Department of Information Technology

Syllabus of B.Sc. in Information Technology (Big Data Analytics)

(Effective from academic session 2019-20)

Semester-II

Name of the Course: B.Sc. in Information Technology (Big Data Analytics) **Subject:** Data Acquisition & Processing, Data Acquisition & Processing Lab			
Course Code: BITDBA201 & BITDBA291		**Semester: II**	
Duration: 36 Hrs.		**Maximum Marks: 100+100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical:4 hrs./week		Continuous Assessment:25	
Credit: 3+2		Practical Sessional internal continuous evaluation:40	
		Practical Sessional external examination:60	
Aim:			
Sl. No.			
1.	Understand the principles of operation and limitations of common measuring instruments.		
2.	Model instruments and their operating conditions to use the instruments correctly.		
3.	Design systems for the acquisition, analysis, and communication of data		
4.	Gain awareness of economical and societal aspects of instrumentation systems and communication of data.		
Objective:			
Sl. No.			
1.	To understand concepts of acquiring the data from transducers/input devices, their interfacing and instrumentation system design.		
2.	To familiarize with different data transfer techniques.		
3.	To automate the acquisition and processing of data.		
Pre-Requisite:			
Sl. No.			
1.	Electrical and Electronics subject knowledge		
2.	Mathematical knowledge		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Sensors**: temperature, light, displacement, acceleration, pressure, flow, mechanical strain.	**3**	**5**
02	**Data acquisition***:* pre-processing and filtering, impedance matching, band pass of the measurement system.	**3**	**8**
03	**AD/DA converters**: AD and DA techniques, data acquisition	**3**	**8**

	systems, convertor properties, the selection and use of ADC.		
04	**Basics of microcontrollers***:* properties, block diagram, input and output units, timing units, other peripheral units.	**3**	**5**
05	**Personal computer***:* sound card, RS232, RS422, GPIB, PCI, USB.	**6**	**7**
06	**Acquisition***: s*ampling, Nyquist criteria, frequency aliasing.	**6**	**10**
07	**Basics of digital data processing***:* FFT, digital filtering, convolution, FIR, IIR.	**6**	**10**
08	**Applications in data processing**: modulation and demodulation (AM, FM, PM), measurement (amplitude, phase, frequency, period), oscillators.	**3**	**10**
09	**Basics of programmable logic circuits:** CPLD and PFHA architecture, examples of the use, basics of programming language VHDL.	**3**	**7**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:
Intellectual skills:

1. Can offer and explain what has been created in a way others can understand and see the nature / unique / specifics of it.
2. Can distinguish which ideas could prove correct.
3. Use an idea to create something new and original which works better than the original.

List of Practical:
Based on Theory
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

S.W. Smith	The Scientist and Engineer's Guide to Digital Signal processing		California Technical Publishing
Reference Books:			
W.J. Thompson, J.G. Webster	Interfacing Sensors to the IBM PC		Prentice Hall
A. Bateman, I. Paterson-Stephens	The DSP Handbook		Prentice Hall

List of equipment/apparatus for laboratory experiments:	
Sl. No.	**Sensor, DAQ Device**
1.	**Computer**
2.	

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

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
A	**1 to 9**	**10**	**10**				**60**
B	**1 to 9**			**5**	**3**	**5**	
C	**1 to 9**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**3**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Note Book	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Big Data Analytics) **Subject:** Foundation in Big Data Analysis and Hadoop Lab	
Course Code: BITBDA202 & BITBDA292	**Semester: II**
Duration: 36 Hrs	**Maximum Marks:100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	End Semester Exam:70
Tutorial: 0	Attendance: 5
Practical: 4 hrs./week	Continuous Assessment: 25
Credit: 3+2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	Understand big data for business intelligence
2.	Learn business case studies for big data analytics.
3.	Understand nosql big data management.
4.	Perform map-reduce analytics using Hadoop and related tools

Objective:

Sl. No.	
1.	Understand the fundamentals of Big cloud and data architectures.
2.	Understand HDFS file structure and Mapreduce frameworks, and use them to solve complex problems, which require massive computation power
3.	Use relational data in a Hadoop environment, using Hive and Hbase tools of the Hadoop Ecosystem..
4.	Understand the Comparison with traditional databases.

Pre-Requisite:			
Sl. No.			
1.	Database Management Systems.		
2.	Object Oriented Programming Through Java		
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to big data** Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.	**6**	**10**
02	**Mining data streams** Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.	**10**	**20**
03	**Hadoop** History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.	**12**	**20**
04	**Frameworks** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere	**8**	**20**

	BigInsights and Streams. Predictive Analytics- Simple linear regression- Multiple linear regression- Interpretation 5 of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.		
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. The HDFS file system, MapReduce frameworks are studied in detail.
2. Hadoop tools like Hive, and Hbase, which provide interface to relational databases, are also covered as part of this course work.
3. Ability to implement algorithms to perform various operations on Mapreduce,Pig,Hive

List of Practical:

1. Basic Linux command
2. Installation of Hadoop .
3. Create a directory in HDFS at given path(s).
4. Copy a file from/To Local file system to HDFS
5. Remove a file or directory in HDFS.
6. Display the aggregate length of a file.
7. Word Count Map Reduce program to understand Map Reduce Paradigm
8. Implementing Matrix Multiplication with Hadoop Map Reduce
9. Pig Latin scripts to sort,group, join,project, and filter your data.
10. Hive Databases,Tables,Views,Functions and Indexes

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**
Tom White	Hadoop: The Definitive Guide	Third Edition	O'reilly Media
Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data		McGrawHill Publishing
Reference Books:			
Anand Rajaraman and Jeffrey David Ullman	Mining of Massive Datasets		CUP
Bill Franks	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics		John Wiley& sons
Glenn J. Myatt	Making Sense of Data		John Wiley & Sons
Pete Warden	Big Data Glossary		O'Reilly
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Computer with moderate configuration		
2.	Linux os or VM		

3.	Hadoop 2.x or higher and other software as required.

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

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
A	**1 to 4**	**10**	**10**				
B	**1 to 4**			**5**	**3**	**5**	**60**
C	**1 to 4**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Note Book		**10**	
On Spot Experiment		**40**	
Viva voce		**10**	**60**

Name of the Course: B.Sc. in Information Technology (Big Data Analytics) **Subject:** Data Structure and Algorithm with Python & Data Structure and Algorithm with Python lab	
Course Code: BITBDA203 & BITBDA293	**Semester: II**
Duration: 36 Hrs	**Maximum Marks:100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	End Semester Exam:70
Tutorial: 0	Attendance: 5
Practical: 4 hrs./week	Continuous Assessment: 25
Credit: 3+2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	**The point of this course is to give you a vibe for algorithms and data structures as a focal area of what it is to be a computer science student.**
2.	**You ought to know about the way that there are regularly a few calculations for some issue, and one calculation might be superior to another, or one calculation better in certain conditions and another better in others.**
3.	**You should have some idea of how to work out the efficiency of an algorithm.**
4.	**You will be able to use and design linked data structures**
5.	**You will learn why it is good programming style to hide the details of a data structure within an abstract data type.**
6.	**You should have some idea of how to implement various algorithm using python programming.**

Objective:

Sl. No.	

1.	**To impart the basic concepts of data structures and algorithms.**
2.	**To understand concepts about searching and sorting techniques.**
3.	**To understand basic concepts about stacks,queues,lists,trees and graphs.**
4.	**To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures**

Pre-Requisite:

Sl. No.	
1.	**Basics of programming language.**
2.	**Logic building skills.**

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Data Structure** Abstract Data Type.	**1**	**2**
02	**Arrays** 1D, 2D and Multi-dimensional Arrays, Sparse Matrices.Polynomial representation .	**3**	**4**
03	**Linked Lists** Singly, Doubly and Circular Lists, Normal and Circular representation of Self Organizing Lists, Skip Lists, Polynomial representation.	**4**	**7**
04	**Stacks** Implementing single / multiple stack/s in an Array, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another, Applications of stack, Limitations of Array representation of stack.	**4**	**10**

05	**Queues** Array and Linked representation of Queue, Circular Queue, De-queue, Priority Queues.	**4**	**7**
06	**Recursion** Developing Recursive Definition of Simple Problems and their implementation, Advantages and Limitations of Recursion, Understanding what goes behind Recursion (Internal Stack Implementation)	**4**	**5**
07	**Trees** Introduction to Tree as a data structure, Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals of Binary Search Trees), Threaded Binary Trees (Insertion, Deletion, Traversals), Height-Balanced Trees (Various operations on AVL Trees).	**5**	**15**
08	**Searching and Sorting** Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Merge Sort, Quick sort, Shell Sort, Comparison of Sorting Techniques	**6**	**15**
09	**Hashing** Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collision by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function.	**5**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**
Practical: **Skills to be developed:**			

Intellectual skills:

1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.
2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.
3. Ability to implement algorithms to perform various operations on data structures.

List of Practical:

1. Implementation of array operations.
2. Stacks and Queues: adding, deleting elements .
3. Circular Queue: Adding & deleting elements
4. Merging Problem : Evaluation of expressions operations on Multiple stacks & queues
5. Implementation of linked lists: inserting, deleting, inverting a linked list.
6. Implementation of stacks & queues using linked lists:
7. Polynomial addition, Polynomial multiplication
8. Sparse Matrices : Multiplication, addition.
9. Recursive and Non Recursive traversal of Trees Threaded binary tree traversal.AVL tree implementation Application of Trees.
10. Application of sorting and searching algorithms Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

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
Michael H. Goldwasser, Michael T. Goodrich,	Data Structures and Algorithms in Python	1118476735, 9781118476734	John Wiley & Sons

and Roberto Tamassia			
Rance D Necaise	**Data Structures and Algorithms Using Python**	**9788126562169**	**John Wiley & Sons**
Reference Books:			
Sartaj Sahni	**DataStructures, Algorithms and applications in C++**	**Second Edition**	**Universities Press**
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
4.	Computer with moderate configuration		
5.	Python 2.7 or higher and other softwares as required.		

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

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
A	**1 to 9**	**10**	**10**				
B	**1 to 9**			**5**	**3**	**5**	**60**
C	**1 to 9**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Note Book	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: B.Sc. in Information Technology (Big Data Analytics) **Subject: Discrete Mathematics**	
Course Code: BITBDA204	**Semester: II**
Duration: 48 Hrs	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 Hrs./week	End Semester Exam: 70
Tutorial:1 Hrs./week	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit:4	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:

Sl. No.	
1.	**The aim of this course is to introduce you with a new branch of mathematics which is discrete mathematics, the backbone of Computer Science.**
2.	**In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. The Discrete Mathematics course aims to provide this mathematical background.**

Objective: Throughout the course, students will be expected to demonstrate their understanding of

Discrete Mathematics by being able to do each of the following

Sl. No.	
1.	**Use mathematically correct terminology and notation.**
2.	**Construct correct direct and indirect proofs.**

3.	**Use division into cases in a proof.**		
4.	**Use counterexamples.**		
5.	**Apply logical reasoning to solve a variety of problems.**		
Pre-Requisite:			
Sl. No.			
1.	**Knowledge of basic algebra**		
2.	**Ability to follow logical arguments.**		
Contents		**4 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Set Theory** Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.	**10**	**14**
02	**Propositional logic** Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradictions, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.	**10**	**14**
03	**Combinatorics** Mathematical induction, recursive mathematical definitions, basics	**10**	**14**

	of counting, permutations, combinations, inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of G.F., solution of recurrence relation using G.F, solution of combinatorial problem using G.F.)		
04	**Algebraic Structure** Binary composition and its properties definition of algebraic structure, Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).	**8**	**10**
05	**Graphs** Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder, post order). Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation (DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite Automation.	**10**	**18**
	Sub Total:	**48**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**52**	**100**

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
Kenneth H. Rosen	Discrete Mathematics and its Applications		Tata Mc.Graw Hill
eymourLipschutz, M.Lipson	Discrete Mathematics		Tata Mc.Graw Hill
Reference Books:			
V. Krishnamurthy	Combinatorics:Theory and Applications		East-West Press
Kolman, Busby Ross	Discrete Mathematical Structures		Prentice Hall International

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

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
A	**1 to 5**	**10**	**10**				
B	**1 to 5**			**5**	**3**	**5**	**60**
C	**1 to 5**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Name of the Course: B.Sc. in Information Technology (Big Data Analytics) **Subject: Environmental Science**	
Course Code: BITBDA205	**Semester: II**
Duration: 36 Hrs	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 1 Hrs./week	End Semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 1	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:

Sl. No.	
1.	To enable critical thinking in relation to environmental affairs.
2.	Understanding about interdisciplinary nature of environmental issues
3.	Independent research regarding environmental problems in form of project report

Objective:

Sl. No.	
1.	To create awareness about environmental issues.
2.	To nurture the curiosity of students particularly in relation to natural environment.
3.	To develop an attitude among students to actively participate in all the activities regarding environment protection
4.	To develop an attitude among students to actively participate in all the activities regarding environment protection

Contents	**4 Hrs./week**

Chapter	Name of the Topic	Hours	Marks
01	**Introduction** Basic ideas of environment, basic concepts, man, society &amp, environment, their interrelationship. Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non- renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development. Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function. Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management, Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.	**3**	**10**
02	**Ecology** Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban), Food chain [definition and one example of each food chain], Food web. Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity.	**7**	**10**
03	**Air pollution and control** Atmospheric Composition: Troposphere, Stratosphere,	**6**	**10**

	Mesosphere, Thermosphere,Tropopause and Mesopause. Energy balance:Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems.Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food.Global warming and its consequence, Control of Global warming. Earth's heat budget. Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification. Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference).		
04	**Water Pollution and Control** Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect]. Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only) Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Wastewater treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. Water pollution due to the toxic elements and	**6**	**15**

	their biochemical effects: Lead, Mercury, Cadmium, and Arsenic.		
05	**Land Pollution** Lithosphere, Internal structure of earth, rock and soil 1L Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes, Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).	**4**	**10**
06	**Pollution** Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise] Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level,(18hr Index), Ldn. Noise pollution control.	**5**	**10**
07	**Environmental Management** Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.	**5**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
G. M.Masters,	Introduction to Environmental Engineering and Science		Prentice-Hall of India Pvt. Ltd., 1991

Reference Books:			
A. K. De	Environmental Chemistry		New Age International

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

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
A	**1 to 5**	**10**	**10**				
B	**1 to 5**			**5**	**3**	**5**	**60**
C	**1 to 5**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Name of the Course: B.Sc. in Information Technology (Big Data Analytics) **Subject:** Project I	
Course Code: BITBDA281	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 100**
Tutorial: 0	**Attendance: 0**
Practical: 2 Hrs./week	**Continuous Assessment: 0**
Credit: 1	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60
Contents	
Students will do projects on application areas of latest technologies and current topics of societal relevance.	