swing APIs and event handling through AWT APIs.
5. Students will obtain skill to develop web through APPLET and server side coding using Servlet.

UNIT-I   **Overview of Java**: Features of Java, Byte-code, JVM, data types, variables and arrays, control statements, Introduction to Java class and object, main() function, garbage collection and finalize() method, this, inheritance, method overriding, dynamic method dispatching, super, final, package, interface, abstract class, class path, String and String Buffer Class.

UNIT-II   **Exception Handling and Multithreading**: Exception types, uncaught Exception, using try-catch, throw, throws, finally, Throwable class and object, Exception classes, create own exception subclass. Creating multiple threads, isAlive(), join(), Thread priorities, synchronization, Deadlock, wait(), notify(), notifyAll() methods, inter-thread communication, suspend, resume and stop the threads. Collection framework - HashSet, Array List, HashMap.

UNIT-III Streams and Sockets: I/O classes &Interfaces, File, The Stream Classes, the Byte stream(InputStream, OutputStream, FileInputStream, FileOutputStream), Serialization. Network basics, Networking classes and Interfaces, InetAddress, TCP/IP Client/Server socket, URL, URL Connection, Datagram, Introduction to RMI.

UNIT-IV   **Event Handling and Swing**: Delegation event model, event classes, Event listener interface, Layout managers, Swing: benefits of Swing over AWT, JFrames, JPanels, JLabels, JButtons, JTabbedPane, JScrollPane, JSplitPane, JOptionPane, JComboBox, JListBox, Textcomponents, JMenu, JToolbar, JDialog, JTable, Databaseconnectivity.

UNIT-V   **Web development:** The Applet class, Applet Architecture, Applet skeleton, HTML APPLET Tag, Passing parameter to Applet, getDocumentBase(), getCodeBase(), Applet Context, showDocument(). Servlet Architecture, Servlet interface, Servlet Request/Response interface, Servlet designing, using cookies, session management.

Text Books:
1. The Complete Reference Java 2 (Updated to Cover J2SE 1.4), Herbert Scheldt, Tata McGraw-Hill publishing company Ltd. New Delhi, India.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Media.

Reference Books:
1. Java 2 for Professionals Developers, Michael Morgan, SAMS, Techmedia, New Delhi.
2. Thinking in Java, The Definitive Introduction to Object-Oriented Programming in the Language of World-Wide- Web, Bruce Echel, Pearson Education.
3. Core Java 2 Volume-I Fundamentals, CayS. Horstmann Gary Cornell, Pearson Education.
4. Java 2 Developer's Hand Book, Philip Heller and Simon Roberts, BPB Publication, New Delhi.
5. Java Thread Programming, Paul Hyde, SAMS.
6. Java Swing, Loy and Wood, O' reilly.

Subject	**: Computer Network**	**Subject Code: SMCAC202**
Maximum Marks	**: 70**	**Minimum Marks: 28**

Course Objectives:
1. To make student know, the network architecture comprising of hardware & software technologies, also to provide the basic Knowledge of data Communication.
2. To make students know, the insight working of network in terms of layered architecture, which includes a set of protocol and its implementation.
3. To make students know, the practical aspect of working of Ethernet in terms of IEEE standards.
4. To make students know, the general principles of network in terms of routing algorithm and Internet architecture and addressing.
5. To make students know, the security aspects in network and implementing it through various methodologies.

Course Outcome:
1. The students will be able to understand the structure and organization of computer networks; including the division into layers, role of each layer, and relationships between the layers.
2. The students will have basic understanding of Communication techniques and functioning of physical layer.
3. The students will be able to understand the basic concepts of data link layer properties; including the flow control mechanisms.
4. The students will be able to understand the basic concepts of application layer protocol design i.e.
5. Thestudentswillbeabletounderstandthebasicconceptsofnetworksecurityconcepts; including authentication, integrity and system security design challenges.

UNIT-I   Introduction:
Layered Network Architecture, ISO- OSI Model, Introduction to TCP/IP Model.; Data Communication Techniques: Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM).; Multiplexing Techniques: Frequency Division, Time Division, Statistical Time Division Multiplexing; Transmission Media: Wires, Cables, Radio Links, SatelliteLink, Fiber Optic.

UNIT-II   Data Link Layer Protocols:
Noise Free Channels Protocol: Stop and Wait Protocols, Sliding Window Protocol, Noisy Channels Protocols: Stop and Wait ARQ, Sliding Window ARQ: Go Back and Selective Repeat ARQS, ISDN, Asynchronous Transfer Mode (ATM), ATM cells, Header and Cell Formats, Error Detection And Correction: Single and Burst Error, Parity Check Codes, Cyclic Redundancy Code & Hamming Code.

UNIT-III   Medium Access Control Sub Layer:
Concept of Random Access, Pure ALOHA, Throughput characteristics of ALOHA, Throughputs for finite and infinite populations, S-ALOHA, LAN: IEEE 802.3, 802.4 and 802.5 Protocols, Performance of Ethernet, Token Ring Protocol, FDDI Protocol, Distributed Queue Dual Bus (DQDB) Protocol.

UNIT-IV   Network and Transport Layer Protocols:
General Principles, Virtual Circuits and Data-grams, Windows Flow Control, Packet Discarding, Traffic Shaping, Choke RSVP, Network Devices: Bridges, Routers and Gateways, Routing Algorithms**:** Optimality principle, Shortest Path Routing- Dijkstra, Distance Vector Routing, Link State Routing, Flow Based Routing, Multicasting Routing, Flooding and Broadcasting, Flow and Congestion Control, Internet Architecture and Addressing, Transport Layer: Design Issues, Quality of Services, Primitives, Connection Management: Addressing, Connection Establishment and Releases, Flow Control and Buffering, Crash Recovery, Protocols: Transmission Control Protocol (TCP), User Datagram Protocol UDP).

UNIT-V   Application Layer Protocols and Other Networks:
Cryptography: Substitution and Transposition, Ciphers, Data Encryption Standard (DES), DES Chaining, Breaking DES, Public key Cryptography, Authentication Protocols, Virtual LAN (VLAN), Virtual Private Network (VPN).

Text Books:
1. A.S. Tanenbaum " Computer Network: Second Ed. Prentice Hall, India(tan)
2. B.A. Frouzan, Data Communication, Tata McGraw Hill.

Reference Books:
1. D. Berekas and R. Gallager, " Data Networks", second Ed. Prentice Hall, India
2. D.E. Coner," Intertworking with TCP/IP", Vol-I. Prentice Hall India.
3. G.E. Keiser, " Local Area Networks", McGraw Hill, International Ed.
4. W. Stalling, "Data & Computer Communications", Maxwell Macmillan Internation Ed.

Subject   **: Artificial Intelligence**   **Subject Code: SMCAC 203**
Maximum Marks   **: 70**   **Minimum Marks: 28**

Course Objectives:
1. To make students learn to define problem of complex nature , state space of problem domain and searching techniques to solve them.
2. To make students understand concept of heuristic and how it is applied to solve AI based problem along with mechanism to represent knowledge structures and inference procedure.
3. To make student learn processing of natural language and challenges associated with it.
4. To make students understand basics of Machine learning
5. To make students understand concept of Expert System, its design issues and applications

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Course Outcome:
1. Student will have ability to understand and define different AI problem and apply suitable problem solving technique.
2. Student will have ability to define the heuristics and apply them for solving complex problem with understanding of different heuristic based search techniques.
3. Student will develop an understanding of game playing techniques
4. Student will have understanding of different knowledge structure and inference mechanism with ability to apply them in intelligent solutions of complex problem .

UNIT-I General overview of AI & Search techniques: Introduction to AI, Problem Solving: State space representation, characteristic of problem; Control Strategies Production systems, Blind searches: Depth first, Breadth first search. Informed Search: Hill climbing; Branch and Bound technique; Best first search, Constraint Satisfaction problems.

UNIT-II Heuristic Search techniques & Knowledge Representation: A* algorithm; Problem reduction AND-OR graph and AO* algorithm; Game Playing: Minimax search procedure; Alpha-Beta cutoffs; **Knowledge representation:** First Order Predicate Calculus; Skolemnisation; Resolution Principle and Unification Algorithm; Semantic Networks; Frame Systems ; Scripts; Conceptual Dependency.

UNIT-III Natural Language Processing, Planning and Uncertainty: Phases of NLP; Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); Planning Overview – An Example Domain: The Blocks Word; Component of Planning Systems; Goal Stack Planning (linear planning); Non-linear Planning using constraint posting; Probabilistic Reasoning and Uncertainty; Probability theory; Bayes Theorem and Bayesian network.

UNIT-IV Machine learning Paradigms: Components of learning system; supervised and unsupervised learning; Reinforcement learning; Inductive learning: Decision trees deductive learning: Probability based reasoning, Clusteringk means fuzzy C means; hierarchal clustering, Introduction of Artificial Neural network.

UNIT-V Expert system and application: Introduction to Expert Systems, Architecture of Expert Systems; characteristic of expert system, Rule based expert system: forward chaining, applications of expert system, Expert System Shells; Knowledge Acquisition; tools for knowledge acquisition Case Studies: MYCIN,

Text Book:
1. Elaine Rich and Kevin Knight: Artificial Intelligence- Tata McGraw Hill.
2. Saroj Kaushik: "Artificial Intelligence", Cenage Learning
3. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems- Prentice Hall of India.
4. B. Yegnanarayana:"Artificial Neural Networks", Prentice Hall of India.

Reference Books:
1. Nils J. Nilsson: Principles of Artificial Intelligence- Narosa Publishing house.
2. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norvig, Pearson Education,2nd Edition
3. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.
4. Siman Haykin,"Neural Netowrks"Prentice Hall of India
5 John Yen,rezaLangari:"Fuzzy Logic" Pearson Education.

Subject	: Operating System with Unix	Subject Code: SMCAC 204
Maximum Marks	: 70	Minimum Marks: 28

Course Objective:
1. To study and apply concepts relating to operating system.
2. To study CPU Scheduling, virtual memory and deadlocks.
3. To provide better understanding of Operating system concepts in the context of Unix Operating system.
4. To study basic and advance commands of unix operating system and Unix shell programming.
5. To understand Unix process structure, and working of kernel.

Course Outcome:
1. The students will be able to understand concepts relating to operating system, such as types of operating system, file system organization.
2. The students will be able to understand concepts and problem solutions related with CPU Scheduling, virtual memory and deadlocks.
3. The students will be able to understand Operating system concepts in the context of Unix Operating system.
4. The students will be able to work with UNIX's basic as well as advance command and various System calls.
5. The students will be able to write shell scripts and understand Unix process structure.

UNIT-I   Introduction to Operating System: Functions provided by operating system, Operating system services, Introduction to multiprogramming, batch interactive Time sharing, and real time systems. Introduction to file systems, Access and allocation methods of file systems, Directory structure of a file system on a disk and tape, File protection.

UNIT-II   Introduction to Scheduling, Memory Management and Deadlocks: CPU scheduling, various types of CPU Scheduling algorithms and their evaluation. Various types of memory management schemes like paging, Segmentation etc. Concept of virtual memory, Meaning of demand paging, various page replacement algorithms. System model.

UNIT-III Concurrency and Deadlock: Meaning of deadlocks, Resource allocation graphs, Deadlock Characterization, Various methods to avoid deadlocks like deadlock avoidance, Deadlock detection, Deadlock prevention, Banker's algorithm for deadlock avoidance. Introduction to concurrent processing, Precedence graphs, Critical section problem, Semaphore concept, Study of classical process co-ordination problem.

UNIT-IV Introduction to Unix O/s and Unix Commands: Architecture and Features of Unix O/S, History of Unix, flavors of Unix, Layered architecture of Unix O/S, Unix file system and its layout (Boot block, Super block, Inode Block, Data block), concept of Inode. **Unix Commands –** PATH, man, echo, who, date, cal, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, vi editor, pipe operator, redirection operator, Filters: tail, head, sort, nl, uniq, grep, egrep, fgrep, tee, cmp, chmod, tr, sed, awk.

UNIT-V Shell programming and Process Control: Basic Script concepts**:** Output, Input, Variables, Environmental Variables, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Script Examples.
Structure of regular file , Directories, OPEN, READ, WRITE, CLOSE, DUP etc., Process States and Transitions. Process Creation/Termination: fork () and exit () system call.

Text Books:
1. Operating System concepts by Silberscatz A and Peterson, J.L, PE- LPE.
2. Operating system concepts Galvin by Silberscatz, John Weiley& Sons
3. Design of Unix O.S., Maurice Bach, Prentice Hall of India.
4. Advance UNIX by Steven Prata, a Programming Guide, BPB publication, New Delhi.
5. UNIX Concepts and Applications, Sumitabha Das, Tata McGraw Hill.

Reference Books:
1. Operating systems by H.M. Deital, Pearson Education
2. Operating System in Depth Design and Programming by Thomas Doeppner, Wiley India
3. Operating System Concept & Design, Milenkovic M, McGraw Hill.
4. Operation System, Stalling William, Maxwell MC Millan International Edition
5. UNIX and shell programming, Frouzan B.A. & Gilberg R.E., Cengage Learning.
6. UNIX shell programming, Yashavant Kanetkar, BPB Publications.

Subject: Accounting and Financial Management (Elective -I)   Subject Code: SMCAE 205 (01)

Maximum Marks: 70   **Minimum Marks: 28**

Course Objective:
The students will be understand-
1. The Different aspects of management and administration
2. The process and type of planning
3. The motivation and its theories
4. The Importance of communication in organization and HRM process.
5. The different aspects of management functions such as marketing, production and financial management.
6. How to make balance sheets, profit & loss and trial balance.

Course Outcome
The student will be able-
1. To understand the theoretical aspect of management and administration.
2. To adapt the concept of motivation and ways to apply motivation technique in real world.
3. To analyze formal and informal relation in an organization.
4. To understand the basics of HRM
5. To understand how to make balance sheets, profit & loss and trial balance.

UNIT – I   Fundamentals of Management: Management functions, Management and Administration, Principles of management. Planning – Nature of Planning, Types of Planning, steps in planning, advantages and limitations of planning.

UNIT – II   Motivation: Theories of Motivation, Need Hierarchy Theory, Maslow's theory, Herzberg's Theory. **Communication –** Meaning and Importance, Process of Communication, channel of communication, communication media, Communication networks, barriers to communication

UNIT – III Financial Management: Scope of Financial Management, Objectives of financial management, Meaning and objects of accounting, Accounting Cycle, Accounting concepts and conventions, accounting, equations, rules of journalizing, ledger posting, Cash book, preparation of trial balance, trading and profit and loss, account and balance sheet with adjustments relating to closing stock, outstanding expenses, prepaid expenses, Accrued income, depreciation, Bad debts, provision for bad debts, provision for discount on debtors and creditors

UNIT – IV Human Resource Management – Functions and objectives, planning process**,** selection process**,** Training process**,** Individual Behavior, Formal and informal relations. Job satisfaction – theories of job satisfaction, determinants of job satisfaction, job satisfaction and productivity.

UNIT – V   Concept of Marketing - Importance of Marketing, managerial Function of marketing, marketing Mix, marketing and other functions, Nature and scope of Marketing Research. **Production Management –** Concept and scope, Production Planning, production control, organization for production planning and control, inter-relationships with other management functions,

Text Books:
    1. Organization and management : R.D. Agrawal, Tata McGraw- Hill Education
    2. K. Aswathappa, "Human Rersource and Personnel Management", 6ᵗʰEd. TMH
    3. Bhattacharya S. K. and Dearden John, " Accounting for Management", Prentice Hall of India, New Delhi.

Reference Books:
    1. Understanding management : Richard L. Daft, Dorothy Marcic, Cengage Learning
    2. M.Y. Khan, P.K. Jain, " Basic Financial Management", 2 Ed. , TMH
    3. Chadwick, The Essence of Financial Accounting, Prentice Hall of India, New Delhi.

Subject	: Supply Chain Management (Elective -I)	Subject Code: SMCAE 205 (02)
Maximum Marks	: 70	Minimum Marks: 28

Course Objective:
1. To provide student Basic Concepts of Supply chain management.
2. To give knowledge about implementation of supply chain to actual organization
3. To introduce with the concept of role of technology in supply chain management.
4. To study an overview about cases effective in supply chain management and its implementation.
5. To study role of information technology in supply chain management.

Course Outcome:
1. Demonstrate knowledge of the functions of logistics and supply chain management.
2. Illustrate the concepts and activities of the supply chain to actual organizations.
3. Analyze the role of technology in logistics and supply chain management.
4. Evaluate cases for effective supply chain management and its implementation.
5. Analyse the role information technology in bringing transparency and execute smart contracts to maintain relationship management.

UNIT-I Introduction to Supply Chain Management:
Supply chain – objectives – importance –decision phases – process view – competitive and supply chain strategies – achieving strategic fit – supply chain drivers – obstacles – framework – facilities – inventory – transportation – information – sourcing – pricing.

UNIT-II Designing the supply chain network: Designing the distribution network – role of distribution – factors influencing distribution – design options – e-business and its impact – distribution networks in practice – network design in the supply chain – role of network – factors affecting the network design decisions – modeling for supply chain.

UNIT-III Designing and Planning Transportation Networks.: Role of transportation- modes and their performance - transportation infrastructure and policies - design options and their trade- offs – Tailored transportation.

UNIT-IV Sourcing and Pricing: Sourcing – In-house or Outsource – 3rd and 4th PLs – supplier scoring and assessment, selection – design collaboration – procurement process –sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.

UNIT-V Information Technology in the supply chain: IT Framework – customer relationship management – Internal supply chain management – supplier relationship management –transaction management – future of IT.

Text Books:
1. Sunil Chopra and Peter Meindl, Supply Chain Management – Strategy, Planning and Operation, Pearson/PHI, 3rd Edition,2007.
2. Coyle, Bardi, Longley, The management of Business Logistics – A supply Chain Perspective, Thomson Press, 2006.
3. Supply Chain Management by Janat Shah Pearson Publication 2008.

References:
1. Donald J Bowersox, Dand J Closs, M Bixby Coluper, Supply Chain Logistics Management, TMH, Second Edition, 2008.
2. Wisner, Keong Leong and Keah-Choon Tan, Principles of Supply Chain Management A Balanced Approach, Thomson Press, 2005.
3. DavidSimchi-Levi et al, Designing and Managing the Supply Chain – Concepts, ISBN-13: 978-0072357561.

| Subject | : Managerial Economics (Elective-I) | Subject Code: SMCAE 205 (03) |
| Maximum Marks | : 70 | Minimum Marks: 28 |

Course Objective:
1. To provide students a basic understanding of the economic theory and analytical tools for solving business problems.
2. To make student understand the nature of market forces of demand and supply
3. To make student learn techniques to solve business problem related to cost pricing and profits.
4. To develop understanding of students for market structures techniques for deciding pricing policy specific to market structure.
5. To make student understand the concept of profits acquire the knowledge of macro environmental variables so as to enhancing the practical decision making

Course Outcome
1. Student will have a good understanding of economic concepts and tools that have direct managerial applications.
2. The student will be able to forecast future demand and supply situation for their product.
3. The student will be able to take decisions related to cost and price.
4. The student will have better understanding of market structure and will be able to design pricing policies related to specific market and industry
5. Student will have a better understanding of profit management techniques and macro environmental factors and their impact on business decision making.

UNIT-I   **Introduction:** Nature, concept and scope of managerial economics. Objectives of the firm, Management and Behavioral theories of the firm, Role and responsibilities of Managerial Economist.

UNIT-II   **Demand and Cost analysis:** Cost Concepts, Law and nature of demand, demand determinants, elasticity of demand, methods of demand forecasting, Product and cost analysis: short run and long run average cost curves.

UNIT-III **Law of Returns and Production functions**. Law of supply. Economies and diseconomies of scale, law of variable proportions

UNIT-IV   **Pricing:** prescriptive approach, Price determination under perfect competition, Monopoly, oligopoly and monopolistic competition, Non price competition, price discrimination, price differentiation, Full cost pricing, Product strategies.

UNIT-V   **Profits:** Nature and measurement policy. Theories of profit, Business fluctuations and trade cycles, Break-even analysis, Input-output analysis, Social cost benefit analysis, Case study.

Text Books:

1. Mehta P.L., "Managerial Economics- Analysis, Problems and cases", Sultan Chand and Sons, New Delhi.
2. K. L Maheshwari, R.L.Varshney :" Managerial Economics", S.Chand

References:

1. Dwivedi D.N., "Managerial Economics" Vikas publications, Edition 6.
2. Dean J "Management economics " Prentice Hall of India, New Delhi, 1982 Mote. V.I. " Management economics " concepts and cases" Tata McGraw Hill. New Delhi 1980

Subject	: Enterprise Resource Planning (Elective -I)	**Subject Code: SMCAE 205 (04)**
Maximum Marks	: 70	**Minimum Marks : 28**

Course Objective:
1 To provide student knowledge about BPR and role of IT in BPR and how to improve Business Process.
2 Describe the evolution of ERP Systems, provide an overview of how ERP systems help address issues caused by all functional systems.
3 Provide an overview of Typical business process like HR, Finance, Sales order processing, marketing etc. and problem in traditional view.
4 Provide an overview about ERP Models like production scheduling, forecasting, distribution, and flow of data across the modules and supporting databases.
5 Review issues associated with implementing ERP systems and to discuss pros and cons of implementing ERP.

Course Outcome
1. Student will acquire an understanding of business process, organizational functional areas, need of reengineering, business process efficiency.
2. Student will be aware of advantages of an enterprise, how technology acts as business process enabler.
3. Student will be able to select best ERP vendor, Contracts with vendors, consultants and employees.
4. Student will get acquainted with different ERP implementation Strategies. know the reasons for the growth of ERP market ,top companies of
5. ERP market and understanding of TQM.
6. Student will have an understanding of ERP modules. ERP project management and monitoring, Pitfalls of ERP packages, ERP implementation lifecycle, Implementation methodology, organizing the implementation
7. Student will have an understanding of an ERP package with emphasis on: - Application basics, cross-sectional analysis of the other ERP systems
8. with the application.

UNIT-I **Conceptual foundation of Business Process reengineering**: Role of information Technology and BPR; Process improvement and Process redesign, Process identification and mapping; Role/Activity diagrams, Process Visioning, and benchmarking**.**

UNIT-II **Enterprise Resource Planning**: Evolution of ERP, structure of ERP- two tier architecture, three tier architecture, Electronic data processing, management information system, Executive information system, overview of supporting technologies, ERP as an integrator of information needs at various Levels**.**

UNIT-III Typical Business Processes: Core processes, Product control, Sales order processing, Purchase, Materials management, Human resource, Finance processes, Marketing, Strategic planning, Research and development, Problems in traditional view.

UNIT-IV **ERP models / functionality:** ERP domain, Sales order processing, Production scheduling, forecasting, distribution, finance, features of each of the models, description of data flow across each module.

UNIT-V **ERP implementation:** Reasons for growth of ERP market, Process of ERP**,** ERP implementation: process, implementation strategies, problems, people involved, cost of implementation, critical success factors for ERP implementations, ERP selection, identifying ERP benefits, Risks involved, team formation, Consultant intervention, Role of users and vendors. Case studies: SAP, ORACLE, SARA.

Text Books:
1. ERP, Concepts and Practices, V.K. GARG & N .K. VENKATKRISHNAN: 2n edition, PHI.
2. Enterprise wide Resource Planning-theory and practice, Rahul V. Altekar, PHI

References:
1. ALEXIS LEON: Enterprise Resource Planning, TMH------ ERP Demystified
2. S. SADAGOPAN: Management Information System, PHI Learning Pvt. Ltd.
3. V. RAJARAMAN: Analysis and Design of Information Systems, PHI
4. MONK' & BRADY: Concepts in ERP, Thomson learning.

Subject : Management Information System (Elective -I)   Subject Code: SMCAE 205 (05)
Maximum Marks : 70   **Minimum Marks: 28**

Course Objective:
1. The objective of this course is to make the student aware about the MIS and role, impact of MIS.
2. To explain the student decision making concept method and tool.
3. Explain to students the concept of system and planning control.
4. The course also includes DSS and Expert system concepts.
5. Identify the major management challenges to building and using information systems and learn how to find appropriate solutions to those challenges;

Course Outcome
1. Understand the basic concepts and technologies used in the field of management information systems.
2. Will able to make decision using DSS tool.
3. Have the knowledge of the different types of system and the concept of planning.
4. Develop an understanding of how DSS and Expert system work.
5. Understand the processes of developing and implementing information systems.

UNIT-I Introduction: Introduction to MIS, definition, Role, impact, subsystems of MIS, structure of MIS, MIS and computer, Executive information system, Transaction processing, Office Automation and Information processing control functions.

UNIT-II Conceptual Foundations: Decision making concept, method, tools, procedures, MIS and Decision making, Concept of information- mathematical definition, classification, methods of collection, value, age of information, Human as an information processor.

UNIT-III Systems, Planning and Control: System concept – definition, General model of system, types, subsystems, preventing system entropy, system stress and system change, system concept applied to MIS. Concept of planning and computational support for planning, characteristics of control.

UNIT-IV DSS and Expert Systems: Concept and philosophy, characteristics, structure of decision making, classes of DSS, users of DSS, support for decision making process, AI systems, Knowledge based Expert systems, semantic networks, MIS and role of DSS

UNIT-V Development and Implementation: Development of long range plans, ascertaining the class of information, determining the information requirement, Development and implementation of MIS, management of quality in MIS, organization for development of MIS, factors of success and failure of MIS

Text Books:
1. Godon B. Davis & Margrethe H. Olson, "Management Information Systems", TMH (2nded) .
2. W.S. Jawadekar 'Management Information Systems' TMH.

Reference Books:
1. S. Sadagopan 'Management Information Systems' PHI.
2. Jerome Kanter 'Managing with Information' PHI(4th edition).
3. James A. Senn 'Analysis and Design of Information systems ' MC Graw-Hill, International Edition.

Subject   : Digital Marketing (Elective-I)   Subject Code: SMCAE 205 (06)
Maximum Marks : 70   **Minimum Marks: 28**

Course Objective:
1. The purpose of this syllabus is to make students aware about the basics of marketing.
2. The course discusses about the important role of Digital Marketing in present age of Information Technology.
3. To make student aware about Email marketing.
4. To make student aware about Social Media Marketing.
5. To make student aware about Mobile Marketing.

Course Outcome
1. Understand basics of marketing.
2. Understand how segmentation and targeting can be done.
3. Understand the basics of digital marketing
4. Understand about the basics and importance of web marketing, email marketing and mobile marketing.

UNIT- I Introduction to Marketing: Importance and Scope of Marketing, Elements of Marketing - Needs, Wants, Demands, Consumer, Markets and Marketers; Marketing Vs Sales. Introduction to Digital Marketing, Benefits & Opportunity of Digital Marketing, Inbound and Outbound Marketing, Content Marketing, Understanding Traffic, Understanding Leads, Digital Marketing use in 'Business to Business' (B2B), 'Business to Consumer' (B2C) and 'Not-for-Profit' marketing.

UNIT- II Search Marketing (SEO): Introduction to Search Engine , Search Engine Optimization (SEO), importance of SEO for business websites, Search Results & Positioning, Benefits of Search Positioning, Role of Keywords in SEO, Meta Tags and Meta Description, On-page & Off-page optimization, Back Link, Internal & External Links, Ranking, SEO Site Map, Steps for B2B SEO and B2C SEO, Advantages & Disadvantages of SEO.

UNIT-III Email Marketing: Introduction to Email Marketing, Elements of Email, Email List Generation, Email Structure, Email Delivery, Online Data Capture, Off Line data Capture, Creating an Email campaign, Campaign Measurement, Concept of A/B testing & it's use in email marketing. Digital Display Advertising: Concepts, Benefits, Challenges, Ad Formats, Ad Features, Ad Display Frequency. Overview of Google Ad Words.

UNIT- IV Social Media Marketing: Key Concepts, Different Social Media Channels – Facebook, YouTube, Twitter, Instagram, Business Page- Setup and Profile, Social Media Content, Impact of Social Media on SEO, Basic concepts – CPC, PPC, CPM, CTR, CR. Case Study of Facebook (Facebook Account Setup, Facebook Marketing Strategy, Competition Analysis, Increase the Likes to Pages, Audience Targeting, Creating a post strategy). Importance of Landing Page. How to create& test landing Pages. User Generated Content (Wikipedia etc.), Multi-media - Video (Video Streaming, YouTube etc), Multi-media - Audio & Podcasting (iTunes etc), Multi- media - Photos/Images (Flickr etc).

UNIT- V Introduction to Mobile Marketing: Overview of the B2B and B2C Mobile Marketing, Use of Mobile Sites, Apps (Applications) and Widgets, Overview of Blogging Web Analytics: Introduction to Web Analytics, Web Analytics – Types & Levels, Introduction of Analytics Tools and it's use case (Google Analytics and others), Analytics Reporting, Traffic and Behaviour Report, Evaluate Conversions.

Text Books:

1.   Stanton William J., Fundamentals of Marketing, McGraw Hill, N. Delhi 10th Ed.

2.   Kotler Philip & Armstrong Graw, Principles of Marketing, Pearson Education, New Delhi 2004.

3.   Vandana Ahuja, Digital Marketing, Oxford Higher Education.

4.   Seema Gupta, Digital Marketing, McGrawHill

Reference Books:

1. Neelamegham S., Indian Cases in Marketing, Vikas Publication, New Delhi.

List of experiments:

1. Write a java program that accepts10-digit string as a telephone number and extracts the 3-digit area code, 3-digit exchange and the remaining 4-digit number as a separate string and print them.

2. Write a Java program to count the number of word sign a given sentences.

3. Write a java code to create a 2-D array having 5 rows, with first row having 1element, second row having 2 elements and so on. Store numbers in these cells by taking input from user and find the sum of the numbers of each row.

4. Write a program that creates an abstract class called Shape. Create two subclasses rectangle and triangle. Include appropriate methods for both the subclasses that calculate and display the area of the rectangle and triangle.

5. Write a java source code to accept elements of an integer array from command line and sort the array.

6. Define an exception NegArgException that is thrown if the argument is negative. Write a program to find the factorial of a number that uses this exception when the number is negative.

7. Create an exception called "NoMatchException" that is thrown if the string is note equal to "India". Handle the exception in your java program.

8. Write Java code to see the all the IP addresses of "www.google.com" using InetAddressclass.

9. Write Java code to see the port number, protocol name and host name of the URL http://download.oracle.com/javase/1.4.2/docs/api/java/lang/String.html.

10. Write a client server program that sends message to and from between client and server using UDP protocol.

11. Write a client server program that sends message to and from between client and server using TCP/IP protocol.

12. Write a java program to read a character file line by line and display its contents with line numbers.

13. Write a java program that display the contents of a directory passed through command line argument.

14. Write a program that illustrates how to use isDirectory() and list() methods to examine the contents of your directory.

15. Write a Java program to copy the contents of one file into other.

16. Createaclasscalledstudentwithrollnumberandname.Writetwoobjectsofstudentclassinafileandprintthe contents of file.

17. Write a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 20 numbers.

18. Write a java program that shows that synchronization between producer and consumer.

19. Write an applet program that accepts two input string using <param> tag and concatenate the strings and display it in the applet window.

20. Write a GUI based java program that handles mouse events.

21. Write a GUI based java program that handles key events.

22. Construct a Swing based GUI that perform simple arithmetic operations on two numbers.

23. Write a GUI based java program that copies the contents of one list into other.

24. Write a GUI based java program having the gender in option buttons and the hobbies as check boxes and displays the selections made by the user.

25. Create a simple java Applet that shows the mouse moving position only on the status bar of the Applet window using Mouse Motion Adapterclass.

26. Writeawell-documentedJavasourcecodethatacceptsastringfromJOptionPaneInputDialogandverifyweather that strings a Palindrome or not.

27. Create a simple servlet used to print "HELLOWORLD".

28. Write a servlet that takes two numbers through the html file and prints the sum of the two numbers.

29. Write Java source code that can transfer the contents of some textfile" D:/SampleDir/SouceFile.txt"intoanothertext file"D:/SampleDir/TargetFile.txt" using some appropriate stream class. The code should also consider the possible exceptions.

30. Write a Java code to display all there cords of a table store din MS-Access/oracle database.

List of Equipments/Machine required:

(i) Software: The Java Development Kitversion1.6 (JDK1.6ormore) and Java Servlets Development Kit.

Recommended Books:

(i) "Head First Java" by Kathy Sierra & Bert Bates O'Reilly Publication.

(ii) "Head First Servlets and JSP" Bryan Basham, Kathy Sierra & Bert Bates.

Subject	**: Unix (Lab)**	**Subject Code: SMCAP 207**	
Maximum Marks	**: 50**	**Minimum Marks: 17**	

List of Experiments:

1) Practice of UNIX Basic commands, directory and files related commands, administrative commands, advanced commands: tr, sed, awk. filters, redirection operators, pipe operator.

2) Working with vi editor.

3) Find the factorial of any number using awk command.

4) Write awk command to count the number of times each word occurs in a sorted list that contains one word per line.

5) Consider the data file containing columns: item name ,id, number of item sold and cost per item. Write a shell script to display
   - i) Total no. of item sold
   - ii) Total cost of individual item
   - iii) Total cost of all item

6) Write shell script to display menu for the following
   - a. Display file contents with line number
   - b. Display the file contents with page break
   - c. Quit.

7) Write a shell script for accepting the following information and storing it in file.
   - i) customer name
   - ii) item description
   - iii) quantity
   - iv) rate the user should get the facility to enter any number of records.

8) Write menu driven shell script to execute 5 basic command of UNIX.

9) Write shell script to check the no is prime or not.

10) Find greatest among three no. using shell script.

11) Write interactive shell script to copy the contents of one file to another.

12)12) Display the output of ls-l command in user friendly way.

13) Write a shell script to search a word in list of file .Take the file name as input from command line argument in which one of them will contain words to search and another will contain name of files.

14) Write shell script to check whether the string is-
   - i. vowel
   - ii. 'unix' or 'UNIX
   - iii. it is two character long

15) Write shell script to perform following for each file of current directory-
      i. To delete a file if its extension is .old
      ii. To copy a file it its extension is .c
      iii. To move a file it its extension is .txt
      iv. To display the contents of file if it has read permission

16) Write a shell script to delete one of the file if two file are similar if not, display proper message. Write shell Script - with command line argument, without command line argument.

17) Write shell script to generate multiple answer type questions.

18) Write a shell script that accepts one or more file names as arguments and converts their contents to uppercase.

19) Write a shell script using set command which uses date that prints the usual date output as default but which has options for printing just the time, just the day-month-year or just the day of week.

20) Write a shell script program to sort the numbers in descending order supplied as command line arguments.

Text Book:

1. Sumitabha Das, Unix Concepts and Applications, 4th Ed. Tata McGraw Hill

2. B.A. Forouzan, Unix and Shell Programming, Cenegage Learning India Private Limited

Reference Book:

1. Y. Kanetkar, Unix Shell programming, BPB Publications

List of Experiment:

1. Introduction to Local Area Network with its cables, connectors and topologies.
2. Installation of Switch. Hub their cascading and network mapping.
3. Installation of UTP, Co-axial cable, Cross cable, parallel cable NIC and LAN card
4. Case Study of Ethernet (10 base 5,10 base 2,10 base T)
5. Installation and working of Net meeting and Remote Desktop.
6. Installation and working with Telnet (Terminal Network).
7. Installation and working with FTP (File Transfer Protocol).
8. Installation and Computers via serial or Parallel ports and enable the computers to share disk and printer port.
9. To connect two Personal Computer with Telephone line.
10. Installation of Modem and Proxy Server.
11. Working with Null Modem.
12. Installation of Windows 2003 server/ Windows 200 server.
13. Configuration of DHCP.
14. Introduction to Server administration.

Recommended Books.

1. Computer Network and internet by Dougles E. Comer (Pearson Education)
2. List of Software required :-
3. Windows 2003 server/Windows 2000 server.
4. List of Hardware required :-
5. LAN Trainer Kit LAN Card Cable, Connectors, HUB, Switch, Crimping Tools.

Dev Sanskriti Vishwavidyalaya

Scheme of Teaching and Examinations
Master of Computer Applications (MCA)
Semester-III

S. No	Board of Studies	Subject ode	Subject Name	Periods Per Week			Scheme of Examination				Total Marks	Credits
							Theory		Practical			
				L	T	P	EX	IN	EX	IN		
	CORE SUBJECT											
1	Computer Applications	SMCAC 301	Computer Graphics and Image Processing	3	1	-	70	30	-	-	100	4
2	Computer Applications	SMCAC 302	Cryptography and Network Security	3	1	-	70	30	-	-	100	4
3	Computer Applications	SMCAC 303	Data Science	3	1	-	70	30	-	-	100	4
	ELECTIVE SUBJECT											
4	Computer Applications	SMCAE 304	**Elective-I**	3	1	-	70	30	-	-	100	4
5	Computer Applications	SMCAE 305	**Elective-II**	3	1	-	70	30	-	-	100	4
	PRACTICALS											
6	Computer Applications	SMCAP 306	Data Science (Lab)	0	0	5	-	-	35	15	50	3
7	Computer Applications	SMCAP 307	Android (Lab)	-	-	4	-	-	35	15	50	2
8	Computer Applications	SMCAP 308	Minor Project*	-	-	4	-	-	35	15	50	2
9	Humanities	LMUC 301	Life management	-	-	2	-	-	35	15	50	-
	Total			**15**	**05**	**15**	**350**	**150**	**140**	**60**	**700**	**27**

L: Lecture T: Tutorial P: Practical ESE: End Semester Examination TA: Teacher's Assessment CT: Class Test

Note: * Student has to undergo 4 weeks training/certification/internship/online course after the second semester during summer vacation, which would be given weightage in assessments of 3rd semester minor project.

Table-I (Elective-I)

Board of Studies	Subject Code	Subject Name
Computer Applications	304 (01)	Natural Language Processing
Computer Applications	304 (02)	Mobile Computing
Computer Applications	304 (03)	Compiler Design
Computer Applications	304 (04)	Neural Network & Fuzzy Logic
Computer Applications	304 (05)	Blockchain Technology

Table-II (Elective-II)

Board of Studies	Subject Code	Subject Name
Computer Applications	305 (01)	Machine Learning
Computer Applications	305 (02)	Parallel Processing
Computer Applications	305 (03)	Internet of Things
Computer Applications	305 (04)	Formal Language and Automata Theory
Computer Applications	305 (05)	Operation Research

Dev Sanskriti Vishwavidyalaya
Semester III

Subject: Computer Graphics and Image Processing
Maximum Marks: 70

Subject Code: SMCAC301
Minimum Marks: 28

Course Objectives:
1. To give an understanding of fundamentals algorithm for output primitive
2. To make students learn what type of operation can be applied on graphical object and how they are applied
3. To give an understanding of surface rendering for realistic images for developing graphical application
4. To give learner an understanding of basic Knowledge of image processing for computer vision.
6. To give an understanding about finding of different research areas in Image Processing and compression techniques.

UNIT- I   Fundamentals of Computer Graphics: Concepts and applications, Random and Raster scan devices, input-output devices: CRT, LCD, laser printer. Output primitives: Line drawing algorithm: DDA and Bresenham's; Circle generating algorithm: Bresenham's, Midpoint algorithms, Antialiasing techniques: super sampling, pixel weighting, area sampling, pixel phasing Area filling: boundary fill algorithm, flood fill algorithm: Scan-line Polygon Fill Algorithm.

UNIT- II Transformation, viewing, Clipping: 2-D Transformation: Translation, scaling, rotation, reflection, shear, matrix representation of all homogeneous coordinates, composite transformations. Two-dimensional viewing: Viewing pipeline Window-to viewport transformation. Clipping operations: Line Clipping: Cohen Sutherland, and Liang-Barsky, Polygon Clipping: Cohen-Sutherland-Hodgeman and Weiler –Atherton Polygon clipping.

UNIT- III 3D Transformation, Visible Surface Detection and curves: Visible Surface detection Algorithm: Object based and image-based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Depth Sorting Method, Area subdivision method. 3-D Transformation: translation, scaling, rotation, reflection. Three- dimensional object representations 3-D Viewing Projections –parallel and perspective projection. Curved lines and Surfaces: Spline representations, Interpolating and approximation curves, continuity conditions Bezier curves: concept and characteristics; B-Spline curves: concept and characteristics.

UNIT- IV   Introduction to image processing Origin of Image Processing, Application of Image Processing, fundamentals of Image Processing, components of DIP system, Image formation model, Spatial & Gray level resolution, Image enhancement in special domain: Piecewise transformation functions, Histogram equalization, Histogram specification, image averaging. spatial filters- smoothing and sharpening, Laplacian filter, image sampling and quantization, some basic relationships between pixels.

UNIT- V   Image Compression: Data compression: storage space, coding requirements. Source, entropy and hybrid coding some basic compression technique: run length code, Coding redundancy- Huffman coding, LZW coding, run length coding, Lossy compression- DCT, JPEG, MPEG, video compression.

Text Books:

1 Computer Graphics by Donald Hearn & M. Pauline Baker PHI
2. Multimedia Computing communication& applications "By Ralf Steimnety & Kerla Neshtudt. Prince Hall.

Reference Books:

1. Principles of interactive compo Graphics; W.M. Newman & Robert F Sproull.
2. Computer Graphics By Rogers TMH
3. Introductions to Computer Graphics Anirban Mukhopadhyay &Arup Chattopadhyay
4 Schaum's outlines -computer Graphics Mc Graw Hill International Edition.5
5. Principles of Multimedia by Ranjan Parekh TMH

Course Outcomes:

1. Students will be able to implement the logic of drawing basic output primitive while developing graphical package
2. Student will have ability to apply various 2D and 3D transformation concept on objects
3. Students will be able develop clipping operation and generate curves
4. Students will have the concept of basic compression techniques for images
5. Students will be equipped with techniques used in image processing

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Cryptography and Network Security
Maximum Marks: 70

Course Objectives:
1. To make student know, the essentials of computer security, also to provide the basic knowledge of security issues.
2. To make students know, different cryptography techniques namely public and private key cryptography.
3. To make students understand, network security protocol including firewall.
4. The students will be able to know advanced attacking techniques.

UNIT- I FOUNDATION OF CRYPTOGRAPHY AND SECURITY: -The OSI Security Architecture, A model for network Security, Symmetric cipher model Substitution techniques Mathematical Tools for Cryptography: Modular Arithmetic, Euclid's Algorithm. Design Principle of Block ciphers: Theory of Block Cipher Design, Feistel ciphers, DES and Triple DES, Strength Of DES, Modes of Operation (ECB, CBC, OFB, CFB).

UNIT- II PUBLIC KEY CRYPTOGRAPHY: - Prime Numbers and Testing for Primality, Principles of public key Cryptosystems RSA, Key Management Diffie- Hellman, key exchange, Hashes and Message Digests: Message Authentication codes, MD5, SHA-1, HMAC.

UNIT- III DIGITAL SIGNATURES, CERTIFICATES, AND STANDARDS: - Digital Signature Standard (DSS and DSA), Authentication: Kerberos V4, Electronic Mail Security: Pretty Good Privacy (PGP), **System Security**: Computer Virus, Firewall and Design Principles, Electronic Commerce Security: Secure Electronic Transaction (SET).

UNIT- IVCYBER SECURITY FUNDAMENTALS & ATTACKING TECHNIQUES: Security Concepts: Cyber Crimes and Criminals: Definition of cyber-crime, types of cyber-crimes and types of cyber-criminals. Anti-forensics: Use of proxies, use of tunneling techniques. Fraud techniques: Phishing and malicious mobile code, Rogue antivirus, Click fraud. Threat Infrastructure: Botnets, Fast Flux and advanced fast flux.

UNIT–V CYBER SECURITY POLICY CATALOG: Cyber Governance Issues, Internet Names and Numbers, Copyrights and Trademarks, Email and Messaging, Cyber User Issues, Cyber Crime, Geo location, Privacy, Cyber Conflict Issues, Intellectual Property Theft, Cyber Espionage.

Text Books:
 (1) Cryptography and Network Security, William Stalling, PHI.
 (2) Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
 (3) Cyber Security Essentials, James Graham, Richard, Ryan CRC press, 2011.

Reference Books:
 (1) Cyber Security policy Guidebook, Jennifer, Jason, Paul, Marcus, Jeffery, Joseph. Wiley Publication,2012.
 (2) Robertra Bragg "Network Security: The Complete Reference", Tata McGraw Hill.

Course Outcome:
1. The students will be able to understand cyber security fundamentals.
2. The students will understand cryptography techniques and function.
3. The students will have in depth understanding of network security algorithms including Firewall.
4. The students will be able to know various advanced attacking techniques.
5. The students will be able to know various cyber security policies.

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Data Science
Maximum Marks: 70

Subject Code: 303
Minimum Marks: 28

> **Course Objectives**:
> 1. To make students understand the fundamentals of data science
> 2. To introduce python-based programming toolkit for developing basic models
> 3 To make student understand mathematics behind data analysis
> 4. To impart fundamentals of machine learning algorithms
> 5. To design and develop DS models for real time applications

UNIT-I Data science in a big data world: 1.1 Why Data Science, Benefits and uses of data science; Facets of data. 1.2 The data science process: Setting up goal, retrieving data, data preparation, data exploration, data modelling, Presentation and automation.

UNIT-II Introduction to Programming: Sequence data: string, list, dictionary, array and tuple. Tools for Data Science 2.1 Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK 2.2 Visualizing Data: Bar Charts, Line Charts, Scatter plots 2.3 Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction

UNIT-III Mathematical Foundations Mathematical Foundations 3.1 Linear Algebra: Vectors, Matrices, 3.2 Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation 3.3 Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem 3.4 Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, P-hacking, Bayesian Inference

UNIT-IV Machine Learning : Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks Learning And Generalization, Overview of Deep Learning.

UNIT-V Application of Data Science Complete development of an application using data science techniques like Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.**:** Exploratory data analysis, data visualization on data set, Prediction, analysis and accuracy of the system.

Text Books
1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. Davy Cielen, Arno, D,B Meysmen, Mohamed Ali "Introducing Data Science", Manning
3. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media

Reference Books
1. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi.
2. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.
3. Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.
4. Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi.
5. Ian Good fellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press http://www.deeplearningbook.org
6. Han and Jian Pei, "Data Mining Concepts and Techniques
7. NPTEL course on " Data science using python"

> 1. Students should be familiar with data science tools
> 2. Students should be able to build a data science model using DS concept
> 3. Student should be able to visualize data and understand the data semantics.
> 4. Build data science applications using Python based toolkits.

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Natural Language Processing (Professional Elective -I)　　　　**Subject Code: 304-1**
Maximum Marks: 70　　　　**Minimum Marks: 28**

Course Objectives:
1. To introduce the fundamental techniques of natural language processing.
2. To develop an understanding of the limits of those techniques.
3. Current research issues, and to evaluate some current and potential applications.

UNIT - I Grammars and Parsing:
Grammar and sentence structure, good grammar, top-down and bottom-up chart parser, transition network grammars, finite state models and morphological processing, grammar and logic programming.

UNIT - II Features and unification:
Human preferences in parsing, encoding uncertainty: shift- Reduce Parsers, A deterministic Parser, Techniques for efficient encoding of ambiguity, semantics and logical form, word senses and ambiguity, partial parsing, feature stems and augmented grammars, some basic feature systems for English, morphological analysis and the lexicon, parsing with features, augmented transition networks, definite clause grammars, generalized feature systems and unification grammars.

UNIT - III Linking syntax and semantics:
Semantics and logical form, word senses and ambiguity, the basic logical form language, encoding ambiguity in the logical form, verbs and states in logical form, thematic roles, speech acts and embedded sentences, defining semantic structure: Model theory, semantic interpretation and compositionality, a simple grammar and lexicon with semantic interpretation, prepositional phrases and verb phrases, lexicalized semantic interpretation and semantic roles. Semantics interpretation using feature unification, generating sentences from logical form.

UNIT - IV Strategies for Semantic Interpretation:
Selection restrictions, semantic filtering using selection restrictions, semantic networks, statistical word sense disambiguation, statistical semantic preferences, combining approaches to disambiguation, grammatical relations, semantic grammars, template matching, semantically driven parsing techniques, scooping phenomena, descriptions and scooping, scooping with parsing, co-reference and binding constraints, adjective phrases, relational nouns and nominalizations.

UNIT - V Natural language generation and translation:
Introduction to language generation, architecture for generation, surface realization, systemic grammar, functional unification grammar, discourse planning, text schemata, rhetorical relations, micro planning, lexical selection, evolution generation stems, generating speech, language similarities and differences, the transfer metaphor, syntactic transformations, lexical transfer, the interlingua idea, direct translation, statistical techniques, quantifying fluency, quantifying faithfulness, usability and system development

Text Books:
　　1. Speech and Language Processing, Daniel Juraf sky & James H. Martin, LPE, Pearson Education.
　　2. Natural Language Understanding, James Allen, 2nd edition, Pearson Education.
Reference Books:
　　1. Natural language processing in prolog, G.Gazder, Benjamin/cunnings

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Course Outcome:
1. Understand the fundamentals of natural language processing
2. Have practical experience using NLP tools
3. Have practical experience applying NLP to a real-world problem
4. Understand how NLP relates to search engines
5. Understand how NLP relates to text mining

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Mobile Computing (Professional Elective-I)   **Subject Code: 304-2**
Maximum Marks: 70   **Minimum Marks: 28**

Course Objectives:
1. The course aims to impart the concepts of wireless communication techniques.
2. Provide extension to communications fundamentals acquired.
3. Helps to understand basics of mobile environment and the technology in the various wireless communications.

UNIT-I   Introduction to Wireless Technology:
Mobile and wireless communications, Applications, history, market vision, overview Frequency of Radio Transmission, Signal Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Error Detection: Parity Check, CRC. Block Error Correction Code: BHC Code, Reed- Solomon Code.

UNIT-II Wireless Communication:
Cellular systems: CDMA, FDMA, TDMA, CSDMA and   comparison between them,   Generations of Cellular Networks 1G, 2G, 2.5G, 3G and 4G

UNIT-III Wireless Lan:
IEEE 802.11, WiFi, IEEE 802.16 Bluetooth: Packet Format and architecture, WIMAX: Standards, Architecture and Services.

UNIT-IV   Mobile Communication Systems:
GSM- Mobile services, System architecture, Radio interface, Protocols & Localization and calling, Handover & Security. DECT: System architecture, Protocol architecture. TETRA, UMTS: UMTS system architecture.
Mobile Network Layer: Mobile IP – Dynamic Host Configuration Protocol, Mobile Ad Hoc Routing Protocols– Multicast routing

UNIT-V   Mobile Transport Layer:
TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP , TCP over 2.5 / 3G wireless Networks.
Application Layer: Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, WML – WML Scripts – WTA - iMode- SyncML.

Text Book:
1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education
2. William Stallings, "Wireless Communications and Networks", Pearson Education

Reference Books:
1. Vijay Garg, "Wireless network evolution: 2G to 3G", Prentice Hall, 2002.
2. MISRA "Wireless Communication and Networks: 3G and Beyond", McGraw Hill
3. Principles of mobile computing and mobile communications by Melizza Othman CR Cpress
4. 802.11 Wireless Networks: The Definitive Guide, 2nd Edition Matthew Gast, O'Reilly
5. Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic, Wiley India Edition
6. Wireless and Mobile Network Architectures Yi-Bing Lin, ImrichChlamtac
7. Wireless and Mobile Networks: Concepts and Protocols, Dr. Sunilkumar S. ManviS.Kakkasageri

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Course Outcome:
1. Students will learn wireless technologies, tools and frameworks which will help them to understand the mobile and the other wireless communications.
2. Students will be understands architecture of mobile system.
3. Students will develop understanding TCP over mobile network.
4. Students will have understanding of architecture.

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Compiler Design (Professional Elective -I)   **Subject Code: 304-3**
Maximum Marks: 70   **Minimum Marks: 28**

Course objectives:
1. To introduce various phases of compiler design.
2. To introduce the major concept areas of language translation and compiler design
3. To develop an awareness of the function and complexity of modern compilers.
4. To introduce code optimization techniques.

UNIT- I Introduction:
Introduction to Compiler, single and multi-pass compilers, Translators, Phases of Compilers, Compiler writing tools, Bootstrapping, Finite Automata and Lexical Analysis: Role of Lexical Analyzer, Specification of tokens, Recognition of tokens, Regular expression, Finite automata, from regular expression to finite automata, transition diagrams, Implementation of lexical analyzer, Tool for lexical anal yzer–LEX, Error reporting.

UNIT- II Syntax Analysis and Parsing Techniques:
Context free grammars, Bottom-up parsing and top down parsing, Top down Parsing: elimi nation of left recursion, recursive descent parsing, Predictive Parsing; Bottom Up Parsing: Operator precedence parsing, LR parsers, Construction of SLR, canonical LR and LALR parsing tables, Construction of SLR parse tables for ambiguous grammar.

UNIT- III Syntax Directed Translation & Intermediate code generation:
Synthesized and inherited attributes, dependency graph, Construction of syntax trees, bottom up and top down evaluation of attributes, Sattributed and L-attributed definitions. Postfix notation; Three address code, quadruples, triples and indirect triples, Translation of assignment statements, control flow, Boolean expressions.

UNIT- IV Runtime Environment:
Storage organization, activation tree, activation record, allocation strategies: stack and heap, symbol table management, dynamic storage allocation: implicit and explicit.

UNIT- V Code Optimization & Code Generation:
Basic blocks and flow graphs, Optimization of basic blocks, Loop optimization, Loop invariant computations. Issues in the design of Code generator, simple Code generator.

Text Books:
1. Compilers-Principles, Techniques and Tools by Alfred V.Aho, Ravi Sethi and J.D. Ullman, AddisonWesley.
2. PrinciplesofCompilerDesign,AlfredV.AhoandJ.D.Ullman,NarosaPublication.

Reference Books:
1. Compiler design in C by A.C. Holub, Prentice Hallof India.
2. Compiler construction (Theory and Practice) by A. Barret William and M. Bates (Galgotia Publication).
3. Compiler Design, Kakde, Compiler Design, Galgotia Publication.

Course Outcome:
1. Students will have a concrete view on the theoretical and practical aspects of compiler design
2. Students will be able to apply ideas and techniques discussed to various software design
3. Students will be able to understand the complexity of compiler.
4. Students will be able to understand the working of runtime environment.

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Neural Network & Fuzzy Logic (Professional Elective -I)   **Subject Code: 304-4**
Maximum Marks: 70   **Minimum Marks: 28**

Course Objectives:
1. The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
2. To learn the various architectures of building an ANN and its applications
3. To learn the advanced methods of representing information in ANN like self-organizing networks, associative and competitive learning
4. To learn the fundamentals of Crisp sets, Fuzzy sets and Fuzzy Relations.

UNIT- I Introduction to Artificial Neural Networks:
Elementary Neurophysiology Models of a Neuron, Neural Networks viewed as directed graphs, Feedback, from neurons to ANN, Artificial Intelligence and Neural Networks; Network Architectures, Single layered Feed forward Networks, Multi-layered Feed-forward Networks, Recurrent Networks, Topologies.

UNIT- II Learning and Training:
Activation and Synaptic Dynamics, Hebbian, Memory based, Competitive, Error Correction Learning, Credit Assignment Problem: Supervised and Unsupervised learning, Memory models, Stability and Convergence, Recall and Adaptation.

UNIT- III A Survey of Neural Network Models:
Single-layered Perceptron – least mean square algorithm, Multilayered Perceptrons – Back propagation Algorithm, XOR – Problem, The generalized Delta rule, BPN Applications, Adalines and Madalines – Algorithm and applications.

UNIT- IV Applications:
Talking Network and Phonetic typewriter : Speech Generation and Speech recognition, Neocognitron - Character Recognition and Handwritten Digit recognition, Pattern Recognition Applications.

UNIT- V Neural Fuzzy Systems:
Introduction to Fuzzy sets, operations, relations, Examples of Fuzzy logic, Defuzzy fication, Fuzzy Associative memories, Fuzziness in neural networks examples, Fuzzy Rules and Fuzzy Reasoning : Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Fuzzy Reasoning system development

Text Books:
   1. Speech and Language Processing, Daniel Jurafsky & James H. Martin, LPE, Pearson Education.
   2. Natural Language Understanding, James Allen, 2nd edition, Pearson Education.
Reference Books:
   1. Natural language processing in prolog, G.Gazder, Benjamin/cunnings

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Course Outcome:
1. Students will be able to understand Artificial Neural Network concept with the help of Biological Neural Network
2. Students will be able to implement algorithms to train ANN by using learning algorithms
3. Students will be able to test fuzzy set operations and binary relations

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Blockchain Technology (Professional Elective -I)   **Subject Code: 304-5**
Maximum Marks: 70   **Minimum Marks: 28**

Course objectives:
1. To provide the understanding of fundamentals of Block Chain Technique.
2. To provide the in-depth concept of Block Chain Technique.
3. To various aspects of block Chain for required for Enterprises
4. To provide the knowledge of various Applications of Block chain
5. To provide the knowledge of Block Chain Implementation Platform and writing Applications
6. The course covers the technological underpinning of block Chain operations in both theoretical and practical implementation of solutions using block Chain technology.

UNIT- I Introduction
Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree,

UNIT- II Understanding Block chain with Crypto currency
Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hash cash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

UNIT- III Understanding Block chain for Enterprises
Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

UNIT- IV Applications of Block chain:
Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain, e-governance.

UNIT- V Block chain application development Platforms
Hyper ledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyper ledger Fabric, Overview of Ethereum , Ripple and Corda.

Text Books:
1. Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, 2015
2. Josh Thompsons, "Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming"
3. Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017

Reference Books:
1. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
2. Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing
3. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
4. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer", Import, 2018

Course Outcomes:

After the completion of this course, the students will be able to:

1. Understand block chain technology.
2. Able to understand block chain Applications.
3. Develop block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
4. Build and deploy block chain application for on premise and cloud based architecture.
5. Integrate ideas from various domains and implement them using block chain technology in different perspectives.

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Machine Learning (Elective -II) **Subject Code: 305-1**
Maximum Marks: 70 **Minimum Marks: 28**

Course objectives:
1. To make students familiar with basics of machine learning
2. To make students understands principle of supervised learning
3. To give an insight of statistical and neural network models
4. To give basic idea of unsupervised learning and decision tree

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UNIT-1: **Towards Intelligent Machine:** well -posed machine learning problems; applications of machine learning, data representation domain knowledge for productive use of machine learning; diversity of data Forms of learning: Supervised, unsupervised; reinforcement; Evolutionary computation, swarm intelligence. Machine learning and data mining, Basic linear algebra

UNIT-II: **Supervised Learning:** rationale and basics: Learning from observation, Empirical risk minimization, Inductive learning , Bias and variance. Why learning works? Computational learning theory. Occam's Razor Principle and over fitting avoidance. Heuristic search and Inductive learning. Ensemble Learning. Evaluation of Learning system. Estimating generalization error: Hold out method and random sub sampling, cross validation, Bootstrapping. Metrics for assessing regression accuracy and classification accuracy, confusion Matrix. Comparing Classifiers on ROC curves. An overview of design cycle and issues in machine learning

UNIT-III: **Statistical learning:** Machine learning and inferential statistical analysis, descriptive statistics in learning techniques: probability distribution, expected mean value covariance, Euclidean distance. Bayesian reasoning, bayes theorem, General bayes theorem. Naïve Bayes Classifier, Bayesian belief networks, k-nearest classifier. Linear regression with LSE criterion. Logistic regression. Learning with support vector machines (SVM): Introduction, linear discriminant functions for binary classification. Perceptron algorithm. Hyperplane of SVM: Large and small margin separation, non linear classifier, regression by SVM

UNIT-IV: Learning with neural networks: Cognitive machine., perceptron to deep networks, neuron models, activation functions, network architecture, feed forward, multilayer perceptron, recurrent networks, standard gradient descent optimization technique. MLP: back propagation algorithm multi class witl MLP, Radial bias function (RBF)

UNIT-V: **Data clustering and data transformation:** Unsupervised learning: Clustering Exploratory data analysis, Clustering analysis. Application of cluster analysis. Basic clustering : partitional and hierarchical, k-means clustering. Decision tree learning Introduction ,example. Measure of impurity: Information gain, gain ratio, gini index ID3 decision tree. Genetic algorithm for search optimization: overview, genetic on computers, genetic operator. Reinforcement learning: elements of RL .

Text Books:
1. Tom M Mitchell, "Machine Learning", McGraw Hill, 1st Edition, 2003.
2. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, 2nd Edition, 2010.
3. Stephan Marsland, "Machine Learning - An Algorithmic Perspective", Chapman and Hall, 1st Edition, 2009.

Reference Books:
1. Nils Nilsson, "Introduction to Machine Learning", MIT Press, 1997.
2. Jude Shavil, Thomas G Dietterich, "Readings in Machine Learning", Morgan Kaufmann Publishers.

Course Outcomes:
1. Students will learn supervised learning algorithms
2. Students will understand the concepts of statistical reasoning algorithm and will be able to implement them
3. Students will have idea of unsupervised learning techniques
4. Students will be familiar with concepts of decision tree and clustering algorithm

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Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Parallel Processing (Elective -II)
Maximum Marks: 70

<div>
Subject Code: 305-2
Minimum Marks: 28
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Course Objectives:
1. To learn how to design parallel programs and how to evaluate their execution.
2. To understand the characteristics, the benefits and the limitations of parallel systems and distributed infrastructures
3. Build experience with interdisciplinary teamwork

UNIT- I Introduction to parallel processing:
Trends towards parallel processing; Parallelism in Uniprocessor systems: Basic Uniprocessor Architecture, Parallel Processing mechanisms, Multiprogramming and Time Sharing; Parallel Computer Structures: Pipeline computers, Array computers, Multiprocessor systems, Performance of Parallel Computers; Architectural classification schemes; Parallel processing applications.

UNIT- II Principles of Pipelining and Vector Processing:
Principles of Linear Pipelining, Classification of Pipelined processors, General pipelines & Reservation tables, Instruction and Arithmetic Pipelines: Design examples and principles of design, Vector Processing: characteristics, Multiple Vector Task Dispatching, Pipelined Vector Processing methods. Architecture of Cray-I.

UNIT- III Structure of Array Processors- SIMD Array Processors:
Organizations, Masking and Data Routing Mechanisms; SIMD Interconnection Networks: Static, Dynamic, Mesh-Connected, Cube Interconnection Networks, Shuffle Exchange, Omega Networks; Performance Enhancement methods; Associative Array processing: Associative Memory Organization, Associative Processors.

UNIT- IV Multiprocessor Architecture:
Functional Structures – Loosely Coupled and Tightly coupled multiprocessors; Interconnection Networks for multiprocessors: Crossbar Switch and multiport memories, Multistage Networks for multiprocessors; Exploiting Concurrency for multiprocessors, Parallel Memory Organizations: High order & Low order interleaved memory; Multiprocessor Scheduling strategies, Inter process communication mechanisms: Process Synchronization Mechanisms, Synchronization with Semaphores, Conditional critical section & monitors.

UNIT–V Algorithms on Array processors;
 Parallel Algorithms on Array Processors- SIMD Matrix Multiplication, Parallel Sorting on Array Processors, SIMD Fast Fourier Transform, Parallel Algorithms of Multiprocessors- Classification of Parallel Algorithms, Synchronized Parallel Algorithms, Asynchronous Parallel Algorithms, Performance of Parallel Algorithms.

Text Book:
1. Computer Architecture & parallel Processing- Kai Hwang & A. Briggs (McGraw Hill)
2. Designing Efficient Algorithms for Parallel Computers – H.J. Quinns (McGraw- Hill)

Reference Book:
1. Advanced Computer Architecture: parallelism, Scalability, Programmability- By:- KaiHwang (TMH)
2. Computer Organization & Programming – By – Gear (TMH)**3.** Parallel Processing for Supercomputers & Artificial Intelligence –By – Hwang &Degroo

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Course Outcome:
1. Be able to reason about ways to parallelize a problem
2. Understand, appreciate and apply parallel and distributed algorithms in problem solving
3. Understand the evolution of high-performance computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents

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Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Internet of Things (Elective -II)   **Subject Code: 305-3**
Maximum Marks: 70   **Minimum Marks: 28**

Course objectives:
 1. To impart necessary and practical knowledge of components of Internet of Things
 2. Develop skills required to build real-life IoT based projects.

Unit- I: Introduction to IoT
Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNIT- II: Elements of IoT
 Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT- III: IoT Application Development
 Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration,

UNIT- IV: IoT Device Data storage and authorization of devices:
Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

UNIT- V : IoT Case Studies
IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

Text Books:
 1. Vijay Madisetti, Arshdeep Bahga, Internet of Things, "A Hands on Approach", University Press
 2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

Reference Books:
   1. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
   2. Adrian McEwen, "Designing the Internet of Things", Wiley
   3. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
   4. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

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Course Outcomes:
After the completion of this course, the students will be able to:
   1. Understand internet of Things and its hardware and software components
   2. Interface I/O devices, sensors & communication modules
   3. Remotely monitor data and control devices
   4. Develop real life IoT based projects

Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Formal Language and Automata Theory
(Elective-II)
Maximum Marks: 70

Subject Code: 305-4
Minimum Marks: 28

Course Objectives:
1. To introduce concepts of automata theory.
2. To identify different formal language classes and their relationships
3. To design grammars and recognizers for different formal languages
4. To determine the decidability of computational problems

UNIT- I
Alphabet, String and language, Finite state systems, finite automata with ε moves, Conversion of NDFA to DFA, Removal of ε transition from NDFA, Two way finite automata, finite automata with output, Mealy & Moore machines, Applications of finite automata, minimization of finite automata.

UNIT- II
Chomsky hierarchy, Regular Expression and Language, Properties of Regular languages, Pumping lemma for regular sets, Closure properties of regular sets, Decision algorithms for Regular sets, Myhill- Nerode theorem.

UNIT- III
Context free grammars and their properties, derivation tree, simplifying CFG, ambiguity in CFG, Chomsky Normal form, Greibach Normal form, Pumping lemma for CFL, Closure properties of CFL.

UNIT- IV
Pushdown automata: Informal description, Definition, Determinism and Non determinism in PDA, Equivalence of PDA's and CFL's. Two way PDA, Concept of Linear Bounded Automata, context sensitive grammars and their equivalence, Turning machine construction, determinism and non-determinism in TM, Multi tape, multi-track TM.

UNIT- V
Undecidability, Universal turning machine and an undecidable problem, recursive function theory, Recursively enumerable sets, recursive sets, partial recursive sets, Church's hypothesis, post correspondence problem, Russell's paradox.

Text Books:
1. Introduction to Automata Theory Language and Computation, John E. Hopcraft and Jeffary D. Ullman, Narosa Publication house.
2. Theory of Computer Science, Automata Languages & computation , K.L.P. Mishra, N. Chandrashekharan, PHI, New Delhi.
Reference Books:
1. Introduction to Formal Languages, Automata Theory and Computation, Kamala Krithivasan and Rama. R, Pearson.
2. Theory of Computation, Lewish Papadimitra, Prentice hall of India, New Delhi
3. Introduction to Automata Theory Languages and Computation, John E. Hopcraft Jeffary, D. Ullman and Rajeev Motwani.
4. Introduction to languages and theory of computation, Matin, J.C, McGraw-Hill, 2003
5. Theory of Computsation, Rajesh .K. Shukla, Cenage Learning

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Course Outcomes:
1. The students will be able to understand the concepts of computational model
2. The students will be able to convert among DFAs, NFAs.
3. The students will be able to identify the grammars and languages based on Chomsky hierarchy.
4. The students will be able to design FA, PDA, TM for the languages.
5. The students will be able to know about decidability and complexity

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Dev Sanskriti Vishwavidyalaya
III Semester

Subject: Operation Research (Elective -II)   **Subject Code:** 305-5
Maximum Marks: 70   **Minimum Marks: 28**

Course objectives:
1. To introduce students to allocation model, solve problems involving assignment of jobs to machine, blending, productmix, advertising media selection, least cost diet, distribution ,transportation.
2. To make students use the concept of inventory control to determine Economics Order Quantitysafety stack ,reorder level.
3. To make students learn PERT & CPM in planning, scheduling in projects.

UNIT - I
LINEAR PROGRAMMING - LP formulations, Graphical method for solving LP with 2 variables, Simplex method, Application of simplex method for maximization and minimization of LP problems, Artificial variable technique for finding the initial basic feasible solution , The Big-M method, Two phase method, Degeneracy in simplex method, Duality theory in LP, Dual simplex method.

UNIT - II
TRANSPORTATION MODEL - North – West comer rule, Least cost method, Vogel's Approximation method, Modi method, Assignment problem, Dynamic Programming: Basic concepts, Bellman's optimality principle, Dynamic programming approach in decision making , Optimal subdivision problem.

UNIT - III
INVENTORY MODELS - Introduction to the inventory problem, Deterministic models, The classical EOQ(Economic order quantity) model, Purchasing model with no shortage, Manufacturing model with no shortage, purchasing model with shortage, Manufacturing model with shortage, Inventory models with probabilistic demand.

UNIT - IV
SEQUENCING AND QUEUING THEORY- Sequencing problem, Johnson's algorithm for processing Njobs through 2 machine problem, N-jobs through 3 machine problem, 2- job through N machine by graphical method, Characteristics of queuing system- steady state M/M/1, M/M/1K and M/M/C queuing models.

UNIT - V
CPM and PERT - Arrow network, Time estimates – Earliest expected time, Latest allowable occurrence time
and slack, Critical path, Probability of meeting scheduled date of completion of project, Calculation on CPM network, Various floats for activities, Critical Path, Updating project, Operation time cost trade off curve &project time cost trade off curve, selection of schedule based on cost analysis.

Text Books:
1. B.E. Gillet Introduction to Operations Research, A Computer Oriented Algorithmic Approach – Tata McGraw Hill publishing Co. Ltd. New York.
2. P.K. Gupta & D.S. Hira, Operations Research, S. Ch and & Co.

Reference Books:
1. J.K. Sharma "Operation Research" Theory and Applications" Mac Millan
2. H.A. Taha, Operations Research – An Introduction, Fifth Edition, Mac Millanpublishing Co. Ltd. New York.
3. S.D. Sharma "Operations Research, KedarNath, Ram Nath, Mecrut.
4. KantiSwarup, Operations Research, S. Chand & Sons.

Course Outcomes:
1. Students should be able to design a model using optimization techniques
2. Students should be design an inventory system with reorder level calculation
3. Students should be able to schedule a project using PERT CPM

Dev Sanskriti Vishwavidyalaya

Subject: Data Science (Lab)   **Subject Code: 306**
Maximum Marks: 50   **Minimum Marks: 20**

Course Objectives

1. To make students familiar with python tools for data science
2. To read data files and visualizing data with tools
3. Develop complete solution of a real time problem implementing classification and prediction models
4. To make students familiar with R environment for data visualization

LIST OF PRACTICALS:

A. **Perquisite**: Basics of python Use of open source is encouraged for the implementation of the problems[Colab, jupyter, spyder environment]
   1. Operations on sequence data: strings, list array dictionary in python
   2. Numpy Array: creating array, numpyattributes, operations on numpy
   3. Panda data frame: Reading data: txt, xlxs, csv files; indexing attributes of data, converting data types
   4. Data visualization : Use of matplotlib; for scatter; histogram; bar plots Use of seaborn for bar scatter histogram and box plot; handling of missing values
   5. Developing a complete model using following (using scikit library)
      a. Classification : Use Naïve bayes, SVM
      b. Prediction Models: linear and logistic regression
      c. Clustering task: K-means clustering
      d. One application for each and use data sets on cars, income ,flower [Kaggle.com]
   6. Analyze performance

B. **Installing and understanding R programming environment.** Use of R programming for performing
      a. Data preparation
      b. Data cleaning
      c. Data visualization

References
1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. NPTEL course python for data science
3. Garrett Grolemund, Hadely Wickhan " R for Data Science" O'ReillyMedia
4.

Course Outcome	
1.	Students will be familiar with python tools for data visualization
2.	Students will be able to design and develop a fundamental model for problems
3.	Students will learn R environment for handling data

Dev Sanskriti Vishwavidyalaya

Subject: Android (Lab)   **Subject Code: 307**
Maximum Marks: 50   **Minimum Marks: 20**

Course Objective:
1. Create Android applications by using application life cycle, manifest, Intents, and external resources
2. Create useful Android applications with compelling user interfaces by extending, and create custom layouts, Views and using Menus.
3. Create feature rich Android applications by using advantage of Android's APIs for data storage, retrieval, user preferences, files, databases.
4. Create location-based services and rich map-based applications
5. Utilize the power of background services, threads, and notifications.
6. Use Android's communication APIs for telephony, network management, and internet resources.

List of Experiments:
1. Create an application that will display Text in the middle of the screen in the red color with white background.
2. Create a login page by using Edit Text View, Text View and Button.
3. Android program to count the number of button click by user and Display the count value in Text View.
4. Android program to transfer the data from login page to welcome page.
5. Create an application to call specific phone number provided by user in the Edit Text control.
6. Create an application that will accept a number in Edit Textcontrol, and display the same number of item in ListView control.
7. Create an application that will display a list with Image Control associated with each list item.
8. Create an application to add menu items to the list view.
    a. Add New item menu
    b. Delete and Update menu item
9. Create an application that display custom dialog box on button click.
10. Create an application that displays result of arithmetic calculations in the form of Toast Message.
11. Create an application that will create database with table of User credential.
12. Create an application that perform student registration, save the registration information in SQLite Database.
13. Create an application that performs CRUD operations in SQLite database
14. Create an application that display one Activity on the basis of specific time interval using Handler.
15. Create an application that display downloading progress through Asyn Task and display the notification on download completion.
16. Create an application that display longitude and latitudes by using Location Manager.
17. Create an application with Google map integration.
18. Create an application that capture image from mobile camera and store it in External Storage.
19. Create an application that will check the status of Internet connectivity features and calculate data transfer rate of phone.
20. Create an application that will play a media file from the memory card.

Text Book:
1. Retro Meier Professional Android™ Application Development, Wrox Publication
2. Ed Burnette, Hello, Android, The Pragmatic Bookshelf
3. Beginning Android 4 Application Development BY WEI-MENG LEE

Reference Books:

1. Lauren Darcey and Shane Conder, Sams Teach Yourself Android™ Application Development in 24 Hours, Sams Press.
2. Mark L. Murphy, Android Programming Tutorials, Commons Ware.

Course Outcome	
1.	Learner will be able to understand the basics about mobile computing, including the devices, applications, markets.
2.	Learner will be able to develop mobile user interface through the Android platform using the GUI tools.
3.	Learner will be able to comprehend the various components for interactive mobile computing, user interface, graphics, multi-media, network and database in Android.
4.	Learner will be able to develop location aware and map enabled android application.
5.	Learner will be able to develop faster, optimized application using Asyn Task and use notification center for notifying user.
6.	Learner will be able to develop Android application which utilizes internet, telephony and other network resources.

Dev Sanskriti Vishwavidyalaya

Subject: Minor Project   **Subject Code: 308**
Maximum Marks: 50   **Minimum Marks: 20**

Course objectives:
A mini-project should be done by the students based on concepts of JAVA. It may be primarily based on database concepts, object-oriented concepts, etc.

Objectives of the mini project:
Working on Mini project is to get used to the larger project, which will be handled in the 6th semester. The project work constitutes an important component of the MCA programme of CSVTU and it is to be carried out with due care and should be executed with seriousness by the students.

Guidelines:
1. A student must find a suitable title within 2 weeks of the start of session.
2. A Synopsis and presentation regarding the work to be done must be conducted after the first month
3. Data Dictionary and ER diagram to be completed in the subsequent 2 weeks followed by DFD and Form design.

Practical manual format :
The evaluation of the mini-project will be based on the project reports submitted by the student as a presentation and a demonstration.
The format of the project Report :
1. Abstract
2. List of Tables
3. List of Figures
4. List of Abbreviations/Symbols
5. Project Development Process Model Used (Methodology) :
Project's Process Documentation
- ❖ 5.1 Object Oriented Analysis and Design (OOA & OOD)
  - ▪ 5.1.1 Initial Description of Problem
  - ▪ 5.1.2 Object Model
    - • 5.1.2.1 Object Classes
    - • 5.1.2.2 Data dictionary containing description of class attributes
    - • (data members, and methods)
    - • 5.1.2.3 Association between classes
    - • 5.1.2.4 Simplifying objects classes using Inheritance
    - • 5.1.2.5 Group classes into module
    - • 5.1.2.6 Object Diagram
  - ▪ 5.1.3 Functional Model
    - • 5.1.3.1 Identification of Input/output values
    - • 5.1.3.2 DFD as needed to show functional dependencies
    - • 5.1.3.3 Identification of constraints
- ❖ 5.2. CASE Tools used to design
- ❖ 5.3 Coding Language and Operating System (OS) used (Including explanation)
- ❖ 5.4 Detail Databases Design and Connectivity Procedure E-R Diagram Table

Relationship Diagram etc
- ❖ 5.5 Testing and Quality Measurement Criterion (T&Q)
- ❖ 5.6 Software Costing by using COCOMO Model
- ❖ 5.7 Maintenance Criteria
- ❖ 5.8 Developed Project Interfaces and Reports (i.e., I/O Interface)
- ❖ 5.9 Features of Project
- ❖ 5.10 Future Enhancement scope of the project

6. Summary and Conclusions
7. Reference/Bibliography
8. Short questions for each experiment :
   - What is the aim of the project?
   - Why the particular software is used?
   - What are the limitations and scope of improvement of your project?
   - Explain the source of data collection and its reliability?
   - What was the importance of analysis and design in your project?
9. List of equipment / machines / instruments / tools / software, if any :
   - The student must develop the project using JAVA.
   - Backend can be ORACLE/ ACCESS/

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Dev Sanskriti Vishwavidyalaya

Master of Computer Applications (MCA)

Semester-IV

S. No	Board of Studies	Subject Code	Subject Name	Periods Per Week			Scheme of Examination				Total Marks	Credits
							Theory		Practical			
	CORE SUBJECT			L	T	P	EX	IN	EX	IN		
1	Computer Applications	SMCAC 401	Cloud Computing	3	1	-	70	30	-	-	100	4
2	Computer Applications	SMCAC 402	Big Data Analytics	3	1	-	70	30	-	-	100	4
3	Computer Applications	SMCAC 403	Software Quality Assurance and Engineering	3	1		70	30	-	-	100	4
	PRACTICALS											
4	Computer Applications	SMCAP 404	Industrial Internship Or Major Project	2	-	24	-	-	100	100	200	14
5	--	--	MOOC Certification*	-	-	-	-	-	-		-	2
	Total			8	2	24	210	90	100	100	500	28

L-Lecture   T-Tutorial   P-Practical

CT-Class Test   TA-Teacher Assessment   ESE-End Semester Exam

Note: *MOOC Certification in any one programming language.

Dev Sanskriti Vishwavidyalaya
Semester IV

Subject: Cloud Computing

Maximum Marks: 70

Subject Code: SMCAC401

Minimum Marks: 28

Course Objectives:
1. Cloud computing represents a latest in the long history computing mainframe, Personal computing networked computing and expected to revolutionize the business is done.
2. This course covers the theoretical and practical aspects of cloud computing. At the end of the course, student will be able to appreciate the cloud computing paradigm, recognize its various forms and able to implement some cloud computing features.

UNIT- I Introduction to Cloud Computing, The Emergence of Cloud Computing, Cloud-Based Service Offerings, Benefits of using a Cloud Model, Key Characteristics of Cloud Computing, Understanding Public & Private cloud environments, The Evolution of Cloud Computing – Hardware & Internet Software Evolution.

UNIT- II Cloud Security Challenges, Software-as-a-Service, Security Management People, Security Governance, Security Portfolio Management, Security Architecture Design, Identity Access Management (IAM), Data Security.

UNIT- III Cloud as: Communication-as-a-Service (CAAS), Infrastructure-as-a-Service (IAAS), Monitoring-as-a Service (MAAS), Platform-as-a-Service (PAAS), Software-as-a-Service (SAAS).

UNIT- IV The MSP Model, Evolution from the MSP Model to Cloud Computing and Software-as-a-Service, The Cloud Data Center, Basic Approach.

UNIT- V Virtualization concepts Smartphone: virtualization benefits, Hardware virtualization, Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Virtualization Security Recommendations, Introduction to Various Virtualization OS VMware , KVM, Virtual Machine Security, Smartphone, Mobile Operating Systems for Smartphone's (iPhone, Windows Mobile), Google(Android) Blackberry, Ubuntu Mobile Internet.

Text Books:
1. Toby Velte, Anthony Vote and Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw Hill, 2002.

Reference Books:
1. George Reese, "Cloud Application Architectures: Building Applications and Infrastructures in the Cloud", O'Reilly Media, 2003.
2. Tim Matherm, Subra Kumaraswamy and Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly Media, 2005.

Course Outcomes:
1. Students will be able to perform cloud-oriented analysis.
2. Students will be able to model cloud candidate derived from existing business documentation.
3. Students will be able to design the composition of a cloud services.
4. Students will be able to design application services for technology abstraction

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Dev Sanskriti Vishwavidyalaya
Semester IV

Subject: Big Data Analytics

Maximum Marks: 70

Subject Code: SMCAC 402

Minimum Marks: 28

Course Objectives:
1. To explore the fundamental concepts of big data analytics and visualization techniques.
2. To learn to use various techniques for mining data stream.
3. To understand big data analytics technology Hadoop concepts.
4. To understand the Hadoop Framework and various big data enabling Technologies.
5. To understand Open Source Database Concepts.

UNIT-I INTRODUCTION TO BIG DATA: Introduction to Big Data, Characteristics of Big Data (5 V's of Big Data), Sources of Big Data, Challenges of Conventional Systems, Analysisvs Analytics, Types of Data Analytics, Analysis vs Reporting, Visualizations - Visual data analysis techniques. Case studies of application Big Data.

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UNIT- II MINING DATA STREAMS: Introduction To Streams Concepts, Stream Data Model and Architecture , Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments , Counting Oneness in a Window, Decaying Window.

UNIT-III HADOOP: Components of Hadoop, The Hadoop Distributed File System, Map Reduce, YARN, COMMON, Hadoop Cluster, How Map Reduce Works, Anatomy of a Map Reduce, Job Scheduling, Shuffle and Sort Map Reduce Types and Formats, Map Reduce Features

UNIT-IV HADOOP FRAMEWORKS - Applications on Big Data Using Pig, Hive, Zookeeper Maintenance of Hadoop Cluster, Hadoop benchmarks. Hadoop frameworks. (Cassandra, Apache Mahout, Tez, Hbase, Avro, Chukwa, Spark, Ambari.)

UNIT-V NOSQL: Limitations of SQL Databases, Introduction to NoSQL databases, types of NoSQL Databases, Document Databases, Key Valued Databases, Column based Databases and Graph Databases. Issues of availability and consistency, CAP Theorem, Case studies of MongoDB, Neo4j, HBase, Cassandra, Memcached and Redis.

Course Outcomes:
1. The students will be able to understand the Big Data Analytics fundamental concepts and visualization techniques.
2. The students will be able to understand various techniques used for mining data stream.
3. The students will be able to understand Hadoop Concepts.
4. The students will be able to Know Hadoop frameworks and big data enabling Technologies.
5. The students will be able to understand about concepts of Open Source database such as NOSQL, HBase etc.

Text Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.

2. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.

3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Dev Sanskriti Vishwavidyalaya
Semester IV

Subject: Software Quality Assurance and Engineering

Subject Code: SMCAC 403

Maximum Marks: 70

Minimum Marks: 28

UNIT-I SOFTWARE QUALITY AND ENGINEERING: Quality concepts and productivity relationship, software quality factors, software quality costs, Total Quality Management (TQM), continuous improvement cycle: Plan, Do, Check and Act (PDCA), quality policy, cost of quality, quality engineering, quality planning: goal setting and strategy formation, assessment and improvement.

UNIT II SOFTWARE QUALITY ASSURANCE (SQA): Components of SQA, classification, defect detection, defect prevention, defect reduction, defect containment, QA activities in software processes, verification and validation, software review, inspection, formal verification, statistical software quality approach.

UNIT III COMPONENTS MEASUREMENT WITH REFERENCE TO SQA: Metrics, product quality metrics, process quality metrics, metrics for software maintenance, quality tools for quality control, test management and organizational structures, Capability Maturity Model (CMM), Capability Maturity Model Integration (CMMI), ISO 9000, quality and quality management metrics, Deming's Principle, SQA team formation.

UNIT IV QUALITY MANAGEMENT MODEL: Integrating quality activities in project life cycle, reviews, software testing, strategies and implementation, Computer-Aided Software Engineering (CASE) tools, The Rayleigh model framework, code integration pattern, Problem Tracking Report (PTR), reliability growth model, Service Quality, Kano Model, Customer retention, continuous process improvement, Juran"s Trilogy, TQM principles, Kaizen Technique, Statistical Quality Assurance, Mc call quality factors.

UNIT V SOFTWARE QUALITY ASSURANCE BEYOND TESTING: Defect prevention and process improvement, root cause analysis for defect prevention, software inspection, inspection related activit ies, fault tolerance and failure containment, comparing quality assurance techniques and activities.
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Reference Books:

1. Metrics and Models in Software Quality Engineering, Stephan H. Kan, Pearson Education, 2007.

2. An Integrated Approach to Software Engineering, Pankej Jalote, Narosa Publishing House, New Delhi 1997.

3. Making Sense of Software Quality Assurance, Raghav J. Nandyal, Tata McGRAW Hill, 2007.

Dev Sanskriti Vishwavidyalaya
Semester IV

Subject : Industrial Internship   **Subject Code: SMCAE404**

General Guidelines for MCA- IV semester

➢ Students are required to take up individual project in companies/Organizations/PSU/Govt.

➢ Project should be real time work.

➢ Project work may be application oriented or research oriented as per student interest.

➢ Therefore, the project reports will vary depending on whether it is application-oriented project or research-based project.

➢ Regular project work weekly dairy should be maintained by the students.

➢ Seminars / presentation should be given at Project Completion levels.

➢ Project verification at the place of project work is mandatory by the internal guide, for completion of the work.

➢ If project report is not as per the format and not a real time project, external guides will have every right to reject the project

➢ Students are encouraged and appreciated to show their project code demo along with their power point slide show during their viva exams as an added advantage.