

“Education for knowledge , science and culture”
- Shikshanmaharshi Dr. Bapuji Salunkhe
Shri Swami Vivekanand Shikshan Sanstha’s
VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR
B. Sc. Part – II (Computer science Entire) CBCS Syllabus with effect from June, 2019
Semester: IV Computer science -Paper- IV
CC-CS-1304D
Introduction to Data Structure Using C++ and Cyber Security Essentials
Theory: 60 Hours (75 Lectures) credits -4

SECTION-I
Introduction to Data Structure Using C++

Course Outcomes:

1. To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
2. Ability to choose appropriate data structures to represent data items in real world problems.
3. Ability to analyze the time and space complexities of algorithms.
4. Ability to design programs using a variety of data structures such as array, stacks, queues, linked list
5. Able to analyze and implement various kinds of searching and sorting techniques.

Unit I: Introduction to Data structure and Linear Data Structures (Array, Stack, Queue) 8

Introduction to Data Structure : Definitions: Data types, Data Object, Data structure, Abstract Data Type (concept), Data Structure classification, Algorithm Efficiency: Complexity, Big O notation, Array: Definition, Types of array (one dimensional and multidimensional), sparse matrices.

Unit II: Stack and Queue 10

Stack: Definition of Stack, Operations on Stack, Static Implementation of stack Applications of stack: Recursion, inter conversions between infix, prefix and postfix expressions. **Queue:** Definition of Queue, Operations on Queue, Static Implementation of Queue. Types of Queue: Linear, Circular and Priority queue, Applications of Queue.

Unit III: Linked List, Trees, Searching and Sorting algorithms 10

Linked List: Concept of Linked List, Operations on Linked List, Implementation of Linear Linked List, Types of Linked List, Implementation of stack and queue using linked list **Trees:** Definition of tree, Tree terminologies, Types of Tree, Tree Traversal(inorder, preorder, postorder).

Unit IV: Searching and Sorting

9

Searching: Linear search and binary search **Sorting:** Bubble Sort, Selection Sort, Insertion sort, Merge Sort

Reference Books

1. Data Structure using C and C++ -Rajesh Shukla
2. Data Structure using C and C++ - Tanenbaum
3. Data Structure using C++ - E Balagurusamy
4. Data Structure using C++ - Yashwant Kanetkar
5. Data Structure using C++ - D.S.Malik

Lab Course- IV Paper Title: Laboratory Course in Computer Science – IV

Data Structure through C++

1. Write a program to perform various operations on array –matrix operations using array, string array program etc
2. Write a program to implement stack using static method.
3. Programs to implement applications of stack
4. Write a program to implement Queue using static method.
5. Programs to implement applications of queue
6. Write a program to create linked list, add node to linked list and Remove node from linked list.
7. Write a program to implement types of linked list
8. Write a program to implement stack and queue dynamically
9. Write a program to sort given elements using insertion sort, bubble sort, selection sort etc.
10. Write a program to search given element using Linear and Binary Search

Section –II

Cyber Security Essentials

Course Outcomes:

Students who complete this course should be able to:

1. Learn working of computer network.
2. Understand importance of cyber security.
3. Learn different security threats.
4. Understand concept of information security management.
5. Learn different access controls methods.
6. Understand wireless network security.
7. Learn cyber security laws and importance of security audit.

Unit I: Introduction to Computer Network

6

Computer Network: Definition, Types of Network, Topologies, Network devices, Internet, Search Engines, Web Browsers, OSI Model, TCP IP Model, IP address scheme, switching techniques.

Unit II: Introduction to Cyber security**6**

Introduction to Cyber Security: Definition, Importance, Computer ethics, Hacker, Hacking phases, Hacker classes, Mobile Device Security, File Security, Password Security, Browser Security, Email Security, Encryption, Decryption, Digital Signature, Firewall, types of Firewall, spoofing.

Unit III: Introduction to information security and threats**12**

Security Threats: Definition, Types of Threats - Virus, Worms, Trojan Horse, Malware, Ransom ware, Identity theft etc, , Web application threats. Torrent and infected websites, Firewall, types of firewall Antivirus-Definition, Types, features, advantages, limitations, difference between Firewall and Antivirus. Definition of attack, Types of Attacks, DoS attack, phishing,

Unit IV: Access Control and cyber security laws**14**

Computer Forensics, Steganography, elements of information security and Introduction to Kali linux **Access Controls:** Overview of Authentication and Authorization, Overview of Intrusion Detection Systems and Intrusion Prevention Systems. **Wireless Network Security-** Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security **Cyber Security Laws:** Security Laws, Intellectual Property Rights, Security Audit. What is cyber crime and types of crime.

References:

1. Computer Networks - Forozoun (TMH)
2. Computer Networks – Olifer (Wiley-india)
3. Computer Network -AS Tannenbum
4. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyberwar, Hacking) by Harry Colvin (Author)
5. How NOT To Use Your Smartphone by Rodney D Cambridge
6. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book 1) AM. Perry
7. Cyber Security Essentials: James Graham, Richard Howard, Ryon Olson(E-book)
8. Network Security Secrets and Solutions – Stuart McClure, Joe Scambray, George Kurtz.
9. Information Assurance Handbook: Effective Computer Security and Risk Management Strategies – Corey Schou, Steven Hernandez.
10. Applied Network Security Monitoring: Collection, Detection, and Analysis – Chris Sanders, Jason Smith
11. E-Commerce and Security- Kjell Orsborn (E-book)

Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.

Nature of Question Paper ----- Total 80 Marks

Section-I

Q.No.1 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q. No. 2 Attempt any two of the following –long Answers (out of three) 16 Marks

Q. No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

Section-II

Q.No.4 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No.5 Attempt any two of the following –long Answers (out of three) 16 Marks

Q. No. 6 Attempt any four of the following -Short Answers - (out of six) 16 Marks

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Semester: III Computer Science-III
CC-CS-1304C

Introduction to RDBMS using MySQL
and Object Oriented Programming Using C++
Theory: 60 Hours (75 Lectures) credits -4

Section-I

Introduction to RDBMS using MySQL

Course Outcomes:

- 1) Understand the basics of MySQL and construct queries using MySQL for database management.
- 2) To provide an advancement on creating tables and inserting data using different constraints, clauses, operators etc.
- 3) To understand the features of data models and normalization.
- 4) To understand the concept of Transaction and Query processing.
- 5) To study an overview on Stored Procedures.

UNIT 1. Introduction to Data Models and Normalization **09**

- Data Flow Diagram : concept of DFD, Symbols, Levels of DFDs, example.
- Entity Relationship Diagram : Concept of Entity, Attributes, Symbols, Types of relations, examples.
- Normalization: Forms of Normalization – 1NF, 2NF, 3NF, BCNF.

UNIT 2. Introduction to MySQL **10**

- what is MySQL, features of MySQL,
- Basic Data types in MySQL,
- Classification of Commands : DDL- Create, Alter, Drop, Truncate, Comment, Rename,
- DML- Insert, Update, Delete, Select. DCL- Grant, Revoke, TCL- Commit, Rollback, Savepoint
- Data Constraints : Primary Key, Foreign Key, Unique, NOT Null, Check, Default.
- Select statement with where, group by, order by clause.
- SQL Operators : Logical, Relational/Comparison, Special - In, Between, Like.
- SQL functions : Arithmetic, Conversion , Date and time, Aggregate Functions.

UNIT 3. MySQL Sub-queries and Joins.

10

- Introduction to Sub Queries: Sub queries, Nested Sub query.
- Introduction to Joins: Simple/Inner Two tables Join, Left, Right, Outer join, Self join.
- Views, Indexes, Sequence.

UNIT 4. Introduction to MySQL Stored Procedures

09

- Stored Procedures definition and concept.
- Structure and Syntax of Stored Procedures block.
- Stored Procedures variables, parameters, modes: IN, OUT, INOUT.
- Flow Control structures : if, case statements, Loops- Simple loop, while, repeat until
- Stored Procedures: Creating, Calling, Modifying, Deleting/Dropping procedures
- Introduction to Cursors, Trigger and its types.

Reference Book

- MySQL The Complete Reference By Vikram Vaswani
- Learning MySQL by O'reilly
- MySQL in Nut Shell by Dyer 2nd Edition
- MySQL - Joel Murach 2012 edition

Lab course III Introduction to RDBMS using MySQL

Note: MySQL may be used

1) Write a MySQL command/Statement to Create a database Student_details and create a table Student inside it with fields – stud_rollno, stud_name, stud_address, stud_course, stud_ph_no and perform following commands:

- i) Display table structure.
- ii) Alter table to add new column marks.
- iii) insert 10 appropriate records.
- iv) display all records in descending order of stud_rollno.
- v) update record of stud_rollno=2 change name from 'Supriya' to 'Priya'.
- vi) Display students with lowest and highest marks and count of records using appropriate aggregate functions.
- vii) Display names of students having letter "s" anywhere in their name.
- viii) Delete record of stud_name=08.
- ix) drop table Student.

2) Create following tables and perform following Queries:

- i) table Salesperson with columns s_no, s_name, city, commission.
- ii) table Customers with columns c_no, s_no, c_name, city.
- iii) table Orders with columns order_no, c_no, amount, order_dt.
- iv) Apply following Constraints:
 - a) Add primary key constraint on s_no in salesperson table, c_no on customers table and order_no in orders table.

- b) Add foreign key constraint on c_no, s_no column in order table.
- c) Add constraint on customer table to check city which should be from the following list(satara, sangli, Kolhapur, pune).
- d) add default value '0' to commissions column of salesperson table.
- v) Select records from salesperson where city is "Sangli".
- vi) Select distinct city from salesperson.
- vii) Display records whose amount is between 4000 to 5000.
- viii) Display records of customer whose city is not "sangli" and "Kolhapur".

3) Write a MySQL program to perform following Join Operations:

- i) Create a table dept_dtls with following fields (dept_no int(5), dept_name varchar2(20), location varchar2(20)).
- ii) create a table emp_dtls(emp_no int(5), emp_name varchar2(20), job varchar2(20), mgr_no int(5), dept_no int(5));
- iii) insert 5 relevant records in each table.
- iv) Perform following queries:
 - a) Use simple join and display dept_name, location, emp_no, emp_name, job.
 - b) Use outer left and outer right join to display information of dept_no, dept_name, location, emp_no, emp_name, job.
 - c) Use self join to display emp_no, emp_name, job, dept_no.

4) Write a procedure to accept two numbers from users and perform arithmetic operations on it.

5) Write a stored procedure to check whether given number is odd or even.

6) Write a stored procedure to check whether given number is prime or not.

7) Stored Procedure on table: (cust_id,cust_nm,contact,address,city,code,country).

- i) Write a stored procedure named "SelectAllCustomers" that selects all records from the "Customers".
- ii) create a stored procedure that selects Customers from a particular City from the "Customers" table.
- iii) creates a stored procedure that selects Customers from a particular City with a particular PostalCode from the "Customers".

8) Procedures on table: Job1 (job_id, job_title, min_salary, maximum salary)

- i) Write a procedure using parameter to accept a number to display number of records from a table. (for e.g. number of records=3, will display first 3 records from table Job1).
- ii) Write a procedure using parameter to display the maximum salary from Job1 table.

9) consider tables product(prod_id, prod_nm,sup_nm,unit_price) and table product_price_history(prod_id, prod_nm,sup_nm,unit_price) write a trigger to store old or previous records in product_price_history which are updated on product table.

10) write a procedure to select data from table using cursor.

Section-II

Object Oriented Programming Using C++

Course Outcomes:

- Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
- To understand how C++ improves C with object oriented features
- To learn syntax and semantics of C++ programming language
- To learn how to write inline functions for efficiency and performance.
- To learn how to overload functions and operators in C++.
- To learn how to design C++ classes for code reuse.
- To learn how inheritance promote code reuse in C++.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

Unit I: Introduction to C++ and Basics of Object Oriented programming Concepts 09

Introduction to C++: Structure of C++ program, Input and output Streams, Memory management operators: new and delete, this pointer, Reference variables, Control Structures (looping and branching statements), Functions: inline function, default argument, function overloading. **OOP Concepts:** Data abstraction, Data Encapsulation, Inheritance, Polymorphism, Message Passing

Unit II Class and Object 10

Class declaration, Access modifiers: public, private, protected, defining member functions (inside the class and outside the class), Static data members and member function, Array of object, friend function and friend class .

Unit III: Constructor, Destructor, Operator Overloading 09

Constructor and Destructor: Definition and features of constructor, Types of constructor, Definition, syntax and use of Destructor **Operator overloading :** Concept, Rules for operator overloading, Unary and Binary Operator overloading

Unit IV: Inheritance and Polymorphism 09

Inheritance: Concept, Definitions of base class and derived class, Types of inheritance (Single, Multiple, Multilevel, Hierarchical and Hybrid inheritance) **Polymorphism:** Definition of polymorphism, Types of polymorphism, virtual function, pure virtual function, Abstract class.

Reference Books

1. K.R.Venugopal, Rajkumar Buyya, Mastering C++, Tata McGraw Hill.2010
2. Pooranchandra Sarang, Object Oriented Programming with C++ ,Prentice Hall .2004
3. Junaid Khateeb, Dr.G.T.Tampi,Computer Programming in C++, Dreamtech.2010
4. Rajendra Akerkar,Sudhakar Bhoite,Glimpses of C++ Object Oriented Programming, Mahalaxmi publication.2002
5. D. Ravichandran , Programming with C++, McGraw Hill.2001
6. Poonam Ponde, Object Oriented Programming with C++, Vision publication.2013

Paper Number: Lab Course-III

Paper Title: Laboratory Course in Computer Science – III

1. Write a C++ program to perform arithmetic operations using inline function
2. Write a C++ program to calculate area of circle ,rectangle and triangle using function overloading
3. Write an object oriented program to display details of n number of students.
4. Write an object oriented program to display salary statement of n number of employees using array of object
5. Write an object oriented program to perform time addition using friend function
6. Write an object oriented program to handle saving account system using constructor and destructor
7. Write an object oriented program to reverse a string using unary operator overloading
8. Write an object oriented program to perform addition of two complex numbers using binary operator overloading
9. Make a class named Fruit with a data member to calculate the number of fruits in a basket. Create two other class named Apples and Mangoes to calculate the number of apples and mangoes in the basket. Print the number of fruits of each type and the total number of fruits in the basket.
10. Write an object oriented program to display the result of student using hybrid inheritance.
11. Create class Shape, derive the two classes Rectangle and Circle from Shape class and calculate area of rectangle and circle using virtual function.

Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.

Nature of Question Paper ----- Total 80 Marks

Section-I

Q.No.1 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q. No. 2 Attempt any two of the following –long Answers (out of three) 16 Marks

Q. No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

Section-II

Q.No.4 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No.5 Attempt any two of the following –long Answers (out of three) 16 Marks

Q. No. 6 Attempt any four of the following -Short Answers - (out of six) 16 Marks

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Semester: III Mathematics -Paper- III
Maths GEC-1300 C
Linear Algebra & Numerical Methods
Theory: 60 Hours (75 Lectures) credits -4
Section – I
(Linear Algebra)

Unit I :- Linear Equations and Matrices **10**

- 1.1 Matrices
- 1.2 Matrix Transformations
- 1.3 Linear systems
- 1.4 Results on system of linear equations and invertible matrices
(statements only)
- 1.5 Solutions of Systems of Linear Equations
 - 1.5.1 Gaussian Elimination method
 - 1.5.2 Gauss-Jordan method
- 1.6 LU- Factorization method

Unit II:- Real Vector spaces **12**

- 2.1 Ring ,Integral Domain ,Field (only definitions)
- 2.2 Vector Spaces
- 2.3 Subspaces
- 2.4 Linear Dependence and Independence – Definition & examples
- 2.5 Basis and Dimension
- 2.6 Rank and Nullity of a matrix
- 2.7 Inner product space
 - 2.7.1 Definition and examples
 - 2.7.2 Properties of inner product
 - 2.7.3 Orthonormal Basis in R
 - 2.7.4 Gram-Schmidt process

Unit III:- Eigen values, Eigen vectors and diagonalization **8**

- 3.1 Eigen values and Eigen vectors
- 3.2 Diagonalization
- 3.3 Cayley Hamilton theorem (Statement only) and examples.

Unit IV:- Linear Transformations and Matrices **8**

- 4.1 Definitions and Examples
- 4.2 The Kernel and Range of a Linear transformation
- 4.3 The Matrix of a Linear Transformation

Note :- All theorems in sections 1.4 , 2.6 , 2.7 , 3.2 , 4.3 are without proof

REFERENCE BOOKS

1. Elementary Linear Algebra with Applications, Howard Anton, Chris Rorres, John Wiley and sons., 7th Edition (1994).
2. Linear Algebra , Schaum Series.
3. A textbook of Matrices, Shanti Narayan, P. K. Mittal, S. Chand.

Section-II
(Numerical Methods)

Unit - I : Solution of Non – linear Equations	09
1.1 Introduction	
1.2 Muller’s method : Algorithm and examples	
1.3 Regula – Falsi method : Algorithm ,graphical representation and examples	
1.4 Newton Raphson method : Algorithm ,graphical representation and examples	
1.5 Secant method : Algorithm and examples	
Unit - II : Numerical Interpolation	09
2.1 Interpolation , Equally and Unequally spaced data	
2.2 Definitions of forward difference (Δ) ,Backward difference (∇) and Shift operator (E)	
2.3 Elementary results on Δ , ∇ , E	
2.4 Fundamental theorem of difference calculus (with proof)	
2.5 Newton – Gregory Forward interpolation formula (with proof) and Examples	
2.6 Newton – Gregory Backward interpolation formula (with proof) and Examples	
2.7 Lagrange’s interpolation formula (with proof) and examples	
2.8 Newton’s divided difference formula (with proof) and examples	
Unit - III : Numerical Intgration	10
3.1 Introduction of numerical integration	
3.2 General Quadrature formula (without proof)	
3.3 Trapezoidal rule (with proof) and examples	
3.4 Simpson’s $\frac{1}{3}$ rule (with proof) and examples	
3.5 Simpson’s $\frac{3}{8}$ rule (with proof) and examples	
3.6 Gauss Quadrature Formula (with proof) and examples	
Unit - 4 : Solution of first order ordinary differential equation	09
4.1 Introduction of first order ordinary differential equation	
4.2 Euler’s method and examples	
4.3 Euler’s modified method and examples	
4.4 Runge – Kutta method (second and fourth order) and examples	
4.5 Simultaneous first order differential equation by Runge-Kutta method (without proof) and examples	
REFERENCE BOOKS	
1. Introductory Methods of Numerical Analysis, S.S. Sastry, 3rd edition,Prentice Hall of India, 1999.	
2. Finite differences and Numerical Analysis, H.C. Saxena, S. Chand and Company.	
3. Numerical Analysis, Balguruswamy.	
4. Calculus of Finite Differences and Numerical Analysis, P. P. Gupta,G. S. Malik and S. Gupta, Krishna Prakashan Media (P) Ltd.	
5. Computer oriented Numerical methods, A. B. Auti Tech-max publications	
6.Applied Numerical Methods, S.S.Patil,Electrotech Publication, Engineering series,3 rd edition	

Mathematics -Lab- III:Linear Algebra & Numerical Methods

Practical number	Title of practical
1	Gauss Elimination method
2	Gauss Jordan method
3	LU Factorization method
4	Gram Schmidt process
5	Eigen values and Eigen vectors
6	Diagonalizable Matrix
7	Verification of Cayley Hamilton theorem
8	Inverse of a matrix using Cayley Hamilton Theorem
9	Muller's method
10	Regula Falsi method and Newton Raphson method
11	Newton Forward and Backward interpolation
12	Lagrange's interpolation & Newton's divided difference formula
13	Trapezoidal , Simpson $\frac{1}{3}$, and Simpson $\frac{3}{8}$ rule
14	Gauss Quadrature formula
15	Computer programme for 1) Euler's method 2) Euler's modified method 3) Runge Kutta method (second and fourth order)
16	Computer Programme for 1) Trapezoidal rule 2) Simpson $\frac{1}{3}$ rule 3) Simpson $\frac{3}{8}$ rule

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Semester IV Mathematics -Paper- IV
Maths GEC-1300 D
Computational Geometry & Operation Research
Theory: 60 Hours (75 Lectures) credits -4
Section-I
(Computational Geometry)

Unit I :- Two dimensional transformations

13

- 1.1 Introduction.
- 1.2 Representation of points.
- 1.3 Transformations and matrices.
- 1.4 Transformation of points.
- 1.5 Transformation of straight lines.
- 1.6 Midpoint transformation.
- 1.7 Transformation of parallel lines.
- 1.8 Transformation of intersecting lines.
- 1.9 Transformation: rotations, reflections, scaling, shearing.
- 1.10 Combined transformations.
- 1.11 Transformation of a unit square.
- 1.12 Solid body transformations.
- 1.13 Transformation and homogeneous coordinates. Translation.
- 1.14 Rotation about an arbitrary point.
- 1.15 Reflection through an arbitrary line.
- 1.16 Projection – a geometric interpretation of homogeneous co-ordinates.
- 1.17 Overall Scaling.
- 1.18 Point at infinity.

Unit II :- Three dimensional transformations

12

- 2.1 Introduction.
- 2.2 Three dimensional – Scaling, shearing, rotation, reflection, translation.
- 2.3 Multiple transformations.
- 2.4 Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space.
- 2.5 Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes.
- 2.6 Affine and perspective transformations.
- 2.7 Orthographic projections.
- 2.8 Axonometric projections.
- 2.9 Oblique projections.
- 2.10 Single point perspective transformations.
- 2.11 Vanishing points.

Unit III :- Plane Curves

9

- 3.1 Introduction.
- 3.2 Curve representation.
- 3.3 Non – parametric curves.
- 3.4 Parametric curves.
- 3.5 Parametric representation of a circle and generation of circle.
- 3.6 Parametric representation of an ellipse and generation of ellipse.
- 3.8 Parametric representation of a parabola and generation of parabolic

segment.

3.9 Parametric representation of a hyperbola and generation of hyperbolic segment.

Unit IV :- Space curves

6

4.1 Bezier Curves – Introduction, Definition, Properties (without proof),

4.2 Curve fitting (upto $n = 3$),

4.3 equation of the curve in matrix form (upto $n = 3$)

REFERENCE BOOKS

1. Mathematical elements for computer graphics, F. David and J. Alan Adams (McGraw Hill International Edition)
2. Computer graphics, Schaum series.
3. Computer Graphics handbook, Geometry and Mathematics, M.E.Mortenson, Industrial Press Inc.

Section-II
(Operation Research)

Unit -I : Introduction to operation Research **04**

- 1.1 Basics of operation research
- 1.2 Different definitions of operation research
- 1.3 Characteristics , scope , limitations of operation research

Unit - II: Linear Programming Problem **12**

- 2.1 Basics definitions
- 2.2 Solution of L.P.P by Simplex method and examples
- 2.3 Solution of L.P.P by Big – M method and examples
- 2.4 Definition of Dual Problem
- 2.5 Relationship between solutions of primal and dual problems

Unit - III : Transportation and Assignment problem **10**

- 3.1 Basics of Transportation problem
- 3.2 Basic Definitions
- 3.3 Initial Solution
 - 3.3.1 North – West corner method and examples
 - 3.3.2 Matrix minima method and examples
 - 3.3.3 Vogel's approximation method and examples
- 3.4 MODI method and examples
- 3.5 Maximization in transportation problem and examples
- 3.6 Unbalanced transportation problem and examples
- 3.7 Introduction to Assignment problem
- 3.8 Hungarian method and examples
- 3.9 Maximization in Assignment problems and examples
- 3.10 Unbalanced Assignment problem and examples
- 3.11 Assignment problems with restrictions and examples

Unit - IV : Theory of Games **09**

- 4.1 Basics definitions
- 4.2 Saddle point and examples
- 4.3 Algebraic method for 2×2 size game and examples
- 4.4 Arithmetic method for 2×2 size game and examples
- 4.5 Principal of dominance , Dominance method and examples
- 4.6 Sub-game method for $2 \times n$ & $m \times 2$ size game and examples
- 4.7 Graphical method for $2 \times n$ & $m \times 2$ size game and examples

REFERENCE BOOKS

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

Mathematics -Lab- IV
Maths GEC-1300 D
Linear Algebra & Numerical Methods

Practical number	Title of practical
17	Plane Linear transformation 1 Scaling , Shearing , Reflection and Rotation about origin
18	Plane Linear transformation 2 Rotation about arbitrary point , Reflection through arbitrary line Combined transformation matrix
19	Space linear transformation 1 Scaling , Shearing and Rotation about Co – ordinate axis Reflection through Co – ordinate planes , Translation Multiple transformations , Rotation about a line parallel to Co – ordinate axis , Rotation through planes which are parallel to Co – ordinate planes , Reflection through arbitrary planes (algorithm only)
20	Plane Curves 1 Generation of points on circle and ellipse (Algorithm and Examples)
21	Plane Curves 2 Generation of points on parabola and hyperbola (Algorithm and Examples)
22	Bezier Curve : Generation of curve with $n = 2, 3$
23	Linear programming Problem 1 Simplex method (maximization and minimization problems)
24	Linear programming Problem 2 Big – M method (maximization and minimization problems)
25	Initial solution of transportation problem North – West Corner method , Matrix minima method Vogel's approximation method
26	MODI method
27	Transportation problem- minimization
28	Maximization in transportation problem , Unbalanced transportation problem
29	Hungarian method
30	Maximization in assignment problem , Unbalanced assignment problem
31	Game Theory 1 Two person zero sum game with saddle point Arithmetic method , Algebraic method
32	Game Theory 2 Dominance method, Sub game method , Graphical method

Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.

Nature of Question Paper ----- Total 80 Marks

Section-I

Q.No.1 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No. 2 Attempt any two of the following –long Answers (out of three) 16 Marks

Q.No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

Section-II

Q.No.4 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No.5 Attempt any two of the following –long Answers (out of three) 16 Marks

Q.No. 6 Attempt any four of the following -Short Answers - (out of six) 16 Marks

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Semester: III Skill Enhancement course-I
SEC-I
WEB TECHNOLOGY
Theory: 30 Hours (38 Lectures) credits -2

Course outcomes

- understand basic concepts in HTML
- create basic web pages
- insert and format text
- implement a variety of hyperlinks to connect pages.
- develop a basic website.

Unit-I: Introduction to web development and HTML

Web Browser, Web server, Web hosting, Web Pages, DNS, URL, Introduction e-documents - Static, Active & Dynamic. Web programming – client side scripting HTML Basic Tags- <HTML>, <HEAD>, <TITLE>,<BODY> structure of html, how create to run html Page Comment tag, HTML Formatting Tags-HTML Color Coding, Headings tags,<P>,<I><U>,,<HR>
Div and Span Tags for Grouping, <CENTER>,<MARQUEE> , <SUB>, <SUP>Lists-Unordered Lists, Ordered Lists, Definition list, tag and its attributes-SRC, align, width, height, hspace, vspace, border,<A> tag and its attributes-href, target, name

Unit-II: Working with tables and forms

<TABLE> Tag, <TR>, <TD>,<TH> and its attributes .<FORM> Tag and its attributes. <INPUT>Tag and its attributes, HTML FORM controls –Label, Text Area, buttons, radio Buttons, checkboxes, select Box Control, hidden controls, Frameset and frames

Unit- III: Introduction to CSS

Introduction to Cascading Style Sheet (CSS), CSS Syntax, Comments, Id and Class, Background -Background Color, Background Image -Text - Text Color, Text Alignment, Text Decoration, Text Transformation, Text Indentation - CSS Font - Font Families, Font Style, Font Size -Setting Text Size - Using Pixels and Em - CSS Lists -Different List Item Markers, Unordered List, Ordered List, An Image as The List

Unit- IV- Introduction to PHP

Introduction to PHP, Server side scripting, Role of Web Server software, including files, comments, variables and scope, echo and print,

Lab Course

1. Create a webpage that prints your bio data to the screen with Title Bio-Data.
2. Create a webpage that prints the numbers 1 - 10 to the screen. Each number being a different color.
3. Create a webpage that prints the message "When was this webpage created? Check page's title for the answer." to the screen, and set the title of the page to the current date.
4. Print a paragraph that is a description of a book, include the title of the book as well as its author. Names and titles should be underlined, adjectives should be italicized and bolded.

5. Print the squares of the numbers 1 - 20. Each number should be on a separate line, next to it the number 2 superscripted, an equal sign and the result. (Example: $10^2 = 100$)
6. Print two lists with any information you want. One list should be an ordered list, the other list should be an unordered list.
7. Prints an h1 level heading followed by a horizontal line whose width is 100%. Below the horizontal line print a paragraph relating to the text in the heading.
8. Print a definition list with 5 items.
9. Create some links to various search engines (google, yahoo etc).
10. Create links to five different pages on five different websites that should all open in a new window.
11. Create a page with a link at the top of it that when clicked will jump all the way to the bottom of the page. At the bottom of the page there should be a link to jump back to the top of the page.
12. Display five different images that has a border of size 2, a width of 100, and a height of 200.. Skip two lines between each image. Each image should have a title.
13. Display an image that when clicked will link to a search engine of your choice (should be opened in a new window).
14. Create login form
15. Create form to display student information
16. Write a program to create HTML table with the following output :

Name	Maths	Science	English	Physics
David	85	87	88	92
Richard	91	81	78	71
John	81	86	88	84
Tony	84	86	87	82
Scott	71	79	82	88

17. Create table with following structure

Day	Today	Tomorrow	Saturday
Condition	Sunny	Mostly sunny	Partly cloudy
Temperature	19°C	17°C	12°C
Wind	E 13 km/h	E 11 km/h	S 16 km/h

18. Create a web Form with following fields

1 Evergreen Valley College Survey

2 [Email webmaster](#) | [Evergreen Valley College Website](#)

Personal Information 3

4 Name:

Email:

5 Age: < 18 18-25 26-40 41-65 65+

Academic Information 3

Goals: Check all that apply

- 6 Associate Degree Transfer to CSU Transfer to UC
 Personal Enrichment

Field of Study: Select all that apply; hold CTRL when clicking to select multiple items

- 7 Accounting
 Astronomy
 Business
 Chemistry
 Computer Information Systems
 Health

Comments:

8

Send Data

Reset Form

- 20 Create Simple website with 5 pages (Home, About, Gallery, Course, and Contact). Gallery and contact page with contact us form is must.
- 21 Simple PHP program that displays a welcome message.

Reference books:

- 1) Web Technologies Black Book- DT Editorial services, Dreamtech 2015 edition
- 2) HTML 5- KRIS JAMSA Jones & Bartlett learning 2014 edition
- 3) HTML & XHTML-O'Reilly Musciano & Kennedy 5th edition
- 4) HTML, Javascript, DHTML & PHP BPB publication Ivan Bayross 4th edition
- 5) Developing web application Wiley publication Ralph Moseley M.T.Savaliya 2nd edition 2013
- 6) PHP & MySQL Aruta publication Sagar Sawant Edition 2014

“Education for knowledge , science and culture”
- Shikshanmaharshi Dr. Bapuji Salunkhe
Shri Swami Vivekanand Shikshan Sanstha’s
VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR
B. Sc. Part – II (Computer science Entire) CBCS Syllabus with effect from June, 2019
Semester: III Electronics -Paper- III
Electronics GEC-1301 C
COMPUTER INSTRUMENTATION AND ORGANIZATION, PROCESSOR
PROGRAMMING
Theory: 60 Hours (75 Lectures) credits -4

Objectives:

- 1) To study different types of sensors.
- 2) To study different types of signal conditioning circuits.
- 3) To study data conversion techniques.
- 4) To study the different types digital instruments and Data Acquisition System
- 5) To get familiar with computer organization
- 6) To study the Intel 8086 processor architecture and instruction set.
- 7) To study the assembly language programming.

Section – I

Computer instrumentation

Unit-I Sensors: (12)

Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Specifications of sensor: (Accuracy, range, linearity, sensitivity, resolution, reproducibility). Temperature transducers: Resistance temperature detector (RTD), Thermistors, Thermocouple (LM-35 and AD590), optical sensor (LDR), displacement sensor (LVDT), Passive Infrared sensor (PIR), ultrasonic sensor, Hall effect transducer, and Proximity sensors.

Unit-II Signal Conditioning: (08)

Introduction to signal conditioning, Signal conditioning of passive sensors using bridge circuit: Wheatstone’s bridge, Three OP-amp instrumentation amplifier, Filters: active and passive filters, Op-Amp based filters: Low Pass Filter, High Pass Filter, Band Pass Filter, Band reject filter.

Unit-III Data Converters: (09)

Digital to Analog Converter (DAC): Resistive divider, R-2R ladder, Parameters: (Linearity, resolution, accuracy), Analog to Digital Converter: Types of ADC: Flash, Successive approximation, Parameters of ADC (Linearity, resolution, conversion time, accuracy)

Unit-IV Digital Instruments and Data Acquisition (08)

Introduction, Digital Multimeters, Digital Frequency Meter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Block Diagram of CRO, Generalized Data Acquisition System, Data Logger.

Recommended Books:

1. Sensors & Transducers : Dr. A. D. Shaligram: CTC publications
2. Op-Amps and Linear Integrated Circuits: Ramakant Gaikwad PHI: 4th Ed.
3. Electronic Instrumentation: H. S. Kalsi: TMH: 2nd Edition
4. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick, William D. Cooper: PHI publications
5. Electronic measurements : K.A. Bakshi, A. V. Bakshi and U. A. Bakshi, Technical publications.
6. A Course in Electrical and Electronic measurements and Instrumentation: A.K. Sawhney:Dhanpat Rai & Sons Educational & technical publishers

Section II

Computer organization and microprocessor programming

Unit-I Computer Organization (12)

CPU organization: Different registers organization

Memory organization: Characteristics of memory systems, Cache memory, Memory Hierarchy, memory management (Segmentation, Paging),

I / O organization: Need of I / O interface, IO mapped IO, Memory mapped IO, DMA concept, Serial bus interface (RS 232, USB), Parallel port, PCI bus, PCMCIA bus

Unit-II The Art of Assembly Language Programming (09)

Program development steps-Defining problem, Writing Algorithms, Flowchart Initialization checklist, Choosing instructions, Converting algorithms to assembly language programs. Assembly Language Programming Tools Editors, Assembler, Linker, Debugger Assembler directives and Operators

Unit-III Instruction Set of 8086 microprocessor (09)

Machine language instruction format, Addressing modes, Instruction Set Group of instructions: Arithmetic instructions, Logical instructions, Data transfer instructions, Bit manipulations instructions, Program control transfer or branching instructions, Process control instructions.

Unit-IV Assembly programming (08)

Introduction to assembler (NASM), Assembly directives, introduction to Programming (Flow chart, Algorithm, program), Assembly programs of Addition, subtraction, multiplication, division, code conversion, Array processing (Finding largest-smallest number, arranging elements in ascending – descending order),

Recommended Books:

1. Computer System Architecture: Morris Mano, Prentice-Hall of India
2. The Pentium Microprocessor: James Antonakos
3. Microprocessors and Interfacing Programming and Hardware: Douglas V. Hall- TATA Mc GRAW-HILL
4. The 8088 and 8086 microprocessor: Tribel, Walter A, Singh Pearson Publications New Delhi
5. Microprocessor and Microcontrollers: Latha, C. Murugeswari Scitech Publications, Chennai.
6. The Intel Microprocessors: Barry B. Brey- Pearson Education Asia

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B. Sc. Part – II (Computer science Entire) CBCS Syllabus with effect from June, 2019
Semester: IV Electronics -Paper- IV
Electronics GEC-1301 D
COMMUNICATION PRINCIPLES AND 8051 MICROCONTROLLER INTERFACING,
PROGRAMMING
Theory: 60 Hours (75 Lectures) credits -4

Objectives:

- 1) To study modulation and demodulation techniques.
- 2) To understand multiplexing and multiple access technique.
- 3) To understand Wireless communication techniques
- 4) To study the concept of mobile communication
- 5) To study the basics of 8051 microcontroller
- 6) To study the Programming and interfacing techniques of 8051
- 7) To apply knowledge of 8051 to design different application circuits
- 8) To introduce the basic concepts of advanced Microcontrollers

Section – I

Communication principles

- Unit-I: Introduction to electronic communication (10)**
importance of communication, elements of communication system, electromagnetic spectrum, types of communication, (serial and parallel), concepts of communication system: signal bandwidth, channel bandwidth, data rate, baud rate, nyquist theorem, signal to noise ratio, and channel capacity, error handling code- hamming code, shannon theorem
- Unit-II. Modulation and demodulation (10)**
basics of modulation and demodulation introduction to modulation techniques: analog modulation (amplitude, frequency and phase), digital modulation, pam,pcm, delta modulation, modem - concept of ask, fsk, bpsk, qpsk and block diagram of modem using fsk.
- Unit-III: Multiplexing and multiple access techniques (09)**
study of multiplexing and multiple access techniques: space division multiplexing ,time division multiplexing , frequency division multiplexing , code division multiplexing, spread spectrum techniques: dsss, fhss, introduction to multiple access and corresponding access types: fdma , tdma , cdma
- Unit- IV Mobile communication (08)**
introduction to mobile communication, cellular concept, working of gsm, hand over, introduction to gprs. introduction to rfid, zigbee, bluetooth and wi-fi (comparison based on range, data rate, frequency, power).

Recommended

1. Communication Electronics : Principles and Applications. L.E.Frenzel 3rd Edition.
2. Modern Electronic Communication. G.M. Miller 7th Edition.
3. Mobile Communication Jochen Schiller 2nd Edition.
4. Wireless Communications: Principles and Practice. Rappaport
5. Wireless Communications and Networks. William Stallings

Books:

Section II

8051 Microcontroller interfacing, programming

Unit-I: Introduction to microcontroller

(10)

Comparison of Microcontroller & Microprocessor, Study of 8051 and its Family (89C51, DS5000, 8031, 8032, 8052, 8751, Phillips RD2, 89C51VRD2). Architecture of 8051: Internal Diagram of 8051 and Study of Internal Blocks, Reset and Clock, Registers, Flags and Internal Memory, SFR, I/O Ports.

Unit-II: 8051 Instruction set

(08)

Study of 8051 Instruction Set and Addressing Modes, Data transfer, Arithmetic, Logical, JUMP, Loops & CALL instructions, Bit manipulation Instructions.

Unit-III: Facilities in 8051

(10)

Timer and Counter: Timer and Counters, Timer modes, Programming the timers in Mode 1 using assembly and C. Time delay generation. Serial Port: Serial port of 8051, RS- 232 standard and IC MAX-232, Baud rate in 8051, programming for transmitting character through serial port using assembly and C.

Unit-IV.: Real world interfacing

(10)

Interfacing ADC, DAC, Stepper Motor, LCD, DC motor (PWM), Respective programming through embedded C. Study of advance microcontrollers (ARM & PIC): Features and applications

Reference Books

1. 8051 Microcontrollers 2nd Edition -Mazidi Pearson
2. 8051 Microcontroller -Ayala Cengage
3. 8051 Microcontroller -Deshmukh TMH

S.Y. B.Sc. Computer Science (Entire) Electronics: Practical Course

- Total Experiments to be performed 24.
- 20 experiments compulsory: At least 10 Practicals from each of the A and B groups.

Practical Examination –

B) Annual examination: 100 Marks in two session of 3 Hours as usual practice.

Session I 45 marks (Practical work 45 marks)

Session II 45 marks (Practical work 45 marks)

Journal Work 10 Marks

- 45 Marks can be divided as -

Circuit diagram	08
Connection and Testing	08
Demonstration and working explanation	07
Observations	07
Calculations/Graph/Result/comment	05
Oral	10

LIST OF PRACTICALS:

Group - A

1. Study of temperature sensor LM 35/AD 590
2. Instrumentation Amplifier using OP-AMP
3. 3 bit Flash ADC
4. R-2R ladder DAC
5. Filters (low pass and high pass)
6. Differential amplifier.
7. Measurement displacement of LVDT
8. Study of Preamplifier using Op-amp.
9. Write an ALP to find sum of series of numbers.
10. Write an ALP to multiply two 16 bit unsigned/ signed numbers.
11. Write an ALP to divide two unsigned/ signed numbers
12. Write an ALP to perform block transfer data using string instructions / without using string instructions.

Group - B

1. Data transfer programming using 8051 microcontroller
2. Arithmetic operations using 8051 microcontroller (Use 8051 Simulator)
3. Logical operations using 8051 microcontroller (Use 8051 Simulator)
4. Time delay generation using timers of 8051 microcontroller
5. Counter Programming using 8051
6. Code Conversion Programming using 8051
7. Interfacing of 7-SEGMENT DISPLAY / THUMB WHEEL SWITCH with 8051
8. Study of parallel port of PC (Port pin access using 'c')
9. Interfacing LCD with 8051
10. Interfacing of Relay/LED/Optocoupler using microcontroller
11. Interfacing Stepper motor with 8051
12. To study waveform generator (square, triangular and saw tooth using DAC) with microcontroller.

Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.

Nature of Question Paper ----- Total 80 Marks

Section-I

Q.No.1 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q. No. 2 Attempt any two of the following –long Answers (out of three) 16 Marks

Q. No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

Section-II

Q.No.4 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No.5 Attempt any two of the following –long Answers (out of three) 16 Marks

Q. No. 6 Attempt any four of the following -Short Answers - (out of six) 16 Marks

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VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR
B. Sc. Part – II (Computer science Entire) CBCS Syllabus with effect from June, 2019
Semester: IV Skill Enhancement course-II
Python Programming
Theory: 30 Hours (38 Lectures) credits -2

Course Outcome:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to install Python, start the Python shell
3. To define the structure and components of a Python program.
4. To learn to perform basic calculations, print text on the screen and perform simple control flow operations using if statements and for loops
5. To learn how to use lists, tuples, and dictionaries in Python programs
6. To learn how to reuse code with functions

Unit I: Introduction to Python and Basic Concepts in python

- **Introduction to python:** What is python? , Applications of Python, Why Python? Installation of python, First program in Python, Comments and Docstrings in Python Variable and data types, Operators in python
- **File Handling :** working with open, read, write, append modes of file
- **Conditional Statements:** Indentation in python, if, if-else, nested if-else statements

Unit II: Looping Statements, Control statements, String Manipulations

- **Looping Statements:** for loop, while loop , Nested loops
- **Control Statements:** break, continue and pass
- **String Manipulations:** Accessing strings, Basic operations, String slices, Functions and methods

Unit III: Python collection

- **Python collections :** list, Tuple, set and dictionary
List: Introduction, Accessing lists, change item value in list, loop through list, methods
Tuple: Introduction, Accessing tuples, change item value in tuple , loop through tuple and methods of tuple
Set: introduction and methods of set
Dictionary: Introduction, Accessing values in dictionaries, properties, Change value in dictionary, loop through dictionary and methods of dictionary.

Unit IV: Functions, Data visualization in python

- **Functions:** Defining a function, Calling a function, Function arguments, Default parameter value, Anonymous function : Lambda function(why use lambda, syntax and examples of lambda).
- **Data visualization in python:** Pandas packages (NumPy and matplotlib libraries)

References:

1. Mark Lutz, Learning Python, 5th Edition, O'reilly .2013
2. Charles Dierbach, Introduction to computer science using python, Wiley.2015
3. Harsh Bhasin, Python for Beginners,New age international publishers.
4. Dr.R.Negeswara Rao, Core python programming,Dreamtech.2018
5. Ajay Ohri, Python for R users, Wiley.2018
6. Laura Cassell and Alan Gauld,Python Projects,Wrox.2018

Lab course:

1. Hello world program in python
2. Python Program to Check Whether a Given Year is a Leap Year
3. Python Program to Check Whether a Number is Positive or Negative
4. Python Program to Take in the Marks of 5 Subjects and Display the Grade
5. Print "1" if a is equal to b, print "2" if a is greater than b, otherwise print "3".Print "Hello" if a is equal to b, and c is equal to d.
6. Python Program to Read a Number n And Print the Series "1+2+.....+n= "
7. Python Program to Check if a Number is a Palindrome
8. Python Program to Count the Number of Digits in a Number
9. Python Program to Find the Sum of Digits in a Number
10. Python Program to Print Odd Numbers Within a Given Range
11. Python Program to Find the Factorial of a Number
12. Python Program to check the number is prime or not
13. Python program to print hello world message using function
14. Python Program to Make a Simple Calculator using function
15. Python program to demonstrate lambda function
16. Write a Python programming to display a bar chart of the popularity of programming Languages.
Sample data:
Programming languages: Java, Python, PHP, JavaScript, C#, C++
Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7
17. Write a Python program to draw a scatter plot comparing two subject marks of Mathematics and Science. Use marks of 10 students.
Test Data:
math_marks = [88, 92, 80, 89, 100, 80, 60, 100, 80, 34]
science_marks = [35, 79, 79, 48, 100, 88, 32, 45, 20, 30]
marks_range = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]
18. Write a Python programming to create a pie chart with a title of the popularity of programming Languages.
Sample data:
Programming languages: Java, Python, PHP, JavaScript, C#, C++
Popularity : 22.2, 17.6, 8.8, 8, 7.7, 6.7

