



Structure for M.Sc. IT – CBCS Programme

**Semester-III**

COURSE	COURSE TYPE	SUBJECT	CREDIT
M.Sc.IT 301	CORE	Data Warehousing and Data Mining	06
M.Sc.IT 302	CORE	Programming in Python	06
M.Sc.IT 303	CORE	NoSQL Database : MongoDB	06
M.Sc.IT 304	CORE	Practical Based On 302 and 303	12
TOTAL			30



**MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY**  
(With effect from Academic Year 2019-20)

M.Sc IT	<b>Course: Data Warehousing and Data Mining</b>	Course No: M.Sc IT-301	
Semester: 03	Type of Course : Core Course		
Marking Scheme: External Examination: 70 + Internal Examination: 30 = 100			
Credits: 06	Teaching Hours Per Week: 06		
Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
<b>Unit-1</b>	<b>INTRODUCTION OF DATAWAREHOUSE AND DATA MART</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>Operational and Informational systems.</li><li>Concept of Data warehouse ,Characteristics of Data Warehouse</li><li>DBMS vs. data warehouse</li><li>Data warehouse system architecture ( Two and Three-Tiered)</li><li>Concept of Data Mart , Usage of Data Mart</li><li>Security in Data Mart</li><li>Data warehouse and Data Mart</li></ul>		
<b>Unit-2</b>	<b>ONLINE ANALYTICAL PROCESSING</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>OLTP AND OLAP SYSTEM</li><li>OLTP VS OLAP</li><li>TYPES OF OLAP: ROLAP, MOLAP,HOLAP</li><li>Comparison of ROLAP,MOLAP,HOLAP</li></ul>		
<b>Unit-3</b>	<b>ETL and Data Mining</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>Concept of ETL(Extract,Transformation and Loading of Data)</li><li>Comparison and contradiction of various ETL tools</li><li>Data Mining-Definition and Functionalities</li><li>Classification of DM Systems</li><li>DM task primitives</li><li>Integration of a Data Mining system with a Database or a Data Warehouse</li><li>Issues in DM</li><li>KDD Process</li></ul>		
<b>Unit-4</b>	<b>Data Mining Techniques and Advance Data Mining</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>Data Mining techniques</li><li>Data Processing (Data Cleaning, Integration and Transformation, Reduction)</li><li>Data mining Primitives and DMQL</li><li>Designing GUI based on a DMQL</li><li>Architecture of Data Mining System</li><li>Mining Text Data,Mining Spatial Databases,Mining WWW</li><li>Mining sequence Data: Time-Series, Symbolic Sequences, and Biological Sequences</li><li>Mining graphs and Network</li><li>Data Mining application and trends</li></ul>		
<b>INTERNAL:</b> <b>Test=15 Marks, Assignment/Presentation=10 Marks, Seminar/Attendance=05 Marks</b>			



**Reference Books**

1. Data Mining – Concepts & Techniques; Jiawei Han & Micheline Kamber – First Indian Reprint 2002, Morgan Kaufmann publication.
2. Data Warehousing in the Real World; Sam Anahory & Dennis Murray; 1997, Pearson
3. Data Mining Techniques; Arun Pujar; 2001, University Press; Hyderabad.
4. Data Mining; Pieter Adriaans & Dolf Zantinge; 1997, Pearson
5. Data Warehousing, Data Mining and OLTP; Alex Berson, 1997, McGraw Hill.
6. Data warehousing System; Mallach; 2000, McGraw



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M.Sc IT	<b>Course: Programming in Python</b>	Course No: M.Sc IT-302	
Semester: 03	Type of Course : Core Course		
Marking Scheme: External Examination: 70 + Internal Examination: 30 = 100			
Credits: 06	Teaching Hours Per Week: 06		
Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
<b>Unit-1</b>	<b>Introduction</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>• The Process of Computational Problem Solving, Python Programming Language</li><li>• Python Data Types: Expressions, Variables and Assignments, Strings, List, Objects and Classes, Python Standard Library.</li><li>• Imperative Programming: Python programs, Execution Control Structures, User-Defined Functions, Python Variables and Assignments, Parameter Passing.</li></ul>		
<b>Unit-2</b>	<b>Text Files</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>• Strings, Formatted Output.</li><li>• Files, Errors and Exception Handling.</li><li>• Execution and Control Structures: if Statement, for Loop, Two Dimensional Lists, while Loop, More Loop Patterns, Additional Iteration Control Statements.</li><li>• Containers and Randomness: Dictionaries, Other Built-in Container Types, Character Encoding and Strings, Module random, Set Data Type.</li></ul>		
<b>Unit-3</b>	<b>Object Oriented Programming, Objects and Their Use</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>• Fundamental Concepts, Defining a New Python Class</li><li>• User-Defined Classes, Designing New Container Classes Overloaded Operators, Inheritance, User-Defined Exceptions.</li><li>• Namespaces: Encapsulation in Functions, Global versus Local Namespaces, Exception Control Flow, Modules and Namespaces.</li><li>• Software Objects, Turtle Graphics.</li><li>• Modular Design: Modules, Top-Down Design, Python Modules.</li></ul>		
<b>Unit-4</b>	<b>Python GUI Programming (Tkinter)</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>• Recursion: Introduction to Recursion, Examples of Recursion.</li><li>• Run Time Analysis, Searching, Iteration Vs Recursion, Recursive Problem Solving, Functional Language Approach.</li><li>• Graphical User Interfaces: Basics of tkinter GUI Development. Event-Based tkinter Widgets, Designing GUIs, OOP for GUI.</li><li>• The Web and Search: The World Wide Web, Python WWW API.</li><li>• String Pattern Matching, Database Programming in Python.</li></ul>		
<b>INTERNAL:</b>			
<b>Test=15 Marks, Assignment/Presentation=10 Marks, Seminar/Attendance=05 Marks</b>			



**Reference Books**

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Ljubomir Perkovic, "Introduction to Computing Using Python: An Application Development Focus", Wiley, 2012.
3. Charles Dierbach, "Introduction to Computer Science Using Python: A Computational Problem-Solving Focus", Wiley, 2013



M.Sc IT		<b>Course: NoSQL Database:MongoDB</b>	Course No: M.Sc IT-303	
Semester: 03		Type of Course : Core Course		
Marking Scheme: External Examination: 70 + Internal Examination: 30 = 100				
Credits: 06		Teaching Hours Per Week: 06		
Unit	Detailed Syllabus	Teaching Hours	Marks/Weight	
<b>Unit-1</b>	<b>NoSQL Database</b>	<b>23</b>	<b>18</b>	
	<ul style="list-style-type: none"> <li>• Concept of NoSQL Database.</li> <li>• History of NoSQL Database</li> <li>• Benefits of NoSQL Database</li> <li>• Types of Nosql Database:CouchDB,MongoDB,Cassandra,Hbase</li> <li>• NoSQL V/S SQL Database</li> <li>• Uses of NoSQL in Industry</li> </ul>			
<b>Unit-2</b>	<b>MongoDB Basic-I</b>	<b>23</b>	<b>18</b>	
	<ul style="list-style-type: none"> <li>• Introduction of MongoDB.</li> <li>• Data Modeling in MongoDB</li> <li>• Basic terms :Database,Collection,Document.</li> <li>• MongoDB Datatypes</li> <li>• Create and Drop Database</li> <li>• Create and drop collection</li> <li>• Insert,Update and delete Document</li> <li>• Querying Document</li> <li>• MongoDB v/s RDBMS</li> </ul>			
<b>Unit-3</b>	<b>Advance MongoDB and MongoDB Connectivity Using PHP</b>	<b>22</b>	<b>17</b>	
	<ul style="list-style-type: none"> <li>• Projection,Limiting ,Sorting Records</li> <li>• Indexing,Aggregation.</li> <li>• Concept of GridFS</li> <li>• Storing files in GridFS</li> <li>• Serving files from GridFS</li> <li>• Reading files in chunks</li> <li>•Connect and Select Database.</li> <li>•Create Collection</li> <li>•Insert Document</li> <li>•Find Document</li> <li>•Update Document</li> <li>• Delete Document</li> </ul>			
<b>Unit-4</b>	<b>Database Management</b>	<b>22</b>	<b>17</b>	
	<ul style="list-style-type: none"> <li>• Database Administration</li> <li>• Security and authentication::Authentication Basic,How Authentication works</li> <li>• Replication and Sharding</li> <li>• Backup and Restore Database</li> <li>• Deployment</li> </ul>			



**INTERNAL:**

**Test=15 Marks, Assignment/Presentation=10 Marks, Seminar/Attendance=05 Marks**

**Reference Books**

1. MongoDB the definitive guide - O'Reilly Kristina Chodorow & Michal Dirolf
2. MongoDB in Action - Kyle Banker Manning Sheltar Island.
3. The definitive guide to MongoDB - NoSQL Database for cloud and desktop computing. -
4. Apress - Eelco Plugge, Peter membrey and Tim Hawkins
5. PHP and MongoDB Web Development Beginners guide - Rubayeet Islam - Open Source

M.Sc IT	<b>Course: Practical Based on 302 and 303</b>	Course No: M.Sc IT-304	
Semester: 03	Type of Course : Core Course		
Marking Scheme: External Examination: 100 + Internal Examination: 0 = 100			
Credits: 12	Teaching Hours Per Week: 12		
	<b>Detailed Syllabus</b>	<b>Teaching Hours</b>	<b>Marks/Weight</b>
<b>1</b>	<b>Paper 302: Programming in Python</b>	<b>90</b>	<b>50</b>
<b>2</b>	<b>Paper 303: NoSQL Database:MongoDB</b>	<b>90</b>	<b>50</b>



Structure for M.Sc. IT – CBCS Programme

**Semester-IV**

COURSE	COURSE TYPE	SUBJECT	CREDIT
M.Sc.IT 401	CORE	Cryptography And Network Security	06
M.Sc.IT 402	CORE	Artificial Intelligence	06
M.Sc.IT 403	CORE	Project	18
TOTAL			30





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M.Sc IT	Course: Cryptography and Network Security	Course No: M.Sc IT-401	
Semester: 04	Type of Course : Core Course		
Marking Scheme: External Examination: 70 + Internal Evaluation: 30 = 100			
Credits: 06	Teaching Hours Per Week: 06		
Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
<b>Unit-1</b>	<b>Introduction to encryption techniques</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>• Concept of Encryption and decryption, importance of encryption</li><li>• Basic types of encryption – one-time pad, end-to end and link encryption,</li><li>• advantages and disadvantages of all methods of encryption</li><li>• Symmetric cipher model – Cryptography, cryptanalysis</li><li>• Cryptographic keys –Private key and public key</li></ul>		
<b>Unit-2</b>	<b>Network Security Fundamental</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>• Concept of Security based on Network, OSI Security Architecture –</li><li>• Security Attack, Security Mechanism and Security service</li><li>• Types of Security Attacks – Active and Passive Attacks</li><li>• Security Services - Authentication, Access Control, Data</li><li>• Confidentiality and Data integrity</li><li>• Security Mechanism –Specific Security mechanism</li></ul>		
<b>Unit-3</b>	<b>E-Mail, IP Security</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>• S/MIME.</li><li>• Benefits of IP Security</li><li>• IP Security Architecture</li><li>• IP security Services</li><li>• Application of IP Security.</li></ul>		
<b>Unit-4</b>	<b>Network Device Security, Firewall &amp; Wireless Network</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>• Switch,Bridge, Router</li><li>• Network Hardening</li><li>• Administrative Practices</li><li>• Centralizing Account Management</li><li>• Introduction to firewall</li><li>• Additional Firewall Function</li><li>• Introduction to Virtual Private Network</li><li>• VPN Protocol</li><li>• Introduction to Wireless Network Security</li></ul>		
<b>INTERNAL:</b>			
<b>Test=15 Marks, Assignment/Presentation=10 Marks, Seminar/Attendance=05 Marks</b>			
<b>Reference Books</b>			
1.Cryptography and Network Security, - William Stallings Person – Printice Hall Publication			



**MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY**  
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M.Sc IT	<b>Course: Artificial Intelligence</b>	Course No: M.Sc IT-402	
Semester: 04	Type of Course : Core Course		
Marking Scheme: External Examination: 70 + Internal Evaluation: 30 = 100			
Credits: 06	Teaching Hours Per Week: 06		
Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
<b>Unit-1</b>	<b>Introduction and Symbolic Logic</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>• Introduction</li><li>• History Of AI and Application Of AI</li><li>• Objective of AI and Future Of AI</li><li>• Introduction of Logic and Propositions</li><li>• Normal Form in Propositional Logic</li><li>• Logic Consequence and Resolution Principle</li><li>• Predicate Calculus, WFF, Clausal Form ( CNF, DNF, PNF)</li><li>• Rules of inference</li><li>• Unification and Resolution</li></ul>		
<b>Unit-2</b>	<b>Knowledge Acquisition and representation</b>	<b>23</b>	<b>18</b>
	<ul style="list-style-type: none"><li>• Introduction</li><li>• Machine intelligence</li><li>• Knowledge Engineering</li><li>• Knowledge Acquisition and Representation</li><li>• Logical ,Procedural, Network and Structured Representation Scheme</li></ul>		
<b>Unit-3</b>	<b>Searching Techniques</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>• Introduction</li><li>• Problem Representation, Definitions, Representation Scheme</li><li>• Problem solving using AI</li><li>• Blind search Technique ( BFS,UCS,DFS,DLS,IDS)</li><li>• Heuristic Search Technique ( Greedy Search, Hill Climbing Search, A* Search, Admissible Heuristics, The 8-Puzzle Problem, Brach and Bound)</li><li>• Game Search (MINMAX Procedure, ALPHA-BETA Procedure)</li></ul>		
<b>Unit-4</b>	<b>Expert System</b>	<b>22</b>	<b>17</b>
	<ul style="list-style-type: none"><li>• Introduction ( Definition , public Knowledge, Private Knowledge)</li><li>• History of ES</li><li>• Skill Versus Knowledge</li><li>• Basic Characteristics of ES</li><li>• Knowledge Engineering</li><li>• Inferencing</li></ul>		
<b>INTERNAL:</b>			
<b>Test=15 Marks, Assignment/Presentation=10 Marks, Seminar/Attendance=05 Marks</b>			
<b>Reference Books</b>			
<ol style="list-style-type: none"><li>1. Rajendra Akerkar : Introduction to Artificial Intelligence Published by PHI</li><li>2. Rich and knight : Artificial Intelligence Published by TMH</li><li>3. Stuart Russell and Peter Norving : Artificial Intelligence Published by Pearson</li></ol>			



M.Sc IT	Course: Project	Course No: M.Sc IT-403
Semester: 04	Type of Course : Core Course	
Marking Scheme: External Examination: 200 [Project Report 100+ Project Presentation 100]		
Credits: 18		

### Detailed Syllabus

#### OBJECTIVE

The objective of the project work is to develop quality software solution. During the development of the project, the student will be involved in all the stages of the software development life cycle like systems requirements specifications, systems analysis, systems design, software development, testing strategies and documentation with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, so as to participate and manage a large software engineering projects in future.

#### General Instruction

It is expected to work on a real-life project preferably in some industry/Research and Development Laboratories/Educational Institution/Software Company. However, it is **not mandatory** for a student to work on a real-life project. The student can formulate a project problem with the help of her/his College Guide and work on it, and complete it. Use of the latest versions of the software packages for the development is desired.