Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CCCS413 **Title of Paper:** Windows Programming with VB.Net		**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	.NET Architecture, .NET Languages, Microsoft Intermediate Language (MSIL), The Just-In-Time (JIT) compiler, Working with Assemblies, The .NET framework class library VB.NET - introduction, applications and types of project Introduction to Visual Studio IDE Creating simple Windows Application using VB.NET Variables, data types, constants and operators Type casting, Boxing and Unboxing,	**20%**
II	Working with arrays and strings Creating simple Windows Application using VB.NET Use of conditional statement (if), multibranaching statement (select) and With…End With statement, Looping Statement: DO, FOR, FOR EACH..NEXT and WHILE, Working with EXIT, CONTINUE and WITH statements Working with procedures – introduction, types, use of parameters, parameter passing, calling procedures OOP concepts - Encapsulation, Inheritance, Interfaces and Polymorphism	**20%**
III	Working with modules, classes (partial) and namespaces Working with Windows Forms – introduction, life cycle, basic properties, methods and events, use of simple windows forms control. Working with SDI and MDI forms Working with basic controls – Button, CheckBox, CheckedListBox, ComboBox, DateTimePicker, GroupBox, HScrollBar, RadioButton, VscrollBar, Label, ListBox, PictureBox, TextBox and Time controls. Working with advanced controls – LinkLabel, RichTextBox, ColorDiolog, FontDialog, TreeView	**20%**
IV	Working with modules, classes (partial) and namespaces ADO.NET – introduction and applications ADO.NET – architecture (connected and disconnected) Database connectivity using ADO.NET Use of Data sources, Server Explorer and working with DataSet Populating data in a DataGridView	**20%**
V	Error Handling: exception, structured exception using try…catch and final statement ArrayList Collection ,HashTable, Searching and Sorting an Array, SortedList Class, Char Class, String Class, DateTime Class, StringBuilder Class, Serialisation Class, TimeSpan Class, Directory Class, File Class, DirectoryInfo Class, FileInfo Class,Path Class File Access by FileStream, StreamReader, Stream Writer, BinaryReader and Binary Writer	**20%**
Basic Text & Reference Books :-		
1.	Mastering VB.Net, by E.Petroutsos	
2.	VB.Net Black Books, by Steven Holzner.	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CCCS413			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Windows Programming with VB.Net			
Unit	**Description**		**Total Marks**
All	Q.1 (A) Multiple Choice Question.	06	14
	Q.1 (B) Answer the following. (With Internal Option) (Definitions, Blanks, Full Forms, True/False, Match the Following)	08	
I, II	Q.2 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
II, III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
III, IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) VB.Net Program. (With Internal Option)	08	
IV, V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) VB.Net Program. (With Internal Option)	08	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CCCS414		**Total Credit :** 4
Title of Paper: Database Management Systems – II		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**PL/SQL** Introduction, Block Structure, Data Types, Operators Control Structures: Loops, Conditional Statements, Procedures, Functions, Cursors, Triggers	**20%**
II	**Distributed and Parallel Databases** Reliability and Commit protocols, Fragmentation and Distribution, View Integration, Distributed database design, Distributed algorithms for data management, Heterogeneous and Federated Database Systems. Parallel database Architectures and their merits and demerits.	**20%**
III	**Database Transactions and Recovery Procedures** Transaction Processing Concepts, Transaction and System Concepts, Desirable Properties of a Transaction, Schedules and Recoverability, Serializability of Schedules, Transaction Support in SQL, Recovery Techniques, Database Backup, Concurrency control, locking techniques for Concurrency Control, Concurrency Control Techniques, Granularity of Data Items	**20%**
IV	**Emerging Databases** Multimedia database: Definition, need of Multimedia databases, MDBMS, Multimedia database components and structure, Multimedia database queries and applications; Mobile database: definition, their need, Characteristics, architecture, uses and limitations of mobile databases; Digital libraries: Introduction, Objectives, types, components, myths, services, advantages, limitations, and comparison with traditional libraries; Spatial databases: Basic concepts, need, types and relationships, architecture, queries, indexing techniques, advantages and disadvantages of spatial databases; Temporal database: basic concepts, characteristics, components, merits and demerits.	**20%**
V	**Introduction to NoSQL and In-memory Databases** **NoSQL** Introduction to NoSQL, Advantages and Disadvantages of NoSQL, CAP Theorem, Types of NoSQL, Key - Value Based, Columnar Based, Graph Based, Document Based, Difference between RDBMS and NoSQL with Use cases, Popular Industry Standard NoSQL, Choose Best NoSQL according to requirement, Generate Data Model with NoSQL, Ways to access NoSQL (Shell, API, Connector, Client), Assignment: *Performance Benchmarks* **In Memory Databases** Introduction to In-memory DB / NoSQL, Requirements of In-memory Databases with Use cases, Advantages and Disadvantages of In memory DB / NoSQL, Scalability, Reliability, Availability, Clustering & replication., Block Architecture of In- memory DB	**20%**
Basic Text & Reference Books :-		
1.	Fundamentals of Database Systems (3 edition), Elmasri R. and Navathe S.B., 2000, Addison Wesley, Low Priced Edition	
2.	An Introduction to Database System by Bipin Desai	
3.	Oracle Database 10g PL/SQL Programming, Scott Urman, Oracle Press	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CCCS414	**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Database Management Systems – II	

Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CCCS415	**Total Credit :** 04
Title of Paper: Practical Based on **CCCS413**	**Total Marks :** 70 **Time :** 3 Hrs

1. Create a Visual Basic .Net program which used to find area of circle. Area = PI * r^2
2. Create a Visual Basic .Net program which used to find area of rectangle. Area of rectangle = l*b
3. Create a Visual Basic .Net program which used to find area of Triangle. Area of Triangle =1/2*Base * Height
4. Create a Visual Basic .Net program which used to find circumference of circle. circumference of circle = 2 x PI * r
5. Create a Visual Basic .Net program which used to find perimeter of rectangle. Perimeter of rectangle=2(l+b)
6. Create a .NET program which used to determine that student is pass or fail. Marks of student input by user. As given below.
7. Create a Visual Basic .Net program which used to determine that number is positive or negative or zero. Change the back colour of textbox based on result.
8. Create a Visual Basic .Net program which used to determine that given number is numeric or not? Print result in a label.
9. Create a Visual Basic .Net program which used to determine that input string is valid date or not.
10. Create a .NET program which used to display name of day based on input value by user. For example if user enter 1 then display Sun, 2 then Mon as on. Using if statement.
11. Create a .NET program which used to display 1 to 10 in a textbox control Using While Loop
12. Create a Visual Basic .Net program which used to display 1 to 10 in a textbox using various Do loop Display using Do while entry controlled as well as exit controlled Display using Do until entry controlled as well as exit controlled
13. Create a Visual Basic .Net program which will print even and odd numbers up to given number. Also print sum of even numbers and odd numbers.
14. Implementation of looping and branching using VB.Net
15. Implementation of concept of class using VB.Net
16. Implementation of data base connectivity using VB.Net

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

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Total Marks : 70
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<tr><td colspan="3">Title of Paper: Practical Based on CCCS413</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Unit</td><td colspan="2">Description</td><td>Total Marks</td></tr>
<tr><td rowspan="2">I</td><td>Q.1 (A) Viva – Voce</td><td>20</td><td rowspan="2">70</td></tr>
<tr><td>Q.1 (B) Practical</td><td>50</td></tr>
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Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CCCS416	**Total Credit :** 04
Title of Paper: Practical Based on **CCCS414 and Elective Courses**	**Total Marks :** 70
	Time : 3 Hrs

1. The instructor shall formulate appropriate laboratory exercises which can result into good understanding of following PL/SQL concepts:
   a. Block structure (three practicals)
   b. Variables and data types (three practicals)
   c. Operators (three practicals)
   d. Control structures (three practicals)
   e. Procedures and functions (five practicals)
   f. Cursors (three practicals)
   g. Triggers (three practicals)

2. Hands-on understanding of any one distributed database (preferably Apache HBase): installation, understanding basic functions, study of algorithms used and applications. (At the end of the student shall write down the findings in the journal.)

3. The instructor shall formulate appropriate laboratory exercises which can result into good understanding of following TCL commands on Oracle database:
   a. Commit
   b. Rollback
   c. Savepoint

4. To understand the architecture and design issues in following:
   a. Multimedia databases
   b. Mobile databases
   c. Digital libraries
   d. Spatial databases
   e. Temporal databases

5. To get hands-on experience with NoSQL databases (e.g. HBase, MongoDB)

6. To get hands-on experience with In-memory databases (e.g. Aerospike)

Elective

Heap

1. Finding k-smallest element in mean-Heap.
2. Implement Queue using Heap.
3. Union of two given Heaps.
4. Given *n* lists of sorted integers, find the smallest range that includes at least one number from each of the *n* lists.

Sorting and Searching

5. Implementing sorting and searching algorithms (all algorithms as per syllabus).

Graphs

6. Count simple paths for given graph G has simple paths from source S to destination D? Assume that graph is represented using adjacent matrix.
7. Count the number of connected components of graph G which is represented using adjacent matrix.
8. Finding depth of directed acyclic graph (DAG).

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

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<tr><td rowspan="2">I</td><td>Q.1 (A) Viva – Voce</td><td>20</td><td rowspan="2">70</td></tr>
<tr><td>Q.1 (B) Practical</td><td>50</td></tr>
</table>

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: FCCS405		**Total Credit :** 4
Title of Paper: Computer Oriented Numerical Methods		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**Computer Arithmetic & Iterative Methods** Absolute, Relative and Percentage error The method of successive bisection, an algorithm of bisection method to find a root and examples The method of false position The method of iterative procedure Secant method, illustration and algorithm The method of successive approximations, illustrations and algorithm	
II	**Interpolation with Equal and Unequal Intervals** Interpolation with equal intervals-finite difference table The Gregory- Newton formula for forward and backward interpolation corresponding algorithms and examples Interpolation for unequal intervals using Newton's formula for divided differences Lagrange interpolation Central difference formulae Extrapolation and corresponding examples	
III	**Probability** Introduction and various related terms of probability, Conditional probability, Baye's Rule, Application of Baye's rule	
IV	**Regression** Introduction to Regression, Difference between correlation and regression, Regression lines for various data	
V	**Time Series and Forecasting** Utility of Time Series Analysis Components of Time Series: Secular trend, Seasonal variation, Cyclical variation and Irregular variation, Methods on measurement of components: The moving average method - merits and limitations, Forecasting models and methods	
Basic Text & Reference Books :-		
1.	Sastry S. S. : Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd., 1986(2)	
2.	Salaria R S : Computer Oriented Numerical Methods, Khanna Book Publishing Co. Ltd., 2000(3)	
3.	Fundamentals of statistics by S.C. Gupta, Himalaya Publishing House (6)	
4.	Rajaraman V. : Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd., 1983	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: FCCS405			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Computer Oriented Numerical Methods			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CECS408	**Total Credit :**04
Title of Paper: Advanced Data Structures and Algorithms	**Total Marks :** 70 **Time :** 3 Hrs

Unit	Description	Weighting
I	**Priority Queues and Heaps** What is a Priority Queue? Priority Queue ADT, Priority Queue, Applications, Priority Queue Implementations, Heaps and Binary Heaps, Binary Heaps, Heapsort, Priority Queues [Heaps]: Problems & Solutions **Disjoint Sets ADT** Introduction, Equivalence Relations and Equivalence Classes, Disjoint Sets ADT, Applications, Tradeoffs in Implementing Disjoint Sets ADT, Fast UNION Implementation (Slow FIND), Fast UNION Implementations (Quick FIND), Summary, Disjoint Sets: Problems & Solutions	**20%**
II	**Sorting** What is Sorting? Why is Sorting Necessary? Classification of Sorting Algorithms, Other Classifications, Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Heap Sort, Quick Sort, Tree Sort Comparison of Sorting Algorithms, Linear Sorting Algorithms, Counting Sort, Bucket Sort (or Bin Sort), Radix Sort, Topological Sort, External Sorting, Sorting: Problems & Solutions **Searching** What is Searching? Why do we need Searching? Types of Searching Unordered Linear Search, Sorted/Ordered Linear Search, Binary Search, Comparing Basic Searching Algorithms, Symbol Tables and Hashing, String Searching Algorithms, Searching: Problems & Solutions	**20%**
III	**Graph Algorithms** Introduction, Glossary, Applications of Graphs, Graph Representation Graph Traversals, Topological Sort, Shortest Path Algorithms, Minimal Spanning Tree, Graph Algorithms: Problems & Solutions **Selection Algorithms [Medians]** What are Selection Algorithms? Selection by Sorting, Partition-based Selection Algorithm, Linear Selection Algorithm - Median of Medians Algorithm, Finding the K Smallest Elements in Sorted Order Selection Algorithms: Problems & Solutions	**20%**
IV	**Symbol Tables** Introduction, What are Symbol Tables? Symbol Table Implementations, Comparison Table of Symbols for Implementations **Hashing** What is Hashing? Why Hashing? HashTable ADT, Understanding Hashing Components of Hashing, Hash Table, Hash Function, Load Factor, Collisions, Collision Resolution Techniques, Separate Chaining, Open Addressing, Comparison of Collision Resolution Techniques, How Hashing Gets O(1) Complexity? Hashing Techniques, Problems for which Hash Tables are not suitable, Bloom Filters, Hashing: Problems & Solutions **String Algorithms** Introduction, String Matching Algorithms, Brute Force Method,	**20%**

	Robin-Karp String Matching Algorithm, String Matching with Finite Automata, KMP Algorithm, Boyce-Moore Algorithm, Data Structures for Storing Strings, Hash Tables for Strings, Binary Search Trees for Strings, Tries, Ternary Search Trees,Comparing BSTs, Tries and TSTs,Suffix Trees, Strings: Problems & Solutions	
V	**Dynamic Programming** Introduction, What is Dynamic Programming Strategy? Properties of Dynamic Programming Strategy, Can Dynamic Programming Solve All Problems? Dynamic Programming Approaches, Examples of Dynamic Programming Algorithms, Understanding Dynamic Programming, Longest Common Subsequence, Dynamic Programming: Problems & Solutions **Complexity Classes** Introduction, Polynomial/Exponential Time, What is a Decision Problem? Decision Procedure, What is a Complexity Class? Types of Complexity Classes Reductions, Complexity Classes: Problems & Solutions	**20%**
Basic Text & Reference Books :-		
1.	Data Structures And Algorithmic Thinking With Python, Narasimha Karumanchi, CareerMonk Publications	
2.	Introduction to Algorithms, Thomas H. Cormen, Prentice-Hall of India	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CECS408	**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Advanced Data Structures and Algorithms	

Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CECS409		**Total Credit :**04 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: System Analysis and Design		
Unit	**Description**	**Weighting**
I	Overview of systems analysis & Design, role of systems analyst, user clientele, categories of business systems - TPS, MIS , DSS OAS, Strategic information systems. System development strategies - classical, structured and Prototyping. Reasons for systems project initiation, Project selection and review - Committee methods, project requests. Preliminary investigation - scope of project, feasibility study, institutional v/s end-user applications.	**20%**
II	Requirement determination - process, data used, information produced, schedule, controls, transaction and decision requirements etc. Fact finding techniques - interview, questionnaires, document scanning, observation. Tools for specifications - decision trees, decision tables, structured English. Structured analysis - Physical and logical data flow diagrams, process charts, data directories. Application prototyping - rationale, suitability, steps, uses. Tools for prototyping - 4GL, report generators, application generators, screen generators. strategies for prototyping	**20%**
III	Modelling object classes, attributes & relationships. Automated tools - front end, back end, integrated tools. CASE tools- functionality and benefits. Objectives in system design. Components to be designed - output, files, database, input, controls, procedures, codes, program specifications. Management of Design Process. Output Design - needs, types of output, presentation of outputs. Printed outputs. Input and controls - capture of input data, source documents, coding methods. Input validation - batch controls, transaction controls, check digit system, and hash totals. Data Entry forms design. User interface design purpose, characteristics, actions to be incorporated, navigation, message display, dialogue design	**20%**
IV	File design - Storage media selection, types of files by purpose. File organization and access methods. Backup and recovery design. Database design - entity relationship, Schema, data models, normalization. Security design, Object oriented approach. Data communication design - choice of communication channels, control devices and protocols. Design of LAN systems, client/Server strategies	**20%**
V	Development and testing. Tools for documentation - HIPO, Structured flowcharts, warnier/orr diagrams. quality assurance - testing, verification and validation . Testing strategies. Creation/conversion of master files. Loading the database. Preparation of system documentation. User training, conversion from old system to new system. Post implementation review. System Development Management - estimation of development time, team management. Hardware/ software selection - selection criteria, benchmarking, purchase/ lease/rent options	**20%**
Basic Text & Reference Books :-		
1.	Analysis and Design of Information Systems, James Senn, McGraw Hill, 1989.	
2.	Systems analysis and design and the Transition to Objects, Sandra D. Dewitz, McGrawHill International, 1996.	
3.	Systems analysis and Design , elias awad, Galgotia , 1997	

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IV

Paper Code: CECS409	**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: System Analysis and Design	

Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	