PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

(Established under the Presidency University Act, 2013 of the Karnataka Act 41 of 2013)

[2023-24 FALL/ODD SEMESTER]

COURSE PLAN [Revision 03 – July 2023]

SCHOOL: SOCSE   **DEPT: CSE**   **DATE OF ISSUE: 18-08-2023**

NAME OF THE PROGRAM   : B.Tech

P.R.C. APPROVAL REF.   : PU/AC-21.X/SOCSE02/CSE/2020-2024

SEMESTER/YEAR   : 7/ 4th

COURSE TITLE & CODE   : Big Data Technologies / CSE 3002

COURSE CREDIT STRUCTURE   : 2-2-3

CONTACT HOURS   : 4 periods per week

COURSE IC   : Dr. Raghavendra M Devadas & Dr Gokulakrishnan S

COURSE INSTRUCTOR(S)   : Dr.S.P. Anandaraj, Dr.Senthilkumar S, Dr Hasan Hussain S

Ms. Ayesha Taranum, Mr. Krishna Mehar P Tirumala, Ms. Kimmi Kumari, Mr. Praveen P

COURSE URL   : CAMU link to be updated

PROGRAM OUTCOMES   :

PO-1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES   :

PSO 01. [Problem Analysis]: Identify, formulate, research literature, and analyse complex engineering problems related to Software Engineering principles & practice, Programming, Big Data computing & analytics Substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PSO 02. [Design/development of Solutions]: Design solutions for complex engineering problems related to Software Engineering principles & practice, Programming, Big Data Computing & analytics and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PSO 03. [Modern Tool usage]: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities related to Software Engineering principles & practice, Programming, Big Data Computing & analytics with an understanding of the limitations.

COURSE PREREQUISITES:

Database Management System (DDL, DML of SQL Queries and Creation of Class & object, interface, reading & writing a file, control statements in java programming).

COURSE DESCRIPTION:

The purpose of the course is to provide the fundamentals of Big data technology, to emphasize the importance of choosing suitable tools for processing and analyzing big data to gain insights.

The student should have knowledge and skill to select and use most appropriate big data tools to solve business problems. The associated laboratory provides an opportunity to implement the concepts and enhance critical thinking and analytical skills.

With a good knowledge in the fundamentals of Big data technology the student can gain practical experience in implementing them, enabling the student to be an effective solution provider for applications that involve huge volume of data.

COURSE OBJECTIVES:

The objective of the course is to familiarize the learners with the concepts of Big Data Technologies and attain Skill Development through experiential Learning techniques.

COURSE OUTCOMES: On successful completion of the course the students shall be able to

CO Number	CO Statement	Expected BLOOMS LEVEL
CO1	Apply Map-Reduce programming on the given datasets to extract required insights	Apply
CO2	Employ appropriate Hadoop Ecosystem tools such as scoop, Hbase, Hive, to perform data analytics for a given problem	Apply
CO3	Use Spark tool to analyze the given dataset for a given problem	Apply

TABLE 1: COURSE OUTCOMES

MAPPING OF C.O. WITH P.O.

TABLE 2a: CO PO Mapping ARTICULATION MATRIX

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	P0-11	P0-12
CO1	M	H	H	-	H	-	-	-	M	L	L	-
CO2	M	H	M	-	M	-	-	-	M	L	L	-
CO3	M	H	M	-	H	-	-	-	M	L	L	-

TABLE 2b: CO PSO Mapping ARTICULATION MATRIX

CO. No	PSO1	PSO2	PSO3
CO1	L	H	M
CO2	L	H	M
CO3	L	M	L

COURSE CONTENT (SYLLABUS):

Module:1: Introduction to Hadoop   **[10 Hrs.] [Blooms 'level selected: Apply]**

Introduction to Big Data and its importance: Basics of Distributed File System, Four Vs, Drivers for Big data, Big data applications, Structured, unstructured, semi-structured and quasi structured data.   Big data Challenges-Traditional versus big data approach, The Big Data Technology Landscape: No-SQL.

The Hadoop: History of Hadoop-Hadoop use cases, The Design of HDFS, Blocks and replication management, Rack awareness, HDFS architecture, HDFS Federation, Name node and data node, Anatomy of File write. Anatomy of File read, Hadoop Map Reduce paradigm, Map and reduce tasks, Job Tracker and task tracker, Map reduce execution pipeline, Key value pair, Shuffle and sort, Combiner and Partitioner, APIs used to Write/Read files into/from Hadoop, Need for Flume and Sqoop.

Anatomy of a YARN: Hadoop 2.0 Features, Name Node High Availability, YARN Architecture, Introduction to Schedulers, YARN scheduler policies, FIFO, Fair and Capacity scheduler

Module: 2: Hadoop Ecosystem Tool   **[8 Hrs] [Blooms 'level selected: Apply]**

Introduction to SQOOP: SQOOP features, Sqoop Architecture, Sqoop Import All Tables, Sqoop Export All Tables, Sqoop Connectors, Sqoop Import from MySQL to HDFS, Sqoop vs flume.
Hive: Apache Hive with Hive Installation, Hive Data Types, Hive Table partitioning, Hive DDL commands, Hive DML commands, and Hive sort by vs. order by, Hive Joining tables, Hive bucketing.
Hbase: Introduction to HBase and its working architecture- Commands for creation and listing of tables- disabled and is disabled of table - enable and is enabled of table- describing and dropping of table-Put and Get command - delete and delete all command-commands for scan, count, truncate of tables.

Module: 3: Spark   **[8 Hrs] [Blooms 'level selected: Apply]**

Introduction to Apache Spark A unified Spark, Who uses Spark and for what? A Brief History of Spark, Spark version and releases, Storage layers for Spark. Programming with RDDs: RDD Basics, Creating RDDs, RDD Operations, Passing functions to Spark, Common Transformations and Actions, Persistence. Spark SQL: Linking with Spark SQL, Using Spark SQL in Applications, Loading and Saving Data, JDBC/ODBC Server, User-defined functions, Spark SQL Performance.

SKILL SETS TO BE DEVELOPED:

1. **An attitude of enquiry.**

2. **Confidence and ability to tackle new problems.**

3. **Ability to interpret events and results.**

4. **Ability to work as a leader and as a member of a team.**

5. **Assess errors in systems/processes/programs/computations and eliminate them.**

6. Observe and measure physical phenomena.

7. Write reports.

8. **Select suitable equipment, instrument, materials & software**

9. **Locate faults in system/Processes/software.**

10. **Manipulative skills for setting and handling systems/Process/ Issues**

11. The ability to follow standard /Legal procedures.

12. An awareness of the Professional Ethics.

13. Need to observe safety/General precautions.

14. To judge magnitudes/Results/issues without actual measurement/actual contacts

DELIVERY PROCEDURE (PEDAGOGY):

S. No	Lecture Number	Subtopic as per lesson Plan	Pedagogy title/ short explanation of adopted pedagogy	** At end of semester please update whether activity was done
		TABLE 3: SPECIAL DELIVERY METHOD/ PEDAGOGY PLANNED WITH TOPICS		
1	P2	Working with Hadoop Commands	Experiential Learning	
2	L15	Hive: Apache Hive with Hive Installation, Hive Data Types, Hive Table partitioning, Hive DDL commands	Classroom Lecture/ PPT presentation	
3	L19	describing and dropping of table-Put and Get command	self-learning topics	
4	P7	Working on basic hbase commands -1	Experiential Learning	

REFERENCE MATERIALS:

(i) Textbooks

T1. Big Data and Analytics- Seema Acharya, Subhashini Chellappan-2016, 2nd Edition, Wiley Publication.

T2. Analytics in a Big data world- Bart Baesens- 2nd Edition, Wiley Publication. 2018

(ii) Reference Book(s)

R1. Big data Analytics, Radha Shankarmani and vijayalakshmi second edition wiley publication 2017

R2. Big Data, Anil Maheshwari, McGraw Hill education 2017

R3. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly. 2016

(iii) web resources

W1. NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs92/preview

W2. Coursera: https://www.coursera.org/learn/big-data-introduction

W3. EDX: https://www.edx.org/course/big-data-fundamentals

Ebook:

http://182.72.188.195/cgi-bin/koha/opac-search.pl?idx=ti&q=Big%20data%20and%20analytics&sort_by=relevance_dsc&count=200&limit=au:Acharya,%20Seema

SPECIFIC GUIDELINES TO STUDENTS:

COURSE SCHEDULE:

	TABLE 4: COURSE BROAD SCHEDULE			
Sl. No.	ACTIVITY	PLANNED STARTING DATE	PLANNED CONCLUDING DATE	TOTAL NUMBER OF PERIODS
01	Over View of the course	28-08-2023	28-08-2023	1
02	Module : 01	29-08-2023	15-09-2023	16
02	Module: 02	18-09-2023	06-10-2023	16
03	Assignment/any other activity/Guest Lecture/ Field Visit	28-9-2023	28-9-2023	1
04	Midterm	16-10-2023	20-10-2023	1
05	Module:03	15-11-2023	15-12-2023	12

DETAILED SCHEDULE OF INSTRUCTION:

		TABLE 5: DETAILED COURSE SCHEDULE / LESSON PLAN (THEORY)						
Sl. No	Session no [with date]	Lesson Title	Topics & Learning Outcome LO: Student shall be able to	LOL (Lower Order Learning)	HOL (Higher Order Learning)	Course Outcome	Teaching Pedagogies	Reference (Chapter & Page No.)
1	L1	**Modul1: Introduction to Hadoop**	Basics of Distributed File System, Four Vs, Drivers for Big data, Big data applications LO1: Define Big Data. LO2: Explain Big Data applications.	L1 L2	-	CO1	PPT / Interactive Lecture	T1: CH2 (Pg. 22-25)
2	L2		Structured, unstructured, semi-structured and quasi structured data LO1: Define Structured and unstructured data. LO2: Summarize Structured and	L1 L2	-	CO1	PPT / Interactive Lecture	T1 CH-14, Page(743-746)

			unstructured data with examples.				
3	L3		Big data Challenges-Traditional versus big data approach, The Big Data Technology Landscape: No-SQL LO1: Describe Big data Challenges LO2: Identify some of the Big data Challenge	L1 L2	-	CO1	PPT / Interactive Lecture	T1:CH4 (Pg.61-79)
4	L4		History of Hadoop-Hadoop use cases, The Design of HDFS, Blocks and replication management LO1: Describe HDFS blocks concepts LO2: Paraphrase HDFS Blocks concepts with examples.	L1 L2	-	CO1	PPT / Interactive Lecture	R1,CH-12 (314-318)
5	L5		Rack awareness, HDFS architecture, HDFS Federation, Name node and data node LO1: State Name node and Data node concepts. LO2: Distinguish between Name node and Data node with	L1 L2	-	CO1	Think Pair Share PPT / Interactive Lecture	R1,CH-17 (548-553)
6	L6		Anatomy of File write. Anatomy of File read, Hadoop Map Reduce paradigm, Map and reduce tasks LO1: Summarize Map Reduce execution procedure.	L2 L3	-	CO1	Think Pair Share PPT / Interactive Lecture	T1:CH2 (Pg.18-22)

			LO2: Apply Summarize Map Reduce execution procedure for the dataset provided				
7	L7		Job Tracker and task tracker, Map reduce execution pipeline, Key value pair, Shuffle and sort, Combiner and Partitioner LO1: Define and describe Job Tracker and task tracker concepts. LO2: Describe Map reduce execution pipeline	L1 L2	-		PPT / Interactive Lecture	R1,CH-11 (251-252)
7	L8		APIs used to Write/Read files into/from Hadoop, Need for Flume and Sqoop LO1: Define Flume and Sqoop concepts. LO2: Describe APIs used to Write/Read files	L1 L2	-	CO1	PPT / Interactive Lecture	R1,CH-11 (252-258)
7	L9		Anatomy of a YARN: Hadoop 2.0 Features, Name Node High Availability, YARN Architecture LO1: List Hadoop 2.0 Features. LO2: Demonstrate YARN Architecture	L1 L3	-	CO1	PPT / Interactive Lecture	T2,CH-1 (8-10)
8	L10		Introduction to Schedulers, YARN scheduler policies, FIFO, Fair and Capacity scheduler LO1: Define Schedulers. LO2: Explain FIFO, Fair and Capacity scheduler	L1 L2	-	CO1	Participative Learning PPT / Interactive Lecture	T2,CH-2 (12-15)
9	L11	**Module 2: Hadoop Ecosystem Tools**	Introduction to SQOOP: SQOOP features, Sqoop Architecture, Sqoop Import All Tables,	L1 L2	-	CO2	PPT / Interactive Lecture	T1:CH7 (Pg.129-132)

			Sqoop Export All Tables LO1: Define and describe sqoop concepts. LO2: Contrast sqoop with import and export table				
10	L12		Sqoop Connectors, Sqoop Import from MySQL to HDFS, Sqoop vs flume LO1: Recall sqoop concepts. LO2: Apply Import from MySQL to HDFS	L1 L3	-	CO2	PPT / Interactive Lecture	T2,CH-2 (22-31)
11	**L13**		Hive: Apache Hive with Hive Installation, Hive Data Types, Hive Table partitioning, Hive DDL commands LO1: Define Apache Hive concepts. LO2: Demonstrate Hive Installation, Hive Table partitioning	L1 L3	-	CO2	PPT / Interactive Lecture	T2,CH-3 (58-77)
12	L14		Hive DML commands, and Hive sort by vs. order by, Hive Joining tables, Hive bucketing. LO1: Select Hive DML commands LO2: Apply Hive sort by vs. order by	L1 L3	-	CO2	Participative Learning PPT / Interactive Lecture	R1,CH-2 (32-58)
13	L15		Hbase: Introduction to HBase and its working architecture- Commands for creation and listing of tables LO1: Recall HBase and its working architecture concepts. LO2: Solve commands for creation and listing of tables	L1 L3	-	CO2	PPT / Interactive Lecture	R3,CH-12 (304-314)
14	L16		disabled and is disabled of table - enable and is enabled of table LO1: Distinguish disabled and is disabled of table - enable and is	L1 L3	-	CO2	PPT / Interactive Lecture	T1:CH16 (Pg.413-431)

			enabled of table LO2: Use enabled and disabled of table					
15	L17		describing and dropping of table-Put and Get command LO1: Describe Table- Put and Get concepts. LO2: Apply dropping of table-Put and Get command	L1 L3	-	CO2	PPT / Interactive Lecture	T1:CH16 (Pg.432- 438)
16	L18		delete and delete all command-commands for scan, count, truncate of tables LO1: Define and list delete and delete all command concepts. LO2: Apply commands for scan, count, truncate of tables	L1 L3	-	CO2	Problem Based Learning PPT / Interactive Lecture	T1:CH8 (Pg.161- 171)
17	L19		Introduction to Apache Spark A unified Spark, Who uses Spark and for what? LO1: Define Apache Spark concepts. LO2: Demonstrate installation of Apache Spark	L1 L3	-	CO3	PPT / Interactive Lecture	T2:CH8 (Pg.175- 180)
18	L20	**Module 3: Spark**	A Brief History of Spark, Spark version and releases, Storage layers for Spark LO1: Recall History of Spark, Spark version and releases concepts. LO2: Summarize Storage layers for Spark	L1 L2	-	CO3	PPT / Interactive Lecture	T1:CH8 (Pg.184- 185)
19	L21		Programming with RDDs: RDD Basics, Creating RDDs LO1: Define RDD Basics. LO2: Discuss Creating RDDs	L1 L2	-	CO3	PPT / Interactive Lecture	T1:CH8 (Pg.181- 183)

20	L22		RDD Operations, Passing functions to Spark, Common Transformations and Actions, Persistence LO1: List RDD Operations. LO2: Apply Common Transformations and Actions, Persistence	L1 L3	-	CO3	PPT / Interactive Lecture	T1:CH9 (Pg.196-210)
21	L23		Spark SQL: Linking with Spark SQL, Using Spark SQL in Applications LO1: Define Spark SQL concepts. LO2: Apply Spark SQL in Applications	L1 L3	-	CO3	Experimental Learning PPT / Interactive Lecture	T2:CH6 (Pg.213-215)
22	L24		Loading and Saving Data, JDBC/ODBC Server LO1: Recall JDBC/ODBC Server concepts. LO2: Apply Loading and Saving Data in JDBC/ODBC Server	L1 L3	-	CO3	PPT / Interactive Lecture	R3:CH10 (Pg.511-535)
23	L25		User-defined functions, Spark SQL Performance, Scala: The Basics LO1: list User-defined functions LO2: Demonstrate Spark SQL Performance	L1 L3	-	CO3	PPT / Interactive Lecture	R2:CH11 (Pg.216-243)
24	L26		Control Structures and functions, Working with arrays, Maps and Tuples LO1: Describe Maps and Tuples concepts. LO2: Apply Control Structures and functions	L1 L3	-	CO3	PPT / Interactive Lecture	R1:CH4 (Pg.99-119)
	L27	**Revision and Conclusion of the Course**				CO1, CO2, CO3	PPT / Interactive Lecture	

COURSE CONTENT &TASK SCHEDULE FOR LABORATORY COMPONENT:

Sl. No.	Task No	Task & Learning Outcome / LO: Student shall be able to	RBT LOL (Lower Order Learning)	RBT HOL (Higher Order Learning)	Number of Lab Sessions required to complete the task	Skills to be developed	Course Outcome to be developed
01	P1	Installation of Hadoop single node cluster using Ubuntu operating system LO1: Explain Hadoop concepts. LO2: Demonstrate Installation of Hadoop single node cluster	L1 L3	-	1	SK1, SK3, SK5, SK8	CO 1
02	P2	Working with Hadoop Commands LO1: Describe Hadoop concepts. LO2: Demonstrate various Hadoop Commands	L2 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 1
03	P3	Word Count analysis using sample data set (MapReduce) LO1: Describe MapReduce concepts. LO2: Demonstrate Word Count analysis	L1 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 2
04	P4	Stock analysis using sample data set (MapReduce) LO1: Describe MapReduce concepts. LO2: Demonstrate Stock analysis program	L1 L3	-	2	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 2
05	P5	Web log analysis using sample data set (MapReduce) LO1: Describe MapReduce concepts. LO2: Demonstrate Web log analysis program	L1 L3	-	2	SK1, SK2, SK3, SK5, SK6, SK7,	CO 2

Sl. No.	Task No	Task & Learning Outcome / LO: Student shall be able to	RBT LOL (Lower Order Learning)	HOL (Higher Order Learning)	Number of Lab Sessions required to complete the task	Skills to be developed	Course Outcome to be developed
						SK8, SK9	
06	P6	Temperature analysis using sample dataset .(MapReduce) LO1: Describe MapReduce concepts. LO2: Demonstrate Temperature analysis program	L1 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO2
7	P7	Working on basic hive commands - 1. LO1: Define hive concepts. LO2: Demonstrate basic hive commands	L1 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 2
8	P8	Working on advance hive commands-2. LO1: Describe hive concepts. LO2: Demonstrate advanced hive commands	L2 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 2
9	P9	Working on basic hbase commands -1. LO1: Define hbase concepts. LO2: Demonstrate basic hbase commands	L1 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 2
10	P10	Working on advance hbase commands-2. LO1: Describe hbase concepts. LO2: Demonstrate advance hbase commands	L2 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 2

Sl. No.	Task No	Task & Learning Outcome	RBT		Number of Lab Sessions required to complete the task	Skills to be developed	Course Outcome to be developed
		LO: Student shall be able to	LOL (Lower Order Learning)	HOL (Higher Order Learning)			
11	P11	Install, Deploy & configure Apache Spark LO1: Define Apache Spark concepts. LO2: Demonstrate Install, Deploy & configure Apache Spark	L1 L3	-	1	SK1, SK3, SK5, SK8	CO3
12	P12	Write a program in Apache spark to count the occurrences words in a given text file and display only those words starting with 'a' in ascending order of count. LO1: Describe Apache spark concepts. LO2: Demonstrate count the occurrences words in a given text file program	L2 L3	-	1	SK1, SK2, SK3, SK5, SK6, SK7, SK8, SK9	CO 3

Topics relevant to Entrepreneurial Skills: Project Life Cycle, Risk Management, Project Planning for Entrepreneurship Development through Problem Solving methodologies/Participative Learning Techniques/ Experiential Learning Techniques.

This is attained through the Assignment/ Presentation/ Lab experiments as mentioned in the assessment component

ASSESSMENT SCHEDULE:

							TABLE 6 ASSESSMENT SCHEDULE					

Sl.no	Assessment type[Include here assessment method for self-learning component also]	Contents	Course outcome Number	Duration In Hours	marks	Weightage	Venue, DATE &TIME
1	Assignment [Review of digital / e-resources from Pres. Univ. link given in the References Section - (Mandatory to submit screenshot accessing digital resource. Otherwise it will not be evaluated]	Module 1 https://web.s.ebscohost.com/ehost/detail/detail?vid=9&sid=cbc51846-7bf7-482b-8aac-fbd99ab97ee4%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#	CO1	1	10	5%	
2	Mini Project	Module 1	CO1		30	15%	
2	Midterm	Module 1, 2	CO1, CO2	1.30hr	60	30%	**22-10-2023**
3	Endterm Lab	All modules	CO1,CO2, CO3	3hr	100	50%	

COURSE CLEARANCE CRITERIA:

AS PER ACADEMIC REGULATIONS OF THE UNIVERSITY

MAKEUP EXAM POLICY:

AS PER ACADEMIC REGULATIONS OF THE UNIVERSITY

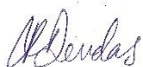**CONTACT TIMINGS IN THE CHAMBER FOR ANY DISCUSSIONS:**

SAMPLE THOUGHT PROVOKING QUESTIONS:

SL NO	QUESTION	MARKS	COURSE OUTCOME NO.	BLOOM'S LEVEL
	TABLE 7: SAMPLE THOUGHT PROVOKING QUESTIONS			
1	A client is running his business on Mysql. He want to migrate his data from Mysql platform to HIVE. As a developer what will be your choice of tool. Highlight important features of the tool	8	CO1	Remember
2	Huge amount of sensor data is generated from different sourses which was unstructured in form. They moved to Hadoop framework for storing and analyzing data. What technology in Hadoop framework, they can use to analyse this unstructured data?	12	CO1	Remember
3	A client wants a database to be developed for his business. He is not sure of how many attributes are required for a particular table. He tells that number of attributes for every row may vary and he is also sure that he may need thousands of attributes for the said table. (i.e it will be a very big table). Which tool best fits for developing the clients requirement.	8	CO2	Understand
4	The Analyst wants to know what is the average number of views for each YouTube channel so that trending videos and channel can be analyzed. Help Analyst to outline the required insight using Mapreduce.	12	CO1	Apply

TARGET SET FOR COURSE OUTCOME ATTAINMENT:

Sl.no	C.O. No.	Course Outcomes	Threshold Set for the CO	Target set for attainment in percentage	Actual C.O. Attainment In Percentage *	Remarks on attainment &Measures to enhance the attainment *
	TABLE 8: TARGET SET FOR ATTAINMENT OF EACH CO and ATTAINMENT ANALYSIS AFTER RESULTS					
01	CO1	Apply Map-Reduce programming on the given datasets to extract required insights.	65	65%		

02	CO2	Employ appropriate Hadoop Ecosystem tools such as scoop, Hbase, Hive, to perform data analytics for a given problem.	65	65%		
03	CO3	Use Spark tool to analyze the given dataset for a given problem	60	60%		

ALDevdas

Signature of the course Instructor In-Charge (s)

APPROVAL:

This course has been duly verified Approved by the D.A.C.

Signature of the Chairperson D.A.C.

Name and signature of the Instructor In-Charge (s) AFTER completing entries in Table number 3 and 8 at end of semester:

Name and signature of the DAC Chairperson AFTER completing entries in Table number 3 and 8 at end of semester:

BLOOM'S TAXONOMY SAMPLE VERBS

Learning Outcomes Verbs at Each Bloom Taxonomy Level to be used for writing the course Outcomes.

TABLE 9: REFERENCE SAMPLES OF BLOOMS TAXONOMY VERBS		
Cognitive Level	Illustrative Verbs	Definitions
Knowledge	arrange, define, describe, duplicate, identify, label, list, match, memorize, name, order, outline, recognize, relate, recall, repeat, reproduce, select, state	remembering previously learned information
Comprehension	classify, convert, defend, discuss, distinguish, estimate, explain, express, extend, generalize, give example(s), identify, indicate, infer, locate, paraphrase, predict, recognize, rewrite, report, restate, review, select, summarize, translate	grasping the meaning of information
Application	apply, change, choose, compute, demonstrate, discover, dramatize, employ, illustrate, interpret, manipulate, modify, operate, practice, predict, prepare, produce, relate schedule, show, sketch, solve, use write	applying knowledge to actual situations
Analysis	analyze, appraise, breakdown, calculate, categorize, classify, compare, contrast, criticize, derive, diagram, differentiate, discriminate, distinguish, examine, experiment, identify, illustrate, infer, interpret, model, outline, point out, question, relate, select, separate, subdivide, test	breaking down objects or ideas into simpler parts and seeing how the parts relate and are organized
Synthesis	arrange, assemble, categorize, collect, combine, comply, compose, construct, create, design, develop, devise, explain, formulate, generate, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize, synthesize, tell, write	rearranging component ideas into a new whole
Evaluation	appraise, argue, assess, attach, choose, compare, conclude, contrast, defend, describe, discriminate, estimate, evaluate, explain, judge, justify, interpret, relate, predict, rate, select, summarize, support, value	making judgments based on internal evidence or external criteria