SHIVAJI UNIVERSITY, KOLHAPUR.

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Revised Syllabus For

B.Sc.

Information Technology (Entire)

(Semester- III and IV)

Syllabus to be implemented from June 2019 onwards.

B.Sc. (Information Technology) Entire Part-II

Semester-III			Semester-IV		
Course Code	**Title of Paper**	**Work load**	**Course Code**	**Title of Paper**	**Work load**
DSC-301	Object Oriented Programming	4	DSC-401	Advanced Object Oriented Programming	4
DSC-302	Operating System-Linux	4	DSC-402	Web technology using HTML	4
DSC-303	Data Structure Using C++ Part-I	4	DSC-403	Data Structure Using C++ Part-II	4
DSC-304	Cyber Security Essentials Part-I	4	DSC-404	Cyber Security Essentials Part-II	4
DSC-305	Electronics Paper-III	4	DSC-405	Electronics Paper-IV	4
DSC-306	Mathematics Paper-III	4	DSC-406	Mathematics Paper-IV	4
Lab-V	Lab course-V based on CC-301, CC-302 and CC-401, CC-402				4
Lab-VI	Lab course-VI based on CC-303 and CC-403				4
Lab-VII	Lab course-VII based on CC-305 and CC-405				4
Lab-VIII	Lab course-VIII based on CC-306 and CC-406				4

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-301: Object Oriented Programming
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Course Outcome:

Upon successful completion of this course, students should be able to:
1. Understand features of Object Oriented Programming
2. Identify problems and apply object-oriented programming paradigm to system designs.
3. Analyze and understand the functionality of program code written in an object-oriented language such as C++

Unit-I: Introduction to Object Oriented Concepts and C++:   **18 Hrs.**

Need and characteristics of Object Oriented Programming, The object oriented approach, Object oriented design, Basic concepts of OOP, Difference between object oriented and procedure Oriented programming. Introduction To C++,Process of compilation & execution of C++ Program, Terminology-Tokens, Keywords, Character set, Constants, Identifiers, Structure of C++, Operators, Data Types, reference variable, Looping & branching statements, Input & output Streams, Arrays, Dynamic Memory allocation (new and delete),Library functions, user defined function, parameter passing mechanism, inline function

Unit-II: Classes and Objects   **18 Hrs.**

Concept of class and object, Declaration of Classes, Data Members and Member functions, Access Specifies- private, public & protected members, Simple Class, Nested Class, this pointer, pointer to object, Array of objects, Passing Object as a parameter, Constructors and Destructor, Types of Constructors, Passing parameters to base class constructors, static members, friend function, friend class.

References:
1. Let Us C++ By Yashawant Kanetkar.
2. The C++ Programming Language – Bjarne Stroustrup
3. Object Oriented Programming (C++) – E. Balaguruswamy
4. Object oriented programming E 2. Mastering C++ -By Venugopal.
5. Object oriented programming with C++ - E. Balgurusamy.
6. C++ Programming –By D. Ravichandran, Rajkumar, T Ravishankar.
7. Object Oriented Programming in C++ - Shukla.
8. Object Oriented Programming in C++ - Dr. G. T. Thampi, Dr. S. S. Mantha.

Course Outcome:

1. Discuss fundamental concept of operating system.
2. Recognize mechanisms involved in memory management, process management, thread and scheduling.
3. Apply knowledge of Linux commands and sell programming for developing applications.

Unit:-I Introduction of Operating System (18 hours)

Operating System Objectives and Functions, The Evolution of Operating Systems, Types of operating systems. Architecture of LINUX OS. LINUX file system. **Process:** Concept of a Process, Process States, Process Description, Process Control (Process creation, Waiting for the process/processes, Loading programs into processes and Process Termination), Execution of the Operating System. **Threads:** concept of thread, types of thread, difference between process and thread. **Scheduling**-concept of scheduling, types of scheduling, scheduling algorithms. **Memory Management**: Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging, Segmentation.

Unit-II LINUX Commands (18 hours)

Different commands- clear, cal, date, wc, who,ls, cp,mv,rm, meta characters, chmod, cut, paste, sort, unique, head, tail, grep, pipe. Concept and modes in VI editor. Concept of shell script, running shell script. Statements- echo, read, test . Branching statements-if, case, exit. Looping statements- while, until, for.

Reference Books:

1. The Complete Reference Linux , Sixth Edition, Richard Peterson, Tata McGraw Hill Edition.
2. Unix concept and applications, Sumitabha Das
3. Unix shell programming- Yashwant Kanetkar
4. Linux programming- Foreword By- Alan Cox 4. RedHalt Linux 718 By Bill Ball , David Pitts
5. Linux Bible, Christopher Negus, Wily Publication, ISBN-13: 978-1118999875, ISBN-10: 1118999878
6. The Linux Command Line: A Complete Introduction, Willam E. Shotts Jr.
7. Linux Command Line and Shell Scripting Bible, Richard Blum and Christine Bresnahan, Wily Publication
8. The Desing of the UNIX Operating System, Maurice J. Bach, ISBN-13-978-0132017992, ISBN-10: 0132017997
E-Learning Resources:
1. https://www.tutorialspoint.com/unix/

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-303: Data Structure using C++ part-I
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Course Outcome:

- Ability to choose appropriate data structures to represent data items in real world problems.
- Ability to analyze the time and space complexities of algorithms.
- Ability to design programs using a variety of data structures such as stack, queue, hash tables, binary trees, search trees, heap, graphs, and B-trees.
- Able to analyze and implement various kinds of searching and sorting techniques.

Unit:-I Sorting and searching   **(18 hours)**

Sorting: Bubble Sort, Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Merge sort, Comparison of Sorting methods.
Searching: Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.

Unit II   Introduction of Data Structures   **(18 hours)**

Introduction: Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data ,Array as ADT, Representation of array Sparse Matrix**, Stack-** Stack as a ADT, Definition ,Declaration of stack ,Implementation of stack , Applications of stack –Expression Evolution infix, prefix, postfix, string reversal ,recursion.

Reference Books:
        1. Data Structure using C by A.M. Tanenbaum, Yecidyanlang
        2. Data Structure Through C- By Dr. Sahani.
        3. Data Structures Using C Yashwant Kanitkar – BPB Publication
        4. Data structures with C++, J. Hubbard, Schaum's outlines, TMH.
        5. Data structures and Algorithms in C++, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.
        6. Data structures and Algorithm Analysis in C++, 3rd edition, M. A. Weiss, Pearson.
        7. Classic Data Structures, D. Samanta, 2nd edition, PHI.
        8. Data structure by S. K. Shrivastav
        9. https://www.tutorialspoint.com/data_structures_algorithms

DSC-304: Cyber Security Essentials-I
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Course Outcomes:

Students who complete this course should be able to:
1. Understand basics of computer and its applications.
2. Learn working of computer network.
3. Understand importance of cyber security.
4. Learn different security threats.

Unit I: Introduction to Computer and Computer Network   18 Hrs

- **Introduction To Computer:** Fundamentals of computer, Applications of Computers in Various Fields Do's and Don'ts about Computer, Concept of Hardware & Software, Peripheral Devices.
- **Computer Network:** Definition, Types of Network, Topologies, Network devices, Internet, Search Engines, Web Browsers, OSI Model, TCP IP Model, IP address scheme, switching techniques. Best Industry practices to follow for secure computing.

Unit II: Introduction to Cyber Security & Threats   18 Hrs

- **Introduction to Cyber Security:** Definition, Importance, Computer ethics, Cyber Security Policy, Data Security, Mobile Device Security, User Security, File Security, Password Security, Browser Security, Email Security, Phishing Encryption, Decryption, Digital Signature, Firewall, Configuring, Windows Firewall.
- **Security Threats:** Definition, Types of Threats - Virus, Worms, Trojan Horse, Malware, Ransom ware, Identity theft etc, Torrent and infected websites, Antivirus-Definition, Types, features, advantages, limitations.

References:
1. Computer Fundamentals by P.K.Sinha and Priti Sinha.
2. Computer fundamentals by Rajaraman.
 3. Computer Networks - Forozoun (TMH)
4. Computer Networks – Olifer (Wiley-india)
5. Complete Guide to Networking - Peter Norton
6. Computer Today – S. Basandra.
7. Computer Network -AS Tannenbum
8. Cyber Security for Beginners: Everything you need to know about it (Cyber security,
Cyberwar, Hacking) by Harry Colvin (Author)
9. How NOT To Use Your Smartphone by Rodney D Cambridge
10. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book 1) AM.
Perry
11.Cyber Security Essentials: James Graham, Richard Howard, Ryon Olson(E-book)

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-305: Electronics Paper-III
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Unit 1: Microcomputer Organization and Architecture of 8085 Microprocessor   [18 hrs]

(A) **Microcomputer Organization:** Basic components of microcomputer (CPU, Program memory, Data memory, Input / Output Devices (List), Data storage (idea of RAM and ROM). Types of RAM (SRAM and DRAM), Types of ROM (masked ROM, PROM, EPROM, EEPROM, UVEPROM).

(B) **8085 Microprocessor Architecture:** Main features of 8085, Pin-out diagram of 8085, architecture of 8085, Data and address buses, Registers(accumulator, flag, general purpose register, stack pointer, program counter), ALU, stack memory, hardware and software interrupts (listing only), interrupt priority, clock and reset circuit.

Unit 2: Programming and interfacing of 8085   [18 hrs]

(A) **Instruction set and programming of 8085:** truction classification: Data transfer, Arithmetic, logical, branch, stack related instructions and control instructions, addressing modes. 8085 Programming: programs for addition, subtraction, multiplication, division and block transfer, block exchange, masking, ascending and descending order.

(B) **Real world interfacing of 8085 :** 8255: Block diagram, control word, interfacing LED and relay with 8085 using 8255. Memory Interfacing: 2764 and 27128 to 8085 with memory map. Interfacing ADC0804 and DAC0808 with 8085 using 8255.

References
1. Ramesh S. Gaonkar-Prentice Hall. *Microprocessor Architecture Programming and Applications with the 8085,*(Pearson Publication, 3rd Edition)
2. B. RAM Fundamentals of Microprocessor and Microcontrollers (Dhanpat Ray publications, 6th Edition)
3. Advanced Microprocessor -Ajay K. Ray & Kishor M. Bhurchandi (TMH Publication, 7th Revised Edition)
4. Microprocessors & Interfacing -Douglas V. Hall & S S S P Rao (TMH Publication, 3rd Edition,2012)

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-306: Mathematics Paper-III
(Algebra and Discrete Mathematics)
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Unit – 1 Lattice, Abstract and Linear Algebra [**18 hours**]

1.1 Definition and examples of Group
1.1.1 Subgroup and basic properties
1.2 Definition and examples of ring, integral domain and field
1.3 Definition and examples of vector spaces
1.3.1 Subspaces, linear span
1.3.2 Linear dependence, independence
1.3.3 Basis
1.3.4 Finite dimensional vector spaces
1.4 Partial ordering relation, Poset
1.5 Lattice
1.5.1 Basic properties of lattice
1.5.2 Distributive lattice
1.5.3 complemented lattice
1.5.4 Boolean lattice
1.6 Boolean algebra
1.6.1 Boolean expression
1.6.2 CNF, DNF

Unit – 2 Graph Theory & Introduction to Finite Automata [**18 hours**]

2.1 Definition: Graph, Path, Circuit, sub graph, induced sub graph, degree of a vertex, connectivity, planar graphs
2.2 Trees, spanning trees
2.2.1 Cut-sets, Fundamental cut sets and circuits
2.2.2 Minimal spanning trees and Kruskal's Algorithm
2.3 Matrix Representation of Graphs
2.4 Eulerian paths and circuits, Hamiltonian paths and circuits
2.5 Finite state Machine: Finite state machines and their transition table, diagrams
2.5.1 Equivalence of finite state machines
2.6 Finite automata
2.6.1 Acceptors, Deterministic and non-deterministic automata
2.6.2 Moore - Mealy machines and their equivalence
2.7 Definition of a Grammar , Derivations sentential forms, types of Grammars
2.8 Languages generated by Grammar
2.8.1 Grammars and Languages

Reference Books

1) Elements of Discrete Mathematics, C.L. Liu MaGraw- Hill.
2) Algebra, S.R. Patil and others, Nirali Prakashan.
3) Discrete Mathematics, S.R. Patil and others, Nirali Prakashan .
4) Graph Theory with Applications to computer science and Engineering , Narsing Deo, Prentice Hall of India Ltd, New Delhi.

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-401: Advanced Object Oriented Programming
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Course Outcome:

Upon successful completion of this course, students should be able to:
1. Design Components to maximize their reuse.
2. Understand the polymorphism concept and implement it using C++programming code
3. Understand concept of file handling
4. Construct C++ programming code to manipulate file

Unit-I: Polymorphism, Operator Overloading and Type Conversion: 18 Hrs.

Concept, Types of polymorphism, Concept of function Overloading, Virtual functions, Abstract class and method. Concept of Operator overloading, Rules for overloading operator, Overloading operator- arithmetic, increment and decrement, negation, relational Operators, unary and binary operators, Type Conversion in C++

Unit-II: Inheritance & Working with files: 18 Hrs.

Concept of inheritance, Defining base and derived classes, Types of Inheritance-single, multiple, multilevel, hierarchical, hybrid inheritance, Virtual function, pure virtual function and virtual Class. Introduction to File handling, Need of file handling, Classes for file stream operations, opening and closing files, modes, file pointers, I/O operations using – putw(), getw() , put(), get(), read(),write().

References:
1. Let Us C++ By Yashawant Kanetkar.
2. The C++ Programming Language – Bjarne Stroustrup
3. Object Oriented Programming (C++) – E. Balaguruswamy
4. Problem Solving with C++ - Walter Savitch
5. Object oriented programming E 2. Mastering C++ -By Venugopal.
6. Object oriented programming with C++ - E. Balgurusamy.
7. C++ Programming –By D. Ravichandran, Rajkumar, T Ravishankar.
8. Object Oriented Programming in C++ - Shukla.
9. Object Oriented Programming in C++ - Dr. G. T. Thampi, Dr. S. S. Mantha.
10. Thinking in C++ - Bruce Eckel
11. C++ Programming Today – Barbara Johnstron

Course Outcomes:

1. Adapt knowledge for creating effective web pages.
2. Explain various tags used for designing website
3. Apply skills for designing websites.

Unit:-I   Basic HTML Tags   (18 hours)

Web Development- introduction, features, steps in web development, limitations.**HTML**: What is HTML, what is tag and attributes, heading tags, text formatting tags, paragraph tags, font tag. List Tags-ordered and unordered, tags: <BR>, <HR>, <Marquee>, <IMG>, <MAP>,<AREA> Hyperlink. **Tables**: table tags, aligning entire table, alignment of row, cell and contents, table attributes, background color setting, width, adding a border, spacing within a cell, spacing between the cells, rowspan and colspan, Table Sections and column properties. Insert audio and video files.

Unit-II   Frame, CSS and Forms   (18 hours)

Introduction to **Frames**, the<FRAMESET> tag, nesting<FRAMESET> tag, placing content in frames with <FRAME>the tag, targeting named frames, creating floating frames<IFRAME>**CSS**: Introduction of CSS, inline, internal and external style sheet<LINK><STYLE>, CSS selector-element, id, class, group. Cross Browsing Testing. Introduction to HTMLL5 & its features.
Forms: creating forms, <FORM> tag, form elements, input types, input attributes.

Reference Books:
1. Web Technologies Black Book, Kogent Learning Solutions Inc., Dreamtech press, 2011 Edition
2. HTML, JavaScript, DHTML and PHP, Ivan Bayross, BPB publications, 2010 Edition
3. HTML Black Book, Steven Holzner, DreamTech Press, 2009 Edition
4. The Essential Guide to CSS and HTML Web Design Craig Granell,,ISBN-13: 978-1-59059-907-5, ISBN-10: 1-59059-907-1
5. Learning Web Design, Jennifer Niederst Robbins, O'Reilly, 4th Edition
6. Head First HTML and CSS, Elisabeth Robson, 2 Edition, O'Reilly
7. Stylin With CSS, Charles Wyke-Smith, 3rd Edition

E-Learning resources:
        https://www.w3schools.com

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-403: Data Structure Using C++ Part-II
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Course Outcome:

- Ability to choose appropriate data structures to represent data items in real world problems.
- Ability to analyze the time and space complexities of algorithms.
- Ability to design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
- Able to analyze and implement various kinds of searching and sorting techniques.

Unit:-I Queue and Linked List   **(18 hours)**

Queue-Definition and declaration of queue, Types of queue-Linear queue, Circular queue, operations on Linear queue, operations on circular queue ,priority queue , Applications of queue.
Linked list – Definition of Linked list, Declaration of Linked List, operations on linked list, circular linked list, doubly linked list, Implementation of Stack and Queue using linked list, Applications of linked list.

Unit:-II Trees and Graphs   **(18 hours)**

Trees - Definition, Terminology, Binary Tree as ADT, Binary trees- definition, Properties of Binary Trees, representation of Binary Trees, Binary Search Tree, Binary Tree traversals, Threaded binary trees, Heap-Definition, Insertion, Deletion from Heap.
Graph -Definitions, Terminology, Applications , Properties, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS.

Reference Books:
1. Data Structure using C by A.M. Tanenbaum, Yecidyanlang
2. Data Structure Through C- By Dr. Sahani.
3. Data Structures Using C Yashwant Kanitkar – BPB Publication
4. Data structures with C++, J. Hubbard, Schaum's outlines, TMH.
5. Data structures and Algorithms in C++, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.

Course Outcomes:

Students who complete this course should be able to:
1. Understand concept of information security management.
2. Learn different access controls methods.
3. Understand wireless network security.
4. Learn cyber security laws and importance of security audit.

Unit I: Information Security Management and Access Control   **18 Hrs**

Information Security Overview: Background and Current Scenario, Types of Attacks, DoS attack, Goals for Security, E-commerce Security, dimensions of E-commerce security, Security protocols, Computer Forensics, Steganography, Security Management- Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices. **Access Controls:** Overview of Authentication and Authorization, Overview of Intrusion Detection Systems, Intrusion Detection Systems and Intrusion Prevention Systems.

Unit II: Network Security and Cyber Security Laws   **18 Hrs**

Wireless Network Security- Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall.
Cyber Security Laws: Security Assurance, Security Laws, Intellectual Property Rights, International Standards, Security Audit.
References:
1. Computer Network -AS Tannenbum
2. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyber war, Hacking) - Harry Colvin.
3. How NOT To Use Your Smartphone - Rodney D Cambridge.
4. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book -A.M. Perry.
5. Cyber Security Essentials- James Graham, Richard Howard, Ryon Olson(E-book)
6. Network Security Secrets and Solutions – Stuart McClure, Joe Scambray, George Kurtz.
7. Information Assurance Handbook: Effective Computer Security and Risk Management Strategies – Corey Schou, Steven Hernandez.
8. Applied Network Security Monitoring: Collection, Detection, and Analysis – Chris Sanders, Jason Smith.
9. E-Commerce- Indian Perspective- P.T. Joseph S.J.
10. E-Commerce and Security- Kjell Orsborn (E-book)

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-405: Electronics Paper-IV
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Unit 1: 8051 Microcontroller and its instruction set [18 Hrs]

(A) **8051 microcontroller:** Introduction and overview of 8051 family (8051, 8031, 8052, 8751), Comparison microprocessor and microcontroller, Pin out diagram of 8051 microcontroller, Block diagram of 8051 microcontroller, Program Counter, internal RAM structure and ROM memory map, Program Status Word (PSW) register, SFR's in 8051.

(B) **Instruction set of 8051 :** 8051 Addressing modes, instruction set of 8051 (data transfer, arithmetic, logical, jump, call, loop and single bit (Bit manipulation), 8051 assembly language programming for square wave generation at port and port pin (I/O port programming), ASCII to BCD conversion, BCD to ASCII conversion

Unit 2: Programming of 8051 [18 Hrs]

(A) **8051 Programming-I:** 8051 programming in C: arithmetic and logic operations in 8051-C, ASCII and BCD conversions in 8051-C. time delay using for loop,
Timers in 8051: Registers involved in 8051 timers, Time delay calculations in mode1, timer programming in mode 1 and mode 2 (ALP/8051-C).

(B) **8051 Programming-II:** Serial communication in 8051: registers involves in 8051 serial programming, Baud rate, RS 232 standards, AX232 interfacing with the 8051, program to transmitt and receive data using serial communication (ALP/8051-C).
Interfacing of LED, DC motor, LCD and Stepper motor with 8051 (ALP/8051-C).

References
1. Mazidi, Muhammad Ali, Janice Mazidi, and Janice Gillispie Mazidi. "A text book of 8051 Microcontroller and Embedded Systems." *Publication: Prentice Hall*.
2. Ayala, Kenneth J. *The 8051 microcontroller*. Cengage Learning, 2004.
3. Predko, Myke. *Programming and customizing 8051 microcontrollers*. McGraw-Hill Professional, 1999.
4. Deshmukh, Ajay V. *Microcontrollers: theory and applications*. Tata McGraw-Hill Education, 2005.

B. Sc. (Information Technology) Entire
Part – II Semester – III
DSC-406: Mathematics Paper-IV
(Operations Research)
Theory: 36 hrs. (Lectures of 48 minutes)
Marks-50 (Credits: 02)

Unit – 1 Basics of operations Research, Transportation Problems and Assignment problems [18 hours]

1.1 Linear Programming Problem : Basic definition, formulation of L.P.P.
1.2 Feasible solution, Basic solution, Basic feasible solution, optimal solution
1.3 Solution of L.P.P : Graphical Methods, Simplex Method, Big M- Method
1.4 Introduction to T.P.
1.5 Initial solution by (i) North west corner method
                       (ii) Matrix, minima method
                       (iii) Vogel's approximation method
1.6 Optimal solution by MODI method
1.7 Maximization in T.P.
1.8 Unbalanced T.P.
1.9 Introduction to A.P.
1.10 Hungarian method and examples
1.11 Maximization in A.P.
1.12 Assignment problem with restrictions
1.13 Unbalanced assignment problem

Unit – 2 Theory of Games [18 hours]

2.1 Introduction
2.1.1 Two person zero sum game, pure and mixed strategies
2.1.2 Min – Max and Max – Min principle, saddle point
2.2 Solution of 2 x 2 game by (i) Algebraic method
                              (ii) Arithmetic method
2.3 Principle of dominance and solving some simple games
2.4 Sub game method
2.5 Graphical method for 2 x m and m x 2 game

Reference Books

1) Operation Research, J.K. Sharma.
2) Operations Research, S.D. Sharma .
3) Principles of Operations Research, H.M. Wagner, Prentice Hall of India.
4) Operation Research, Gupta and Hira .

Lab course-V based on CC-301, CC-302 and CC-401, CC-402

DSC-301: Object Oriented Programming

1. Write a C++ program to add, subtracts, multiply and divides two numbers.
2. Write a C++ program to check given number is Armstrong or not.
3. Write a C++ program to display following pattern for give number.
   1
   1 2
   1 2 3
   1 2 3 4
   1 2 3 4 5..
4. Write a C++ program using inline function.
5. Write a C++ program to display n-terms of Fibonacci series.
6. Write a C++ program to demonstrate nested class.
7. Write a C++ program to find maximum and minimum number from 5 given numbers using array.
8. Write a C++ program to demonstrate use of constructor and destructor.
9. Write a C++ program to overload constructors.
10. Write a C++ program to swap given two numbers using function
11. Write a C++ program to find mean value of two numbers using friend function.
12. Write a C++ program to demonstrate the use of static data member and static member function.

DSC-302: Operating System- Linux

1. Login, logout procedure (user/ login name and password)
2. Copy, move, and delete files from different directories.
3. Change files access permissions using chmod and confirm using ls –l command
4. Use of filter commands
 5. Creating text files using VI editor.
6. Shell script to get any number and display its square, cube sum of its digits
7. Commands for displaying file and directory operations
8. Script handling use of if, if else, case structure.
9. Script handling use of while, until, for structure.

DSC-401: Advanced Object Oriented Programming

1. Write a C++ program to calculate area of circle, triangle, and rectangular box using three times function overloading.
2. Write a C++ program to overload unary operator ++.
3. Write a C++ program to overload conditional operators > and < to compare salaries of two employees objects.
4. Write a C++ program to demonstrate use of function overriding.
5. Write a C++ program to show multiple inheritances.
6. Write a C++ program using virtual function.
7. Write a C++ program in C++ to demonstrate the creation and the use of dynamic object.
8. Write a C++ program to take input from text.txt file and then prints on the terminal.
9. Write a C++ program to write number 1 to 100 in a data file NOTES.TXT.
10. Write a user-defined function in C++ to read the content from a text file OUT.TXT, count and display the number of alphabets present in it.
11. Write a C++ program to write five Student information in "data" file and display the contains of file on terminal.

DSC-402: DSC-402: Web Technology using HTML

Design web pages for different functional areas like- Business, Education, Government, Medical, and Agriculture etc. with the help of following programs-

1. Programs based on singular and paired tags, formatting tags, list tags.
2. Programs based on marquee, hyperlink, image maps
3. Program based on frame tags, table tags.
4. Programs based on CSS, cross browser testing.
5. Program based on action buttons, radio, checkbox.
6. Programs based on creating forms, inputting values.
7. Programs based on drop down and list box, text area, and password.

Lab course-VI based on CC-303, CC-403

DSC-303: Data Structure using C++ Part-I

1. Write a program to implement Array.
2. Write a program to sort given elements using insertion sort.
3. Write a program to sort given elements using bubble sort.
4. Write a program to sort given elements using selection sort.
5. Write a program to sort given elements using Quick sort
6. Write a program to sort given elements using Radix sort
7. Write a program to search given element using Linear Search.
8. Write a program to search given element using Binary Search.

DSC-403: Data Structure using C++ Part-II

1. Write a program to implement Queue using Static method.
2. Write a program to implement Circular queue using Static Method
3. Write a program to create linked list, add and Remove node from linked list.
4. Write a program to implement Circular linked list.
5. Write a program to implement doubly linked list
6. Write a program to implement stack using Linked List.
7. Write a program to implement Queue using Linked List

Lab course-VII based on CC-305, CC-405

DSC-305: Electronics Paper-III *Practical (SEM-III, Credits-01)*

Section-A: Programs using 8085 Microprocessor (At least 10 experiments)
1. 8 bit addition and subtraction using register addressing mode
2. 8 bit addition and subtraction of numbers using direct addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers: 16-bit addition
6. To find largest and smallest number.
7. Block data handling: Block Transfer
8. Block data handling: Block Exchange
9. Parity Checker
10. Masking of the upper and lower nibble.
11. Stack related instructions (PUSH and POP)
12. LED/ Relay interfacing with 8085 using 8255.for different time delay

DSC-405: Electronics Paper-IV *(SEM-IV, Credits-01)*

Section-B: Experiments using 8051 microcontroller with the use of Kit or Simulator
(At least 10 experiments):
1. Study of Keil software for 8051.
2. Logical operations (AND, OR, NOT, EXOR) in 8051
3. Programming timers in mode 1
4. Interface LED/Relay to 8051.
5. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
 6. Program to rotate (right and left) the contents of the accumulator.
7. Program to toggle any ports with some delay.
8. Arithmetic operations (addition, subtraction, division and multiplications) in 8051-C
9. Logical operations (AND, OR, NOT and EXOR) in 8051-C
10. 8051-C programs for the ASCII to BCD conversion and BCD to ASCII conversion.
11. Interface LCD to 8051.
12. Serial communication programming in 8051

Equivalence for old syllabus

Old Papers	New Papers
Semester III, Paper III Microprocessor 8085	Semester III, Paper III ELECTRONICS-DSC 305: 8085 Architecture, Programming and Applications
Semester IV, Paper VIII Microcontroller 8051	Semester IV, Paper VIII ELECTRONICS-DSC 405: Microcontroller Architecture, Programming and Applications with the 8051

Lab course-VIII based on CC-306, CC-406

B. Sc. Part II (I.T.) (Entire)
MATHEMATICS (Practical)
Implemented from June – 2019

(Based on CC-306: Discrete Mathematics and Linear Algebra)
Number of Credits:01

Sr. No.	Topic	No. of Practical's
1	**Boolean Algebra**	
	Boolean Expression : CNF, DNF	**1**
2	**Abstract & Linear Algebra**	
	Group, Subgroup: Examples	**1**
	Ring, Integral domain, Field : Examples	**1**
	Vector Space : Examples	**1**
	Linear Dependence & Independence	**1**
3	**Graph Theory & Finite Automata**	
	Minimal Spanning Tree : Kruskal's algorithm	**1**
	Finite State Machine : Transition table, State diagram.	**1**
	Finite Automata	**1**
	Languages generated by Grammar	**1**

LAB COURSE – VIII (Second Term)
(Based on CC-406:Operations Research Techniques)
Number of Credits:01

Sr. No.	Topic	No. of Practical's
1	**Linear Programming**	
	Solution of L.P.P by Graphical Method	**1**
	Simplex Method : (Maximization & Minimization Case)	**1**
	Big-M-Method	**1**
2	**Transportation & Assignment Problems**	
	Initial Solution by : (i) North- West Corner Method (ii) Matrix - Minima Method (iii) Vogel's Approximation Method	**1**
	Optimization of T.P. by Modi Method	**1**
	Unbalanced T. P.	**1**
	Assignment Problem - Hungarian Method	**1**
	Maximization Case in Assignment Problem & Unbalanced Assignment Problems	**1**
3	**Theory of Games**	
	Games with saddle point	**1**
	Games without saddle point: a) Algebraic method b) Arithmetic Method c) Subgame method	**1**
	Games without saddle point : Graphical method	**1**