

**Department of Information Technology (In-house)**  
**Syllabus of B.Sc. in Information Technology (Data Science)**  
**(Effective from academic session 2019-20)**

**Semester-III**

<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Operating System &amp; Operating System Lab</b>	
<b>Course Code: BITDS301 &amp; BITDS391</b>	<b>Semester: III</b>
<b>Duration: 36 Hrs.</b>	<b>Maximum Marks: 100+100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 3 hrs./week</b>	End Semester Exam: 70
<b>Tutorial: 0</b>	Attendance : 5
<b>Practical:4 hrs./week</b>	Continuous Assessment:25
<b>Credit: 3+2</b>	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination:60
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	General understanding of structure of modern computers
2.	Purpose, structure and functions of operating systems
3.	Illustration of key OS aspects by example
<b>Objective:</b>	
<b>Sl. No.</b>	
1.	To learn the fundamentals of Operating Systems.
2.	To learn the mechanisms of OS to handle processes and threads and their communication
3.	To learn the mechanisms involved in memory management in contemporary OS
4.	To gain knowledge on distributed operating system concepts that includes architecture,

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	Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols		
5.	To know the components and management aspects of concurrency management		
6.	To learn programmatically to implement simple OS mechanisms		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Strong programming skills (Knowledge of C)		
2.	Computer architecture		
3.	Elementary data structures and algorithms		
<b>Contents</b>			<b>Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<p><b>Introduction</b></p> <p>Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.</p>	3	5
02	<p><b>Processes</b></p> <p>Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.</p>	8	20
03	<b>Inter-process Communication:</b>	4	5

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	Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc.		
04	<b>Deadlocks</b>  Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	4	10
05	<b>Memory Management</b>  Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	8	10
06	<b>I/O Hardware</b>  I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.	6	10
07	<b>Disk Management</b>  Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk	3	10

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	reliability, Disk formatting, Boot-block, Bad blocks.		
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**Practical:**

**Skills to be developed:**

Intellectual skills:

1. Can be able to Identify the purpose of the analysis.
2. Can be considered a reliable source of information.
3. Can able to use a variety of techniques to extend the original idea.

**List of Practical:**

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement Bankers algorithm for Dead Lock Avoidance
7. Implement an Algorithm for Dead Lock Detection
8. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU 10. Implement Shared memory and IPC
9. Implement Paging Technique f memory management.
10. Implement Threading & Synchronization Applications

**Assignments:**

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Based on the curriculum as covered by subject teacher.			
<b>List of Books</b>			
<b>Text Books:</b>			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia	Operating System Concepts Essentials	978-1-119-32091-3	
William Stallings	Operating Systems: Internals and Design Principles	5th Edition	Prentice Hall of India
<b>Reference Books:</b>			
Charles Crowley	Operating System: A Design-oriented Approach	1st Edition	Irwin Publishing
J. Nutt, Addison-Wesley	Operating Systems: A Modern Perspective	2nd Edition	
Maurice Bach	Design of the Unix Operating Systems	8th Edition	Prentice-Hall of India
Daniel P. Bovet, Marco Cesati	Understanding the Linux Kernel	3rd Edition	O'Reilly and Associates
<b>List of equipment/apparatus for laboratory experiments:</b>			
Sl. No.			
1.	<b>Computer</b>		
2.	<b>Linux/Ubuntu operating system</b>		
<b>End Semester Examination Scheme.</b>		<b>Maximum Marks-70.</b>	<b>Time allotted-3hrs.</b>

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Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>1 to 7</b>	<b>10</b>	<b>10</b>				<b>60</b>
<b>B</b>	<b>1 to 7</b>			<b>5</b>	<b>3</b>	<b>5</b>	
<b>C</b>	<b>1 to 7</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>			
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>			
<b>C</b>	<b>All</b>	<b>15</b>	<b>3</b>	<b>3</b>			
<b>Examination Scheme for Practical Sessional examination:</b>							
<b>Practical Internal Sessional Continuous Evaluation</b>							
<b>Internal Examination:</b>							
Continuous evaluation					<b>40</b>		



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<b>External Examination: Examiner-</b>		
Signed Lab Note Book	<b>10</b>	
On Spot Experiment	<b>40</b>	
Viva voce	<b>10</b>	<b>60</b>



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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Database Management System &amp; Database Management System Lab</b>	
<b>Course Code: BITDS302 &amp; BITDS392</b>	<b>Semester: III</b>
<b>Duration: 36 Hrs.</b>	<b>Maximum Marks: 100+100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 3 hrs./week</b>	End Semester Exam: 70
<b>Tutorial: 0</b>	Attendance : 5
<b>Practical:4 hrs./week</b>	Continuous Assessment:25
<b>Credit: 3+2</b>	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination:60
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	To store and transform data into information
2.	To organize the data in the form of table, schema and report forms
3.	To provide security of data
4.	Data is stored in either hierarchical form or a navigational form
<b>Objective:</b>	
<b>Sl. No.</b>	
1.	Understand the uses the database schema and need for normalization
2.	Experience with SQL
3.	Use different types of physical implementation of database



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4.	Use database for concurrent use		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Elementary knowledge about computers including some experience using UNIX or Windows		
2.	Computer Programming & Utilization		
<b>Contents</b>			<b>Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<p><b>Database system architecture</b></p> <p>Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.</p>	6	15
02	<p><b>Relational query languages</b></p> <p>Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.</p>	12	25
03	<p><b>Storage strategies</b></p> <p>Indices, B-trees, hashing.</p>	6	10
04	<p><b>Transaction processing</b></p> <p>Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.</p>	8	15

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05	<b>Advanced topics</b>  Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	4	5
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**Practical:**

**Skills to be developed:**

Intellectual skills:

1. Can be able to implement the plan .
2. Can be able to use a variety of techniques to extend the original idea.
3. Can be able to analyze relevant data.
4. Can be considered valid by the fact of it.

**List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)**

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
3. Write a sql statement for implementing ALTER,UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the query for implementing the following functions: MAX(),MIN(),AVG(),COUNT()
6. Write the query to implement the concept of Intergrity constrains
7. Write the query to create the views
8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints.
10. Write the query for creating the users and their role.

**Assignments:**

Based on the curriculum as covered by subject teacher.

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<b>List of Books</b>							
<b>Text Books:</b>							
<b>Name of Author</b>		<b>Title of the Book</b>		<b>Edition/ISSN/ISBN</b>		<b>Name of the Publisher</b>	
Abraham Silberschatz, Henry F. Korth, S. Sudarshan		Database System Concepts		6th Edition		McGraw-Hill	
R. Elmasri and S. Navathe		Fundamentals of Database Systems		5th Edition		Pearson Education	
<b>Reference Books:</b>							
J. D. Ullman		Principles of Database and Knowledge – Base Systems				Computer Science Press	
Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley		Foundations of Databases					
<b>List of equipment/apparatus for laboratory experiments:</b>							
Sl. No.							
1.		Computer/Laptop					
2.		Oracle /Mysql					
<b>End Semester Examination Scheme.</b>			<b>Maximum Marks-70.</b>			<b>Time allotted-3hrs.</b>	
<b>Group</b>	<b>Unit</b>	<b>Objective Questions</b>		<b>Subjective Questions</b>			
		(MCQ only with the correct answer)					
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks

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<b>A</b>	<b>1 to 5</b>	<b>10</b>	<b>10</b>				<b>60</b>
<b>B</b>	<b>1 to 5</b>			<b>5</b>	<b>3</b>	<b>5</b>	
<b>C</b>	<b>1 to 5</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
<b>Group</b>	<b>Chapter</b>	<b>Marks of each question</b>	<b>Question to be set</b>	<b>Question to be answered</b>			
<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>			
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>			
<b>C</b>	<b>All</b>	<b>15</b>	<b>3</b>	<b>3</b>			
<b>Examination Scheme for Practical Sessional examination:</b>							
<b>Practical Internal Sessional Continuous Evaluation</b>							
<b>Internal Examination:</b>							
Continuous evaluation				<b>40</b>			
<b>External Examination: Examiner-</b>							
Signed Lab Note Book				<b>10</b>			
On Spot Experiment				<b>40</b>			
Viva voce				<b>10</b>	<b>60</b>		

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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Probability &amp; Statistics</b>	
<b>Course Code: BITDS303</b>	<b>Semester: III</b>
<b>Duration: 48 Hrs.</b>	<b>Maximum Marks: 100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 3 hrs./week</b>	End Semester Exam: 70
<b>Tutorial:1 hr./week</b>	Attendance: 5
<b>Practical:0</b>	Continuous Assessment: 25
<b>Credit:4</b>	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	The aim of this course is to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
2.	The objective of this course is to familiarize the students with statistical techniques.
<b>Objective:</b> Throughout the course, students will be expected to demonstrate their understanding of probability & statistics by being able to learn each of the following	
<b>Sl. No.</b>	
1.	The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
2.	The basic ideas of statistics including measures of central tendency, correlation and regression.

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3.	The statistical methods of studying data samples.		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Knowledge of basic algebra, calculus.		
2.	Ability to learn and solve mathematical model.		
<b>Contents</b>		<b>Hrs./week</b>	<b>Contents</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and nonhomogeneous linear partial differential equations of second order by complimentary function and particular integral method. Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables.	16	20
02	Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality. Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.	16	25

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03	Basic Statistics, Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, Tests for single mean, difference of means, and difference of standard deviations. Test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.	<b>16</b>	<b>25</b>
	<b>Sub Total:</b>	<b>48</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>52</b>	<b>100</b>

**Assignments:**

Based on the curriculum as covered by subject teacher.

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Erwin Kreyszig	Advanced Engineering Mathematics	9 th Edition	John Wiley & Sons
N. G. Das	Statistical Methods	0070083274, 9780070083271	Tata Mc.Graw Hill

**Reference Books:**

P. G. Hoel, S. C. Port and C. J. Stone	Introduction to Probability Theory		Universal Book Stall
W. Feller	An Introduction to Probability Theory and	3rd Ed.	Wiley

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		its Applications					
<b>End Semester Examination Scheme.</b>		<b>Maximum Marks-70.</b>		<b>Time allotted-3hrs.</b>			
<b>Group</b>	<b>Unit</b>	<b>Objective Questions</b> (MCQ only with the correct answer)		<b>Subjective Questions</b>			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>1 to 3</b>	<b>10</b>	<b>10</b>				
<b>B</b>	<b>1 to 3</b>			<b>5</b>	<b>3</b>	<b>5</b>	<b>60</b>
<b>C</b>	<b>1 to 3</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
<b>Group</b>	<b>Chapter</b>	<b>Marks of each question</b>	<b>Question to be set</b>	<b>Question to be answered</b>			
<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>			
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>			
<b>C</b>	<b>All</b>	<b>15</b>	<b>5</b>	<b>3</b>			



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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Data Mining &amp; Data Warehousing</b>	
<b>Course Code: BITDS304</b>	<b>Semester: III</b>
<b>Duration: 48 Hrs.</b>	<b>Maximum Marks:100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 3 hrs./week</b>	End Semester Exam: 70
<b>Tutorial: 1 hr./week</b>	Attendance : 5
<b>Practical:0</b>	Continuous Assessment:25
<b>Credit: 4</b>	Practical Sessional internal continuous evaluation:NA
	Practical Sessional external examination:NA
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	Understand the functionality of the various data mining and data warehousing component
2.	Appreciate the strengths and limitations of various data mining and data warehousing models
<b>Objective:</b>	
<b>Sl. No.</b>	
1.	Be familiar with mathematical foundations of data mining tools..
2.	Understand and implement classical models and algorithms in data warehouses and data mining
3.	Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4.	Master data mining techniques in various applications like social, scientific and

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	environmental context.		
5.	Develop skill in selecting the appropriate data mining algorithm for solving practical problems.		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	<b>Knowledge of DBMS</b>		
2.	<b>Analytical Knowledge</b>		
<b>Contents</b>			<b>Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	Introduction to Data Warehousing; Data Mining: Mining frequent patterns, association and correlations; Sequential Pattern Mining concepts, primitives,scalable methods;	8	10
02	Classification and prediction; Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns,	8	10
03	Mining Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis;	8	10
04	Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem; Graph Mining; Social Network Analysis;modulation for communication, filtering, feedback control systems.	11	20
05	Web Mining, Mining the web page layout structure, mining web	9	10

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	link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Distributed Data Mining.		
06	Recent trends in Distributed Warehousing and Data Mining, Class Imbalance Problem; Graph Mining; Social Network Analysis.	4	10
	<b>Sub Total:</b>	<b>48</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>52</b>	<b>100</b>

**Practical:**

**Skills to be developed:**

Intellectual skills:

1. Explain the analyzing techniques of various data
2. Describe different methodologies used in data mining and data ware housing
3. Compare different approaches of data ware housing and data mining with various technologies.
4. Can use a variety of techniques to extend the original idea.

**Assignments:**

Based on the curriculum as covered by subject teacher.

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Paulraj Ponniah	Data Warehousing Fundamentals for IT Professionals		Wiley India
Alex Berson and	Data Warehousing, Data	Second Edition	Tata McGraw Hill

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Stephen J. Smith	Mining, & OLAP		Education					
<b>Reference Books:</b>								
Ralph Kimball	Data warehouse Toolkit		Wiley India					
Jiawei Han and M Kamber	Data Mining Concepts and Techniques	Second Edition	Elsevier Publication					
G Dong and J Pei	Sequence Data Mining		Springer					
<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>								
Group	Unit	Objective Questions		Subjective Questions				
		(MCQ only with the correct answer)		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question
<b>A</b>	<b>1 to 6</b>	<b>10</b>	<b>10</b>					<b>60</b>
<b>B</b>	<b>1 to 6</b>			<b>5</b>	<b>3</b>	<b>5</b>		
<b>C</b>	<b>1 to 6</b>			<b>5</b>	<b>3</b>	<b>15</b>		
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>								
<b>Examination Scheme for end semester examination:</b>								
Group	Chapter	Marks of each question	Question to be set	Question to be answered				



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<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>
<b>C</b>	<b>All</b>	<b>15</b>	<b>3</b>	<b>3</b>

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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Value &amp; Ethics in Data Science</b>	
<b>Course Code: BITDS305</b>	<b>Semester: III</b>
<b>Duration: 36 Hrs.</b>	<b>Maximum Marks: 100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 3 hrs./week</b>	End Semester Exam: 70
<b>Tutorial: 0</b>	Attendance : 5
<b>Practical:0</b>	Continuous Assessment:25
<b>Credit: 3</b>	Practical Sessional internal continuous evaluation:NA
	Practical Sessional external examination:NA
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	<b>To understand the ethics in data science</b>
<b>Objective:</b>	
<b>Sl. No.</b>	
1.	Students will learn key philosophical concepts related to responsible conduct of research.
2.	Students will develop familiarity with current debates in, and case studies of, ethical issues in non-medical scientific research.
3.	Students will acquire skills to describe and explain the rationale behind philosophical ethical positions.
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	

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1 Knowledge of Analysis			
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	<p><b>HUMAN VALUES</b></p> <p>Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.</p>	6	15
02	<p><b>ENGINEERING ETHICS</b></p> <p>Senses of „Engineering Ethics“ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories</p>	8	15
03	<p><b>ENGINEERING AS SOCIAL EXPERIMENTATION</b></p> <p>Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.</p>	8	15
04	<p><b>SAFETY, RESPONSIBILITIES AND RIGHTS</b></p> <p>Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination</p>	8	15
05	<p><b>GLOBAL ISSUES</b></p> <p>Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social</p>	6	10

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	Responsibility		
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**List of Books**

**Text Books:**

<b>Name of Author</b>	<b>Title of the Book</b>	<b>Edition/ISSN/ISBN</b>	<b>Name of the Publisher</b>
W. Martin and Roland Schinzinger	Ethics in Engineering		Tata McGraw Hill
Govindarajan M, Natarajan S, Senthil Kumar V. S	Engineering Ethics		Prentice Hall of India
Charles B. Fleddermann	Engineering Ethics		Pearson Prentice Hall
Laura P. Hartman and Joe Desjardins	Business Ethics: Decision Making for Personal Integrity and Social Responsibility		Mc Graw Hill education

**Reference Books:**

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins	Engineering Ethics – Concepts and Cases		Cengage Learning
John R Boatright	Ethics and the Conduct of Business		Pearson Education
Edmund G Seebauer and Robert L Barry	Fundamentals of Ethics for Scientists and		Oxford University Press



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	Engineers						
<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>1 to 5</b>	<b>10</b>	<b>10</b>				<b>60</b>
<b>B</b>	<b>1 to 5</b>			<b>5</b>	<b>3</b>	<b>5</b>	
<b>C</b>	<b>1 to 5</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>• Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>• Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>			
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>			
<b>C</b>	<b>All</b>	<b>15</b>	<b>3</b>	<b>3</b>			