

**SVKM's NMIMS**  
**Mukesh Patel School of Technology Management & Engineering**

<b>Program: B. Tech. - Data Science (Business Analytics)</b>				<b>Semester : III</b>	
<b>Course/Module: Data Gathering and Cleaning - ETL process</b>				<b>Module Code : BTDS03001</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	2	0	4	<b>Marks Scaled to 50</b>	<b>Marks Scaled to 50</b>
<b>Pre-requisite:</b> Nil					
<b>Objectives:</b>					
<ul style="list-style-type: none"> <li>To understand the amount of data needed today for business decision is increasing, which is Big Data. Mostly 60-75 percentage of time is spent on data gathering, cleaning and making these data process worthy for business decision. Hence, it is important for students to understand ETL (Extract, Transform, and Load) process.</li> <li>To give information about fundamental concepts of Data Warehousing like slowly changing dimensions, data granularity, data velocity, metadata etc.</li> </ul>					
<b>Outcomes:</b>					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> <li>Obtain data from a variety of sources. Know the principles of tidy data and data sharing.</li> <li>Understand and be able to apply the basic tools for data cleaning and manipulation.</li> <li>Learn the basic concepts of data warehousing like metadata, SCD, ETL etc.</li> </ul>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	Introduction to Data Science				02
2	Data Scientist's Toolbox Introduction to basic tools like R and R-Studio; Matlab etc. Types of data questions Lifecycle of DS problem:- Discovery, Data Preparation, Model Planning, Model Planning, Model Building, Operationalize, Communicate Result, Steps in a data analysis				05
3	Getting and Cleaning Data - best practices: <ul style="list-style-type: none"> <li>Data collection</li> <li>Data formats</li> </ul> Making data tidy Distributing data <ul style="list-style-type: none"> <li>Scripting for data cleaning</li> </ul>				07
4	Introduction to Data Warehousing, Advantages, characteristics, Architecture, Metadata, Data Granularity, IPD				06



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5	Dimensional Modelling, Fact tables, dimension tables, ER model, slowly changing dimensions, Cyclicity of data, Schemas	06
6	The ETL Process; Major steps, Data Extraction, Transformation, Loading, Data Quality, sources of pollution of Data, Different levels of Testing	07
7	Fundamental Problems using training data for Decision Trees, Bayes Model and Frequent item sets with problems, study of some trends like Operational Data Store	12
<b>Total</b>		<b>45</b>

**Text Books:**

1. The Data Warehouse Etl Toolkit: Practical Techniques For Extracting, Cleaning, Conforming, And Delivering Data; by Ralph Kimball; Publisher: WILEY INDIA, Year - 2004

**Reference Books:**

1. The Microsoft Data Warehouse Toolkit: With SQL Server 2008 R2 and the Microsoft Business Intelligence Toolset Paperback - 2011 by Joy Mundy (Author), Warren Thornthwaite (Author), Ralph Kimball (Contributor); Publisher: Microsoft INC.

**Any other information: NIL**

**Total Marks of Internal Continuous Assessment (ICA): 50 Marks**

**Distribution of ICA Marks:**

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
<b>Total Marks :</b>	<b>50</b>

**Details of Term work:**

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



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<b>Program: B. Tech. -Data Science (Business Analytics)</b>				<b>Semester : III</b>	
<b>Course/Module: Data Structure and Algorithm</b>				<b>Module Code: BTDS03002</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	4	0	5	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Computer Programming – I (basic programming skills)					
<b>Objectives:</b>					
<ul style="list-style-type: none"> <li>• To provide knowledge of data structure and its type</li> <li>• To provide advanced computer Science Programming of different data structure background for complex programming skill</li> </ul>					
<b>Outcomes:</b>					
After completion of the course, students would be able to :					
<ul style="list-style-type: none"> <li>• distinguish data and information</li> <li>• learn about data structure</li> <li>• define various types of data structures</li> <li>• know different data structure operations</li> <li>• describe about data types in C</li> <li>• define abstract data types</li> </ul>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction to Data Structures:</b> Introduction to the theory of data structure, classification of data structure, Data representation, Abstract data types with examples, Data types Recursion: Recursive definition, recursion to solve the real life problems, Importance of data structures, Fundamental of operations of various data structures such as array, Structure etc.				4
2	<b>Array, stack and Queues"</b> Array, Stack and queue representation, Operation and examples, Polish notation, stack in recursion Queue, Queue processing, Types of Queues: Circular queues and priority queues, Role of data structure in optimized coding				10
3	<b>List and Linked lists:</b> Linked list and array, Dynamic linked lists (single, doubly, circular) – processing, operations, applications of linked lists				7
4	<b>Tree:</b> Concept of trees, Binary tree and its representation, complete binary tree, tree traversal algorithms, in-order, preorder, post-order, Height balanced tree, Threaded binary tree, Expression tree and game tree, Huffman algorithm and its applications Search Trees: Binary search tree, insertion and deletion, AVL tree, M-way search tree, B tree and B+ tree (including insertion and deletion). Applications of tree data structures to solve real life problems				10

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5	<b>Graph:</b> Terminology, sequential and linked representation of graphs, adjacency matrices, Adjacency list, adjacency multi list, graph traversal: breadth first search and Depth first search, connected component, spanning trees, minimum cost spanning tree, Prims and Kruskal algorithms, transitive closure and shortest path algorithm, Application of graph to solve the real life problems.	6
6	<b>Searching, Sorting and Hashing:</b> General background, Basic search techniques, sequential searching, bubble sort, selection sort, insertion sort, Shell sort and Radix sort and their efficiency, Quick sort and merge sort comparison, indexed sequential searching, binary search, Hashing: Basics, collision resolution and their efficiency comparison, Application of search and indexes to solve real life problems.	8
<b>Total</b>		45

**Text Books:**

1. C and Data Structure, P.S. Deshpande and O.G. Kakde, CHARLES RIVER MEDIA, INC. Hingham, Massachusetts (pdf version)
2. Reema Thareja, "Data Structure using C", Oxford University Press, 2<sup>nd</sup> Edition, 2014
3. Y. Langsam, M.J. Augenstein, A.M. Tenenbaum; "Data structure using C and C++", 2<sup>nd</sup> Edition, PHI2004
4. Seymour Lipschutz, "Data Structures", Schaum's Outlines, Tata McGraw Hill, 2006

**Reference Books:**

1. Richard F. Gillberg, Behrouz A. Forouzan, "Data Structure - A Pseudo Approach with C", Cengage Publication, 2005
2. G.S. Baluja, "Data Structure through C (A practical approach)", Dhanpat rai and co. 4<sup>th</sup> edition, 2014

**Any other information: NIL**

**Total Marks of Internal Continuous Assessment (ICA): 50 Marks**

**Distribution of ICA Marks:**

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
<b>Total Marks :</b>	<b>50</b>

**Details of Term work:**

1. Minimum: Practical based on 10 Experiments
2. Minimum Two class tests.
3. Minimum two assignments



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<b>Program: B. Tech. - Data Science (Business Analytics)</b>				<b>Semester : III</b>	
<b>Course/Module: Database Management System</b>				<b>Module Code: BTDS03003</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	2	0	4	Scaled to 50 marks	Scaled to 50 Marks
<b>Pre-requisite: NIL</b>					
<b>Objectives:</b>					
<ul style="list-style-type: none"> <li>To provide knowledge of relational database management systems, design database management and their implementation</li> </ul>					
<b>Outcomes:</b>					
After completion of the course, students would be able to :					
<ul style="list-style-type: none"> <li>Describe core concepts of database and model a database management system through ER modeling</li> <li>Apply knowledge of relational algebra and structural query language to retrieve and manage data from relational database.</li> <li>Apply integrity constraints and triggers in database</li> <li>Illustrate the concept of normalization</li> <li>Discover importance of indexing, transaction management, concurrency and recovery in database management system</li> </ul>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction to Database concepts:</b> Introduction to Data Processing, Overview of files systems, drawback of file systems, purpose of database system, concept of a database, database system vs file system, view of data, data models, database languages, database users and administrator, transaction management, database system structure				4
2	<b>Entity Relationship Model:</b> Overview of design process, the entity-relationship model, constraints, removing redundant attribute in entity sets, ER diagram, and reduction to relational schemas, entity-relationship design issues, extended ER features				5
3	<b>Relational Model:</b> Concept of relation, Notion of primary and secondary keys, foreign keys, structure of relational database, relational algebra and extended relational algebra operations, formation of queries, modification of the database views.				5



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4	<b>Structured Query Language (SQL):</b> Background, basic structure, set operations, aggregate functions, NULL values, nested queries, views, complex queries, database modification, DDL, embedded SQL, stored procedures and functions, dynamic SQL featured	7
5	<b>Integrity and Security:</b> Domain constrains, referential integrity, assertions, triggers and assertions in SQL, security and authorization in SQL	3
6	<b>Relational Database Design:</b> Features of good relational database design, atomic domains and first normal form, decomposition using functional dependencies, functional dependency theory, normalization, decomposition, first normal to fifth normal forms, BCNF, pitfall in relational-database design.	6
7	<b>Indexing and Hashing:</b> Basic concepts, ordered indices - dense, sparse index, multilevel indices, static hashing, dynamic hashing, comparison of indexing and hashing, indexing in SQL	4
8	<b>Transactions:</b> Basic concept of transaction, state of a transaction, implementation of atomicity and durability, concurrent executions, serializability, recoverability, implementation of isolation, transaction in SQL	4
9	<b>Concurrency Control and Recovery:</b> Lock based protocols, timestamp based protocols, validation based protocols, deadlock handling, failure classification, storage structure, recovery and atomicity, log based recovery and shadow paging.	6
10	<b>Case Study:</b> Conceptual and database design for students examination system and students admission (to an institute) system.	1
<b>Total</b>		<b>45</b>
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Henny Korth and Abraham Silberschatz, "Database System Concepts", McGraw Hill, 6<sup>th</sup> Edition, 2011</li> <li>2. Elmars and Navathe, "Fundamentals of Database Design", Addison Wesley 5<sup>th</sup> Edition, 2006</li> <li>3. Coronel Morris Rob, "Database Principles Fundamentals of Design Implementation and Management", Cengage Learning, 9<sup>th</sup> Edition, 2012</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Bipin Desai, "An introduction to Database System", Galgotia Publication Ltd, 1<sup>st</sup> Edition, 2013.</li> <li>2. C.J. Date, "an introduction to Database System", Addison Wesley, 8<sup>th</sup> Edition, 2003</li> <li>3. Ivan Bayross, "Oracle Developer", BPB, 2000</li> <li>4. George Koch, "Oracle8i - the complete reference", Tata McGraw Hill, 2001</li> <li>5. W. Kim, "Modern Database System", ACM Press, Addison Wesley, 1995</li> <li>6. R. Ramakrishnan, "Database Management System", McGraw Hill, 3<sup>rd</sup> Edition, 2002</li> </ol>		



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**Any other information: NIL**

**Total Marks of Internal Continuous Assessment (ICA): 50 Marks**

**Distribution of ICA Marks:**

<b>Description of ICA</b>	<b>Marks</b>
Test Marks	<b>20</b>
Term Work Marks	<b>30</b>
<b>Total Marks :</b>	<b>50</b>

**Details of Term work:**

1. Minimum: Practical based on 10 Experiments
2. Minimum Two class tests.
3. Minimum two assignments



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<b>Program: B. Tech. - Data Science (Business Analytics)</b>				<b>Semester : III</b>	
<b>Course/Module: Applied Mathematics - III</b>				<b>Module Code: BTDS03004</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Basic syntax and semantics of programming languages, object-oriented programming					
<b>Objectives:</b>					
<ul style="list-style-type: none"> <li>• To prepare students to use knowledge of numerical techniques for scientific computing</li> <li>• To make students aware of various techniques to solve Engineering problems</li> </ul>					
<b>Outcomes:</b>					
After completion of the course, students would be able to :					
<ul style="list-style-type: none"> <li>• Compute and interpret errors in numerical methods</li> <li>• Compare and contrast various methods for finding roots of equations and approaches of interpolation</li> <li>• Use various approaches to solve liner algebraic equations</li> <li>• Demonstrate various approaches to solve ordinary differential equations</li> <li>• Design the solution of mathematical problems using numerical methods of differentiation and integration</li> </ul>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Error in Numerical Computations:</b> Types of error, Analysis and estimation of error, Taylor's series for approximation of functions, general error formula, error propagation and its stability and condition.				06
2	<b>Root of Equations:</b> Bisection methods, secant methods, method of false position, Newton-Raphson method, convergence method, choice of iterative method, engineering application				06
3	<b>System of Linear Algebraic Equations:</b> System with small number of equations, graphical method, Cramer's rule, matrix inversion method, substitution methods, Gaussian elimination method, Gauss Jordan elimination method, Gauss Siedel iterative method				08
4	<b>Curve Fitting:</b> Finite difference operators, forward, backward, divided and central differences, Newton's interpolation methods, Lagrange interpolation, least square approximation				06



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5	<b>Solution to ordinary differential equations:</b> Taylor series method, Picard's method of successive approximation, Runge-Kutta methods, Euler's method, Euler's predictor-corrector method, Runge-Kutta method of second order and forth order, boundary value and eigen value problems	08
6	<b>Numerical differentiation and Integration:</b> Methods bases on interpolation and finite differences, Trapezoidal rule for numerical integration, Simpson's 1/3 rule, Simpson's 3/8 rule	11
<b>Total</b>		45
<b>Text Books:</b> 1. Steven C. Chapra, Raymond P. Canale, "Numerical methods for Engineers", Tata McGraw Hill, 5 <sup>th</sup> Edition, 2005		
<b>Reference Books:</b> 1. Robert J. Schilling, Sandra L. Harris, "Applied Numerical methods for Engineers (using MATLAB and C)", Thomson Asia Pte. Ltd., 1 <sup>st</sup> edition, 2002 2. S.S. Sastry, "Introduction to methods of Numerical Analysis", Prentice Hall of India, 4 <sup>th</sup> Edition, 2006		
<b>Any other information: NIL</b>		
<b>Total Marks of Internal Continuous Assessment (ICA): 50 Marks</b>		
<b>Distribution of ICA Marks:</b>		
<b>Description of ICA</b>	<b>Marks</b>	
Test Marks	20	
Term Work Marks	30	
<b>Total Marks :</b>	<b>50</b>	
<b>Details of Term work:</b> 1. Practical based on 10 Experiments 2. Two class tests. 3. Minimum two assignments		



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<b>Program: B. Tech. - Data Science (Business Analytics)</b>				<b>Semester :III</b>	
<b>Course/Module: Business Visualization</b>				<b>Module Code: BTDS03005</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks --)</b>
2	0	0	2	Marks Scaled to 50	---
<b>Pre-requisite: NIL</b>					
<b>Objectives:</b> Use of Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces. <ul style="list-style-type: none"> <li>• Use of visual analytics tools and techniques to synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data</li> <li>• Data representations and transformations that convert all types of conflicting and dynamic data in ways that support visualization and analysis</li> </ul>					
<b>Outcomes:</b> After completion of the course, students would be able to : <ul style="list-style-type: none"> <li>• Analytical reasoning techniques that enable users to obtain deep insights that directly support assessment, planning, and decision making</li> <li>• Techniques to support production, presentation, and dissemination of the results of an analysis to communicate information in the appropriate context to a variety of audiences.</li> </ul>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	Introduction to data and its visualization				02
2	Defining the Research and Development Agenda for Visual Analytics				02
3	The Science of Analytical Reasoning Build upon theoretical foundations of reasoning, sense making, cognition, and perception to create visually enabled tools to support collaborative analytic reasoning about complex and dynamic problems.				02 02
	Visual Representations and Interaction Technologies Develop a new suite of visual paradigms that support the analytical reasoning process. Create a science of visual representations based on cognitive and perceptual principles that can be deployed through engineered, reusable components. Visual representation principles must address all types of data, address scale and information complexity, enable knowledge discovery through information synthesis, and facilitate analytical reasoning.				04 02 04



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5	Data Representations and Transformations Develop both theory and practice for transforming data into new scalable representations that faithfully represent the content of the underlying data Create methods to synthesize information of different types and from different sources into a unified data representation so that analysts, first responders, and border personnel may focus on the meaning of the data	04 02 04
	Production, Presentation, and Dissemination Tools : SAS Visual Analytics, Tableau	02
<b>Total</b>		<b>30</b>

**Text Books:**

1. SAS manual for Visual Analytics
2. The Research and Development Agenda for Visual Analytics by James J. Thomas Kristin A. Cook - 2013
3. Mastering the Information Age Solving Problems with Visual Analytics by Daniel Keim, Jörn Kohlhammer, Geoffrey Ellis and Florian Mansmann - 2014

**Reference Books:**

1. Visual Analytics by Daniel A. Keim, Florian Mansmann, Andreas Stoffel, Hartmut Ziegler University of Konstanz, Germany - 2014

**Any other information: NIL**

**Total Marks of Internal Continuous Assessment (ICA): 50 Marks**

**Distribution of ICA Marks:**

Description of ICA	Marks
Test Marks	--
Term Work Marks	<b>50</b>
<b>Total Marks :</b>	<b>50</b>

**Details of Term work:**

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



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<b>Program: B. Tech Data Science (Business Analytics)</b>				<b>Semester: III</b>	
<b>Course/ Module: Environmental Studies</b>			<b>Module Code: BTDS03007</b>		
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- -- in Question Paper)</b>
2	0	0	0	Marks Scaled to 50	--
<b>Pre-requisite:</b> Chemistry, Physics					
<b>Objectives:</b>					
<ol style="list-style-type: none"> <li>1. Introduce - Environment, Environmental Pollution,</li> <li>2. Acquaint with Social Issues and methods to manage them</li> <li>3. Improving Planning of activities</li> </ol>					
<b>Outcomes:</b>					
After completion of the course, students would be able to:					
<ol style="list-style-type: none"> <li>1. Discuss Types of Environmental Pollution, Natural resources and its misuse, Importance of Environmental management for Construction Projects</li> <li>2. Prepare plan for water management, promotion of recycle and reuse, generation of less waste, avoiding electricity waste</li> <li>3. Prepare Slogan, Poster and plan activities for environmental protection and social issues</li> </ol>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	Introduction to Environment and its components: Natural Resources and it Misuse leading to Environmental degradation. Role of Ecology in Environmental Degradation and Protection. Major industrial and other environmental disasters  Environmental pollution- Types, Causes, Effects, Reduction methodology.				08
2	Introduction to waste generation, Methods to Reduce, Reuse and Recycle of Waste Importance of 3R's, Promotion of 3R's - Methods  Solid wastes, Industrial Waste, Bio-Medical Waste and Hazardous waste management - Types, Storage, Transportation, Treatment Disposal.  C&D and E-waste - Concept, methods for reduction, management Campaigning for waste reduction and management.				08
3	Concept of EIA and SIA, significance, methodology, report drafting. Environmental Management System, ISO 14000 EMS certification				05
4	Environmental Protection, Social Issues, Disaster Management Social Issues and Environment International Conventions, Summits and Protocols Generation of less waste and avoiding electricity waste. Environmental management for construction Projects				05



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<b>5</b>	Role of the Government in managing the environmental activities in all sectors. Organisational set up at the Central and state level to manage the environment. Role of judiciary in managing the environment. Role of Citizens, Role of NGOs/ Environmental Activists.  Major Laws Air (P&C.P.) Act, Water (P & C.P) Act. Environment Protection Act EPA 1986. Wild life Protection Act etc., PIL	04
	<b>Total</b>	<b>30</b>

Text Books:

1. Benny Joseph (2017), "Environmental Studies", The McGraw-Hill Companies
2. Gerard Kiely (2007), "Environmental Engineering", Tata McGraw-Hill Education

Reference Books:

1. P. Aarne Vesilind, Susan M. Morgan (2004), "Introduction to Environmental Engineering", Thomas/Brook/Cole.
2. Mackenzie Davis, David Cornwell (2017), "Introduction to Environmental Engineering", McGraw-Hill Companies.

**Any other information: NIL**

**Total Marks of Internal Continuous Assessment (ICA): 50 Marks**

**Distribution of ICA Marks:**

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
<b>Total Marks :</b>	<b>50</b>

**Details of Term work:**

Term work should consist of the following:

1. Minimum five assignments on the above syllabus
2. Report on Social Issues
3. Report on Environmental Management Case Study



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<b>Program: B. Tech Data Science (Business Analytics)</b>				<b>Semester: III</b>	
<b>Course/Module : Managing Uncertainty</b>				<b>Module Code: BTDS03008</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Objective:</b>					
<ul style="list-style-type: none"> <li>Students will be familiar with basic rules of probability and will be able to use them in modeling uncertainty in obtaining and recording data. They will be able to utilize graphical and numerical summaries of data in understanding data generating processes. To enable the students to analyze data more effectively using MS Excel</li> <li>To increase the student's ability in problem solving</li> </ul>					
<b>Outcomes:</b>					
After completion of the course, students would be able to :					
<ul style="list-style-type: none"> <li>Students will be able to learn basic probability and statistics and apply them to the analysis of real data sets from business fields.</li> </ul>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>(1) Classification and tabulation of Data:</b> Meaning and objective of classification, Types of classification, formation of discrete and continuous distribution.				2
	<b>(2) Data Classification and Data Presentation :</b> Histogram, Frequency distribution, Quantitative Data Graphs (Histograms , Frequency Polygons, Ogives, Dot Plots, Stem-and-Leaf Plots) ; Qualitative Data Graphs (Pie Charts ,Bar Graphs, Pareto Charts ) ; Graphical Depiction of Two-Variable Numerical Data: Scatter Plots				4
	<b>(3) Descriptive Statistics:</b> Measures of Central Tendencies - Grouped and Ungrouped Data; Mean, Sample Mean- Weighted mean, Geometric Mean, Harmonic Mean; Median - Quartiles, Deciles, and Percentiles; Mode, Box Plot;				4
	Measures of Variability- Dispersion, Range, Standard deviation, Chebyshev's theorem; Population v/s sample variance and standard deviation, Skewness; Kurtosis.				4



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2	<p><b>(1) Probability Distribution:</b> Introduction to Probability and Probability Distribution: Methods of Assigning probabilities, Probability Space, conditions of probability model, Events, simple and compound, Laws of probability, Probability density function, Cumulative distribution function, Expected values of Mean and Variance. Marginal, union, joint and conditional probabilities, Bayes' Theorem</p>	4
	<p><b>(2) Discrete Probability Distribution:</b> Basics of Binomial Distribution pdf, Multinomial Distribution, Negative Binomial Distribution, cdf, Poisson Distribution pdf, cdf, Hypergeometric Distribution pf, cdf. Continuous Probability Distributions: Relative frequency, distribution and pdf, Exponential pdf, cdf, Normal distribution - Normal pdf, cdf, Standard Normal Distribution, Normal Approximation to the binomial.</p>	4
3	<p><b>Sampling Distribution:</b>  (1) Introduction, Central Limit Theorem; Population frequency distribution vs. Sampling Distributions; Sampling distribution of the sample mean - Estimating population Mean and Standard deviation; Sampling distribution of the sample proportion - Estimating proportions in a binomial population.</p>	4
	<p>(2) Sampling distributions of the difference between sample means/proportion - Mean and Standard Deviation, Conditions for estimation.</p>	4
4	<p><b>Hypothesis Testing:</b>  (1) Large Sample estimation of the population parameters and Hypothesis testing: Basics of Estimating the populations mean and difference; estimating the proportion and difference; large sample test for population mean, difference; large sample test for proportion, difference.</p>	4
	<p>(2) Estimation of a population variance: Sampling distribution of variance, estimation.</p>	4
	<p>(3) Inferences from small sample: Student's t distribution; Small sample t test for following - A population mean, A difference between two means, Confidence interval.</p>	4



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	(4) Rejection and Non-rejection region, Type I and Type II errors, testing hypothesis about a population mean using the Z- statistic, using p-values to test Hypothesis	3
<b>Total</b>		<b>45</b>

**Prescribed Text :**

1. Richard, L & David, R. (2013). *Statistics For Management*, Pearson
2. Gupta, S. P (2012). *Statistical Methods*. Sultan Chand & Sons

**References:**

1. Gujarati, D (2011). *Basic Econometrics*. McGraw Hill
2. William, M. (1993). *Statistics for Management and Economics*. Duxbery Press
3. Ken Black (2010). *Business Statistics*. E-book

**Internet references:** NIL

**Any other information:** NIL

**Total Marks of Internal Continuous Assessment (ICA): 50 Marks**

**Distribution of ICA Marks:**

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
<b>Total Marks :</b>	<b>50</b>

**Details of Term work:**

- Class Test/ Assignments/ Case Studies / Projects / Presentations



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