



Rajagiri School of Engineering & Technology, Autonomous

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**SEMESTER 7**

**PERIOD: SEPTEMBER 2023-**

**DECEMBER 2023**

**RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY**  
**Department of Information Technology, Programme: Information Technology**

**Vision**

To evolve into a centre of excellence in information technology by creation and exchange of knowledge through leading edge research, innovation and services, which will in turn contribute towards solving complex societal problems and thus building a peaceful and prosperous mankind.

**Mission**

To impart high quality technical education, research training, professionalism and strong ethical values in the young minds for ensuring their productive careers in industry and academia so as to work with a commitment to the betterment of mankind.

**Programme Educational Objectives (PEO)**

Graduates of Information Technology program shall

PEO 1: Have strong technical foundation for successful professional careers and to evolve as key-players/ entrepreneurs in the field of information technology.

PEO 2: Excel in analyzing, formulating and solving engineering problems to promote life-long learning, to develop applications, resulting in the betterment of the society.

PEO 3: Have leadership skills and awareness on professional ethics and codes.

**Programme Outcomes (PO)**

*Information Technology Program Students will be able to:*

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. 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.

PO3. 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.

PO4. 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.

PO5. 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.

PO6. 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.

PO7. 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.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO10. 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.

PO11. 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.

PO12. 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)

*Information Technology Program Students will be able to:*

PSO1: Acquire skills to design, analyze and develop algorithms and implement those using high-level programming languages.

PSO2: Contribute their engineering skills in computing and information engineering domains like network design and administration, database design and knowledge engineering.

PSO3: Develop strong skills in systematic planning, developing, testing, implementing and providing IT solutions for different domains which helps in the betterment of life.

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### 1. Assignment Schedule

SI No	Subject Code & Name	Faculty in-charge	Week
1	100004/IT700A DATA ANALYTICS	Dr. Neeba E A	WEEK 1
2	100004IT/701B MOBILE COMPUTING	Mathews Abraham	WEEK 2
3	100004/IT702B ARTIFICIAL INTELIGENCE	Ajith Jacob	WEEK 3
4	100908-CO700D INDUSTRIAL SAFETY ENGINEERING	Emi Elizabeth	WEEK 4
5	100004/IT700A DATA ANALYTICS	Dr. Neeba E A	WEEK 5
6	100004IT/701B MOBILE COMPUTING	Mathews Abraham	WEEK 6
7	100004/IT702B ARTIFICIAL INTELIGENCE	Ajith Jacob	WEEK 7
8	100908-CO700D INDUSTRIAL SAFETY ENGINEERING	Emi Elizabeth	WEEK 8
9	100004/IT700A DATA ANALYTICS	Dr. Neeba E A	WEEK 9
10	100004IT/701B MOBILE COMPUTING	Mathews Abraham	WEEK 10
11	100004/IT702B ARTIFICIAL INTELIGENCE	Ajith Jacob	WEEK 11
12	100908-CO700D INDUSTRIAL SAFETY ENGINEERING	Emi Elizabeth	WEEK 12



# DATA ANALYTICS

## 2.1 COURSE INFORMATION SHEET

PROGRAMME: Information Technology	DEGREE: BTECH
COURSE: Data Analytics	SEMESTER: S7 CREDITS: 4
COURSE CODE: 100004/IT700A REGULATION: 2020	COURSE TYPE: <b>CORE</b> /ELECTIVE <del>/BREADTH/S&amp;H</del>
COURSE AREA/DOMAIN: Data Mining	CONTACT HOURS: 4 hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): 100004/IT722S	LAB COURSE NAME: Data Analytics Lab

### SYLLABUS:

No	Topic	No. of Lectures
<b>1</b>	<b>Module1 : Introduction and statistics for data analytics</b>	<b>7 Hours</b>
1.1	Introduction and evolution of data analytics (Text1: 1.1, 1.1.2, 1.2)	1
1.2	Data Analytics Lifecycle (Text1: 2.1 -2.7)	1
1.3	Types of data analytics (descriptive, prescriptive, predictive, diagnostic) (Text2: 1)	1
1.4	Statistical Methods for Evaluation (Text1: 3.3)	2
1.5	Resampling (Text3: 2.6)	2
<b>2</b>	<b>Module 2: Big data, IoT, NoSQL technologies</b>	<b>8 Hours</b>
2.1	Introduction to big data-Definition, features and challenges (Text4:Ch.1)	1
2.2	Related Technologies-Cloud computing and IoT(Text4:Ch.2- 2.1,2.2)	1
2.3	Big data Generation and Acquisition(Text4:Ch.3 – 3.1,3.2)	1
2.4	Big data analysis - (Text4:Ch.5 - 5.2, 5.3, 5.4)	1
2.5	Big data applications (Text4:Ch.6 - 6.2)	1
2.6	NoSQL:introduction and need for NoSQL, column oriented stores, key-value stores, document databases and graph databases (Text5:Ch.1)	1
2.7	MongoDB features , database, collection, documents, data types,	1



	configuration, shell,(Text6:Ch.1, 2)	
2.8	Creating, updating, and deleting documents ,Querying (Text6:Ch.3,4)	1
<b>3</b>	<b>Module 3: Big data processing - Hadoop, Spark, Hive, Pig</b>	<b>8 Hours</b>
3.1	What is Hadoop, brief history of Hadoop, comparison with other systems (Text7:Ch.1)	1
3.2	MapReduce data flow, weather dataset example (Text7:Ch.2)	1
3.3	Hadoop Distributed File System (HDFS) concepts, basic commands, HDFS Java interface (Text7:Ch. 3)	1
3.4	HBase (Text7:Ch.17)	1
3.5	YARN, anatomy of a YARN application, scheduling (Text7:Ch. 4)	1
3.6	Pig Latin language, running an example, comparison with databases (Text7:Ch. 16)	1
3.7	Hive data warehousing, shell, running an example, Hive architecture, comparison with databases (Text7:Ch. 17)	1
3.8	Spark framework, example, anatomy of a SPARK job run (Text7:Ch.19)	1
<b>4</b>	<b>Module 4 : R programming for data analytics</b>	<b>7 Hours</b>
4.1	R programming: basics (Text8: Ch.1)	1
4.2	Data visualization with ggplot2 (Text8: Ch.1)	1
4.3	Data transformation with dplyr (Text8: Ch.3)	1
4.4	Exploratory data analysis in R (Text8: Ch.5)	1.5
4.5	Tidy data with tidyr (Text8: Ch.9)	1.5
4.6	Modelling (Text8: Ch. 18)	1
<b>5</b>	<b>Module 5 : Popular data analytics case studies</b>	<b>5 Hours</b>
5.1	Recommender system, types ( Text9: Ch.8)	1
5.2	Case study: Netflix Recommender system (Ref.7)	1
5.3	Social media analytics: current trends, tools (Text9: Ch.8)	1
5.4	Social media analytics for citizen-centric public services: a case study of a local government Facebook use (Ref.8)	1
5.5	Churn prediction (Text9: Ch.8)	1

	Uplift modelling Case study: Uplift Modeling for preventing student dropout in higher education (Ref.9)	
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**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. Wiley publishing (1 <sup>st</sup> ed.), 2015.
T	Thomas Erl, Wajid Khattak, and Paul Buhler. Big Data Fundamentals: Concepts, Drivers & Techniques. Prentice Hall Press, USA.(1st. ed.). 2016.
T	Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer- Verlag, Berlin, Heidelberg.(1st. ed.), 1999
T	Min Chen, Shiwen Mao, Yin Zhang, and Victor C. M. Leung. Big Data: Related Technologies, Challenges and Future Prospects. Springer Publishing Company, Incorporated.2014.
T	Shashank Tiwari. Professional NoSQL.Wrox Press Ltd., GBR. 2011.
T	Kristina Chodorow and Michael Dirolf. Mongo DB: The Definitive Guide. O'Reilly Media, Inc. (1st. ed.). 2010
T	Tom White. Hadoop: The Definitive Guide. O'Reilly Media, Inc.(4th. ed.). 2015.
T	Hadley Wickham and Garrett Grolemund. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data. O'Reilly Media, Inc.(1st. ed.). 2017.
T	Bart Baesens," Analytics in a Big Data World: The Essential Guide to Data Science and itsApplications", John Wiley & Sons, 2014.
R	Michael Minelli, Michele Chambers, and AmbigaDhiraj. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses. Wiley Publishing.(Wiley CIO) (1st. ed.). 2013.
R	Eelco Plugge, Tim Hawkins, and Peter Membrey. The Definitive Guide to MongoDB: The NoSQL Database for Cloud and Desktop Computing. Apress, USA. (1st. ed.). 2010.
R	Joe Celko. Joe Celko's Complete Guide to NoSQL: What Every SQL Professional Needs to Know about Non-Relational Databases. Morgan Kaufmann Publishers Inc., San Francisco, CA, USA. (1st. ed.). 2013.
R	Benjamin Bengfort and Jenny Kim. Data Analytics with Hadoop: An Introduction for Data Scientists. O'Reilly Media, Inc. (1st. ed.). 2016.

R	Brett Lantz. Machine Learning with R. Packt Publishing. (2nd. ed.). 2015
R	The R Manuals - <a href="https://cran.r-project.org/manuals.html">https://cran.r-project.org/manuals.html</a>
R	Carlos A. Gomez-Uribe and Neil Hunt. (2016). The Netflix Recommender System: Algorithms, Business Value, and Innovation. ACM Trans. Manage. Inf. Syst. 6, 4, Article 13 (January 2016), 19 pages. DOI: <a href="https://doi.org/10.1145/2843948">https://doi.org/10.1145/2843948</a>
R	Chicago Reddick, C., Chatfield, A., & Ojo, A. (2017). A social media text analytics framework for double-loop learning for citizen-centric public services: A case study of a local government Facebook use. Gov. Inf. Q., 34, 110-125
R	Diego Olaya, Jonathan Vásquez, Sebastián Maldonado, Jaime Miranda, outerVerbeke, Uplift Modeling for preventing student dropout in higher education, Decision Support Systems, Volume 134, 2020, 113320, ISSN 0167- 9236, <a href="https://doi.org/10.1016/j.dss.2020.113320">https://doi.org/10.1016/j.dss.2020.113320</a> .

### COURSE PRE-REQUISITES:

- ITT201 - Data Structures
- ITT 206 - Database Management Systems
- MAT 208 - Probability, Statistics and Advanced Graph theory
- ITT 306 - Data Science

### COURSE OUTCOMES:

CO No.	Course Outcome(CO)	Bloom's Category Level
CO 1	Describe the introductory concepts of data analytics; integrate statistical learning into data analytic processing and tools	Level 2: Understand
CO 2	Summarize the big data concepts, methods, tools and applications; explain the evolution of NoSQL with popular NoSQL products like MongoDB	Level 3: Apply
CO 3	Illustrate the ideas of distributed processing with Hadoop, MapReduce paradigm and related projects namely HBase, Spark, YARN, Hive and Pig	Level 2: Understand
CO 4	Experiment with R language to perform data exploration, wrangling and modelling	Level 3: Apply
CO 5	Analyze how big data techniques could be used in diverse application domains of real world	Level 4: Analyze

### Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO	PSO	PSO 3
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													1	2	
CO1	3	2	2	2	-	-	-	-	-	-	-	3	1	2	
CO2	2	3	3	2	3	-	-	-	-	-	-	3	1	2	1
CO3	2	2	2	2	3	-	-	-	-	-	-	3	2	1	1
CO4	2	3	3	3	3	2	-	-	-	-	2	3	1	1	1
CO5	2	3	3	3	-	3	3	-	-	-	2	3	1	1	1

3/2/1: high/medium/low

**JUSTIFICATION FOR CO-PO MAPPING**

MAPPING	LEVEL	JUSTIFICATION
ITT401.1-PO1	3	CO1, which emphasizes introductory concepts of data analytics, aligns well with the need for engineering knowledge outlined in PO1. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.1-PO2	2	CO1 involves introductory concepts, which may have some alignment with the need for problem analysis in PO2. However, the correlation is considered medium, as it may not cover all aspects of problem analysis in a broader engineering context.
ITT401.1-PO3	2	CO1 focuses on introductory concepts, which may have some alignment with the design and development of solutions in PO3. However, the correlation is considered medium, as it may not cover all aspects of design and development.
ITT401.1-PO4	2	CO1 involves introductory concepts, which may have some alignment with the need for conducting investigations of complex problems in PO4. However, the correlation is considered medium, as it may not cover all aspects of investigation.
ITT401.1-PO5	1	CO1 does not explicitly address modern tool usage, and thus, there is a low correlation with PO5, which emphasizes the use of appropriate techniques and tools. The correlation is low as these aspects are not directly covered in CO1.
ITT401.1-PO12	3	CO1, which emphasizes introductory concepts of data analytics, aligns well with Program Outcome 12 (PO12) – Lifelong Learning. The course content introduces foundational concepts and skills in data analytics, which serve as a basis for continuous learning and adaptation to technological changes.
ITT401.2-PO1	2	CO2 involves summarizing big data concepts and methods, which may have some alignment with the need for engineering knowledge outlined in PO1. However, the correlation is considered medium, as it may not cover all aspects of engineering knowledge

ITT401.2- PO2	3	CO2 aligns well with the need for problem analysis in PO2, as it involves summarizing big data concepts and methods. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.2- PO3	3	CO2 involves summarizing big data concepts and methods, which aligns with the design and development of solutions in PO3. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.2- PO4	2	CO2 summarizes big data concepts and methods, which may have some alignment with the need for conducting investigations of complex problems in PO4. However, the correlation is considered medium, as it may not cover all aspects of investigation.
ITT401.2- PO5	3	CO2, focusing on big data concepts and methods, aligns well with the need for modern tool usage in PO5. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.2- PO12	2	CO2, which involves summarizing big data concepts, methods, tools, and applications, has a medium correlation with Program Outcome 12 (PO12) – Lifelong Learning.
ITT401.3- PO1	2	CO3 involves distributed processing with Hadoop and related technologies, which may have some alignment with the need for engineering knowledge outlined in PO1. However, the correlation is considered medium, as it may not cover all aspects of engineering knowledge.
ITT401.3- PO2	2	CO3 focuses on distributed processing, which may have some alignment with the need for problem analysis in PO2. However, the correlation is considered medium, as it may not cover all aspects of problem analysis.
ITT401.3- PO3	2	CO3 aligns with the design and development of solutions in PO3, as it involves distributed processing with Hadoop and related projects. The correlation is considered medium, as it may not cover all aspects of design and development.
ITT401.3- PO4	2	CO3 involves distributed processing, which may have some alignment with the need for conducting investigations of complex problems in PO4. However, the correlation is considered medium, as it may not cover all aspects of the investigation.
ITT401.3- PO5	3	CO3, focusing on distributed processing and big data techniques, aligns well with the need for modern tool usage in PO5. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.3- PO12	1	CO3, which involves distributed processing with Hadoop and related projects, has a low correlation with Program Outcome 12 (PO12) – Lifelong Learning.

ITT401.4- PO1	2	CO4 involves experimenting with the R language for data exploration and modeling, which may have some alignment with the need for engineering knowledge outlined in PO1. However, the correlation is considered medium, as it may not cover all aspects of engineering knowledge.
ITT401.4- PO2	3	CO4 aligns well with the need for problem analysis in PO2, as it involves experimenting with data using the R language. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.4- PO3	3	CO4 involves experimenting with the R language, which aligns with the design and development of solutions in PO3. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.4- PO4	3	CO4, which focuses on experimenting with the R language for data exploration and modeling, aligns well with the need for conducting investigations of complex problems in PO4. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.4- PO5	3	CO4 aligns well with the need for modern tool usage in PO5, as it involves the application of the R language for data analysis. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.4- PO12	2	CO4, which involves experimenting with the R language for data exploration, wrangling, and modeling, has a medium correlation with Program Outcome 12 (PO12) – Lifelong Learning.
ITT401.5- PO1	2	CO5 focuses on analyzing how big data techniques could be used in diverse application domains, which may have some alignment with the need for engineering knowledge outlined in PO1. However, the correlation is considered medium, as it may not cover all aspects of engineering knowledge.
ITT401.5- PO2	3	CO5 aligns well with the need for problem analysis in PO2, as it involves analyzing big data techniques. The high correlation suggests a strong connection between the course content and the program outcome.
ITT401.5- PO3	3	CO5 involves analyzing big data techniques, aligning with the design and development of solutions in PO3. The high correlation suggests a strong connection between the course content and the program outcome.
IT401.5- PO4	3	CO5, focusing on analyzing big data techniques, aligns well with the need for conducting investigations of complex problems in PO4. The high correlation suggests a strong connection between the course content and the program outcome.
IT401.5- PO5	1	CO5, while focusing on big data techniques, does not explicitly address modern tool usage. Therefore, there is a low correlation with PO5, which

		emphasizes the use of appropriate techniques and tools.
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### JUSTIFICATION FOR CO-PSO MAPPING

MAPPING	LEVEL	JUSTIFICATION
IT404.1-PSO1	3	CO1, which involves describing introductory concepts of data analytics and integrating statistical learning, highly correlates with PSO1. This is justified as the course aligns well with the need for designing, analyzing, and developing algorithms, which is the focus of PSO1.
IT404.1-PSO2	1	There is a low correlation with PSO2, as CO1 does not directly address the contribution of engineering skills in computing and information engineering domains like network design and administration, covered by PSO2
IT404.1-PSO3	2	There is a medium correlation with PSO3, as CO1 contributes to systematic planning, developing, and providing IT solutions, aligning with the emphasis of PSO3.
IT404.2-PSO1	1	There is a low correlation with PSO1, as CO2, which focuses on summarizing big data concepts, may not directly align with designing, analyzing, and developing algorithms.
IT404.2-PSO2	2	There is a medium correlation with PSO2, as CO2 contributes to engineering skills in computing and information engineering domains, aligning with the focus of PSO2.
IT404.2-PSO3	1	There is a low correlation with PSO3, as CO2 may not directly address the systematic planning and testing aspects emphasized in PSO3.
IT404.3-PSO1	2	There is a low correlation with PSO3, as CO2 may not directly address the systematic planning and testing aspects emphasized in PSO3.
IT404.3-PSO2	1	There is a low correlation with PSO2, as CO3 may not directly contribute to network design and administration, covered in PSO2.
IT404.3-PSO3	1	There is a low correlation with PSO3, as CO3 may not fully align with the systematic planning and testing aspects emphasized in PSO3.
IT404.4-PSO1	1	There is a low correlation with PSO1, as CO4, involving experimenting with the R language, may not directly align with designing, analyzing, and developing algorithms.
IT404.4-PSO2	1	There is a low correlation with PSO2, as CO4 may not directly contribute to network design and administration, covered in PSO2.
IT404.4-PSO3	1	There is a low correlation with PSO3, as CO4 may not fully align with the systematic planning and testing aspects emphasized in PSO3.
IT404.5-PSO1	1	There is a low correlation with PSO1, as CO5, focusing on analyzing big data techniques, may not directly align with designing, analyzing, and developing algorithms.

IT404.5-PSO2	1	There is a low correlation with PSO2, as CO5 may not directly contribute to network design and administration, covered in PSO2.
IT404.5-PSO3	1	There is a low correlation with PSO3, as CO5 may not fully align with the systematic planning and testing aspects emphasized in PSO3.

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

SI NO	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
1	Spark MapReduce programming	Assignment	1, 2, 3, 4, 5, 6

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURE/NPTEL ETC

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

SI No:	DESCRIPTION	PO MAPPING
1	Big Data with Spark Streaming and Scala	1, 2, 3, 4, 5, 6

**WEB SOURCE REFERENCES:**

<a href="https://onlinecourses.nptel.ac.in/noc20_cs92/preview">https://onlinecourses.nptel.ac.in/noc20_cs92/preview</a>
<a href="https://www.coursera.org/learn/data-analysis-r?action=enroll&amp;adgroupid=139157158700&amp;adpostion=&amp;campaignid=17653505036&amp;creativeid=608115588139&amp;device=c&amp;devicemodel=&amp;hide_mobile_promo&amp;keyword=data+analysis+training+online&amp;matchtype=b&amp;network=g&amp;specialization=google-data-analytics&amp;utm_campaign=B2C_INDIA_google-data-analytics_google_FTCOF_professional-certificates_arte-agency_desktop&amp;utm_content=B2C&amp;utm_medium=sem&amp;utm_source=gg">https://www.coursera.org/learn/data-analysis-r?action=enroll&amp;adgroupid=139157158700&amp;adpostion=&amp;campaignid=17653505036&amp;creativeid=608115588139&amp;device=c&amp;devicemodel=&amp;hide_mobile_promo&amp;keyword=data+analysis+training+online&amp;matchtype=b&amp;network=g&amp;specialization=google-data-analytics&amp;utm_campaign=B2C_INDIA_google-data-analytics_google_FTCOF_professional-certificates_arte-agency_desktop&amp;utm_content=B2C&amp;utm_medium=sem&amp;utm_source=gg</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES
<input checked="" type="checkbox"/> LCD/SMART BOARDS	• STUD. SEMINARS	<input checked="" type="checkbox"/> ADD-ON COURSES

**ASSESSMENT METHODOLOGIES-DIRECT**



<input checked="" type="checkbox"/> ASSIGNMENTS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
• STUD. LAB PRACTICES	• STUD. VIVA	• MINI/MAJOR PROJECTS	<input checked="" type="checkbox"/> CERTIFICATIONS
• ADD-ON COURSES	• OTHERS		

STUDENT FEEDBACK ON FACULTY (TWICE)

ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)

**ASSESSMENT METHODOLOGIES-INDIRECT**

**Prepared By  
Faculty**

**Approved By  
HOD**

**Dr. Neeba E A**

**Dr. Neeba E A**

## 100004/IT700A - DATA ANALYTICS

### 2.2 Course Plan

No	Topic	No. of Lectures
<b>1</b>	<b>Module1: Introduction and statistics for data analytics</b>	<b>7 Hours</b>
1.1	Introduction and evolution of data analytics (Text1: 1.1, 1.1.2, 1.2)	1
1.2	Data Analytics Lifecycle (Text1: 2.1 -2.7)	1
1.3	Types of data analytics (descriptive, prescriptive, predictive, diagnostic) (Text2: 1)	1
1.4	Statistical Methods for Evaluation (Text1: 3.3)	2
1.5	Resampling (Text3: 2.6)	2

<b>2</b>	<b>Module 2: Big data, IoT, NoSQL technologies</b>	<b>8 Hours</b>
2.1	Introduction to big data-Definition, features and challenges (Text4:Ch.1)	1
2.2	Related Technologies-Cloud computing and IoT(Text4:Ch.2- 2.1,2.2)	1
2.3	Big data Generation and Acquisition(Text4:Ch.3 – 3.1,3.2)	1
2.4	Big data analysis - (Text4:Ch.5 - 5.2, 5.3, 5.4)	1
2.5	Big data applications (Text4:Ch.6 - 6.2)	1
2.6	NoSQL: introduction and need for NoSQL, column-oriented stores, key-value stores, document databases, and graph databases (Text5:Ch.1)	1
2.7	MongoDB features, database, collection, documents, data types, configuration, shell,(Text6:Ch.1, 2)	1
2.8	Creating, updating, and deleting documents,Querying (Text6:Ch.3,4)	1
<b>3</b>	<b>Module 3: Big data processing – Hadoop, Spark, Hive, Pig</b>	<b>8 Hours</b>
3.1	What is Hadoop, a brief history of Hadoop, comparison with other systems (Text7:Ch.1)	1
3.2	MapReduce data flow, weather dataset example (Text7:Ch.2)	1
3.3	Hadoop Distributed File System (HDFS) concepts, basic commands, HDFS Java interface (Text7:Ch. 3)	1
3.4	HBase (Text7:Ch.17)	1
3.5	YARN, anatomy of a YARN application, scheduling (Text7:Ch. 4)	1
3.6	Pig Latin language, running an example, comparison with databases (Text7:Ch. 16)	1
3.7	Hive data warehousing, shell, running an example, Hive architecture, comparison with databases (Text7:Ch. 17)	1
3.8	Spark framework, example, anatomy of a SPARK job run (Text7:Ch.19)	1
<b>4</b>	<b>Module 4 : R programming for data analytics</b>	<b>7 Hours</b>
4.1	R programming: basics (Text8: Ch.1)	1

4.2	Data visualization with ggplot2 (Text8: Ch.1)	1
4.3	Data transformation with dplyr (Text8: Ch.3)	1
4.4	Exploratory data analysis in R (Text8: Ch.5)	1.5
4.5	Tidy data with tidyr (Text8: Ch.9)	1.5
4.6	Modelling (Text8: Ch. 18)	1
<b>5</b>	<b>Module 5 : Popular data analytics case studies</b>	<b>5 Hours</b>
5.1	Recommender system, types ( Text9: Ch.8)	1
5.2	Case study: Netflix Recommender system (Ref.7)	1
5.3	Social media analytics: current trends, tools (Text9: Ch.8)	1
5.4	Social media analytics for citizen-centric public services: a case study of a local government Facebook use (Ref.8)	1
5.5	Churn prediction (Text9: Ch.8) Uplift modelling Case study: Uplift Modeling for preventing student dropout in higher education (Ref.9)	1

## 2.3 ASSIGNMENT

### ASSIGNMENT – 1

#### Section 1: Introduction to NoSQL

1. Define NoSQL databases. What are the primary reasons for the emergence of NoSQL databases, and in what scenarios are they more suitable than traditional relational databases?
2. Compare and contrast NoSQL databases with traditional relational databases. Discuss the key differences in terms of data models, scalability, and use cases.
3. Explain the four main categories of NoSQL databases: column-oriented stores, key-value stores, document databases, and graph databases. Provide examples of popular databases within each category.

#### Section 2: MongoDB Basics

1. What is MongoDB, and how does it fit into the NoSQL landscape? Describe its primary features and advantages.
2. Define the following MongoDB terms: database, collection, and document. How does the structure of MongoDB collections differ from tables in a traditional relational database?

3. Discuss the concept of data types in MongoDB. Provide examples of common data types used in MongoDB documents.

#### Section 3: MongoDB Configuration and Shell

1. Explain the importance of configuration in MongoDB. What are some key configuration options that can be customized to optimize a MongoDB deployment?
2. Describe the MongoDB shell and its role in interacting with the MongoDB database. How can you connect to a MongoDB server using the shell, and what are some common shell commands?

#### Section 4: Creating, Updating, and Deleting Documents

1. Walk through the process of creating a new document in a MongoDB collection using both the `insertOne()` and `insertMany()` methods. Provide code examples for each.
2. Discuss various methods for updating documents in MongoDB, including `updateOne()`, `updateMany()`, and the `update()` method. Explain the significance of the filter and update operations.
3. What are the considerations and potential pitfalls when deleting documents in MongoDB? Describe the differences between `deleteOne()` and `deleteMany()` methods and when to use each.

#### Section 5: Querying in MongoDB

1. Explain the importance of querying in MongoDB. How do you use the `find()` method to retrieve documents that match specific criteria? Provide examples of queries with different filter conditions.
2. Describe how to sort, limit, and skip results in MongoDB queries. What is the purpose of the `sort()`, `limit()`, and `skip()` methods, and when should they be used?
3. Discuss the concept of indexing in MongoDB. How can indexes be used to optimize query performance, and what types of indexes are available in MongoDB?

### **100004/IT700A - DATA ANALYTICS**

#### **ASSIGNMENT - 2**

#### Section 1: R Programming Basics

1. Write R code to create a vector containing the numbers from 1 to 10. Calculate the mean, median, and sum of this vector.
2. Create a function in R that accepts two arguments (a and b) and returns their sum, difference, product, and quotient. Test the function with sample values.
3. Create a simple R script to read a CSV file and display the first few rows of data. Include error handling to handle the case where the file may not exist.

#### Section 2: Data Visualization with ggplot2

1. Using `ggplot2`, create a bar plot to visualize the distribution of a categorical variable in a dataset of your choice. Customize the plot by adding labels and titles.

2. Generate a scatter plot with ggplot2 to explore the relationship between two numerical variables in a dataset. Include color-coded points to represent different categories.

#### Section 3: Data Transformation with dplyr

1. Load a dataset and use dplyr to filter and subset the data. Create a summary table displaying the mean and standard deviation of a numerical variable for each group in a categorical variable.
2. Apply the mutate function in dplyr to create a new variable by performing a mathematical operation on existing variables in the dataset.

#### Section 4: Exploratory Data Analysis in R

1. Perform exploratory data analysis on a dataset of your choice. Calculate and visualize summary statistics, such as mean, median, and standard deviation, for multiple variables.
2. Create a boxplot and histogram to visualize the distribution of a numerical variable. Include appropriate labels and titles on the plots.

#### Section 5: Tidy Data with tidyr

1. Load a messy dataset and use tidyr functions to reshape the data into a tidy format. Provide step-by-step instructions for the data transformation process.
2. Demonstrate how to pivot data from a wide format to a long format using the gather function in tidyr. Include before-and-after representations of the data.

#### Section 6: Modeling

1. Choose a dataset and split it into a training and testing set. Build a linear regression model using the training data and evaluate its performance on the testing data. Report the model's coefficients and metrics like R-squared and Mean Absolute Error.
2. Apply a classification algorithm (e.g., logistic regression or decision tree) to predict a binary outcome variable in your dataset. Assess the model's accuracy, precision, recall, and F1-score.

## 2.4 TUTORIAL

### TUTORIAL – 1

1. Discuss the stages involved in the data analytics lifecycle.
2. What are the primary methods for data collection in the context of the data analytics lifecycle?
3. Describe the significance of exploratory data analysis (EDA) in the data analytics process.
4. Compare and contrast descriptive, prescriptive, predictive, and diagnostic data analytics types.
5. Explore the statistical methods used for evaluating analytical models in data analytics.

6.What are the key resampling techniques and how are they applied in the field of data analytics?

## TUTORIAL – 2

1. Discuss the key features and historical development of Hadoop.
2. Compare Hadoop with other distributed systems.
3. Explain the MapReduce data flow, using a weather dataset.
4. Outline the concepts and basic commands related to.
5. Provide an introduction to HBase.
6. Explore the components and working of YARN, including the anatomy of a YARN application and scheduling.
13. Describe the Pig Latin language and run an example, also comparing it with traditional databases.

# MOBILE COMPUTING

### 3.1 COURSE INFORMATION SHEET

<b>PROGRAMME: INFORMATION TECHNOLOGY</b>	<b>DEGREE: BTECH</b>
<b>COURSE: MOBILE COMPUTING</b>	<b>SEMESTER: VII      CREDITS: 3</b>
COURSE CODE: 100004IT/701B	COURSE TYPE: CORE / <del>ELECTIVE</del> / BREADTH/ S&H
COURSE AREA/DOMAIN: <b>NETWORKING &amp; COMMUNICATION</b>	<b>CONTACT HOURS: 3+1 (Tutorial) hours/Week.</b>
CORRESPONDING LAB COURSE CODE (IF ANY):	LAB COURSE NAME:

**SYLLABUS:**

UNIT	DETAILS	HOURS
I	Introduction to mobile systems, Limitations of conventional system, Basic cellular mobile system- Analog and digital cellular systems, 1G, 2G, 3G, 4G and 5G cellular systems, Cellular radio system design- Frequency reuse, Co-channel interference. Medium access control- MAC, SDMA, FDMA, TDMA, CDMA, Handoffs and dropped calls- Initiation of handoff, Types of handoffs- Power difference, Mobile assisted, Cell-site, Intersystem.	7
II	Telecommunication systems: GSM, System architecture, Protocol, Localization and calling, GPRS- System architecture, Protocol architecture, DECT- System architecture, Protocol architecture, IMT-2000- Basic concepts and Objectives. Broadcast systems: Digital audio and video broadcasting. Satellite Systems: GEO, LEO, MEO.	7
III	Wireless systems: IEEE 802.11-Architecture, Physical and MAC layer, HIPERLAN1, HIPERLAN2, WATM, Bluetooth- Architecture, protocol stack.	7
IV	Mobile IP- Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and encapsulation, Optimizations. Dynamic Host Configuration Protocol (DHCP), Mobile Ad-hoc Networks (MANETs)- Features, Routing, Routing algorithms-DSDV, DSR, MANET Security issues.	7
V	Traditional TCP, Classical TCP improvements-Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP. Support for mobility - WWW, WAP.	7
<b>TOTAL HOURS</b>		<b>35</b>

**TEXT/REFERENCE BOOKS:**



T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Jochen Schiller, Mobile Communications, Second Edition, Pearson Education
T2	William Stallings, Wireless Communications and Networks, Pearson Education.
T3	Kaveh Pahlavan, Prasanth Krishnamoorthy, Principles of Wireless Networks, Pearson Education
R1	Behrouz A. Forouzan, Data Communications and Networking, 4/e, Tata McGraw Hill.
R2	C.K.Toh, AdHoc Mobile Wireless Networks-, First Edition Pearson Education.
R3	Shu Lin, Daniel J Costello, Error Control Coding Fundamentals and Applications: Prentice Hall Inc, 1983

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM
Nil			

**COURSE OBJECTIVE:**

1	To learn about the basic concepts of Mobile Computing.
2	To understand about networking concepts relevant to modern wireless systems.
3	To introduce emerging mobile computing ideas and best practices
4	To gain hands-on knowledge practice with mobile computing

**COURSE OUTCOMES:**

Sl.No.	CO. No.	DESCRIPTION	BLOOMS TAXONOMY LEVELS
1	100004IT/701B.1	Enables the students to <b>analyze</b> and <b>compare</b> the various wireless communication technologies.	Level 2,4
2	100004IT/701B.2	Enables the students to <b>visualize</b> the various important steps in GSM communication	Level 1
3	100004IT/701B.3	Enables the students to <b>analyze</b> the mobile IP and Transport Protocol.	Level 2
4	100004IT/701B.4	Enables the students to <b>examine</b> the important aspects of Mobile Adhoc Networks	Level 3
5	100004IT/701B.5	Enables the students to <b>apply</b> the knowledge gained to design and develop a mobile application	Level 3

**CO-PO MAPPING AND CO-PSO MAPPING**

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO															
100004IT/701 B.1	1	2	-	3	-	-	-	-	-	-	-	-	3	-	2
100004IT/701	-	1	-	2	-	-	-	-	-	-	-	-	3	-	1

B.2															
100004IT/701 B.3	-	2	-	2	-	-	-	-	-	-	-	-	3	-	1
100004IT/701 B.4	-	1	-	2	-	-	-	-	-	-	-	-	3	-	2
100004IT/701 B.5	2	1	-	-	3	-	-	-	-	-	-	-	3	1	2

**JUSTIFICATIONS FOR CO-PO MAPPING**

Mapping	Low/Medium/High	Justification
100004IT/701B.1- PO1	L	Applying the knowledge gained to understand the various wireless communication technologies
100004IT/701B.1- PO2	M	Analyzing the mobile computing technology to understand the challenges in the mobile computing environment
100004IT/701B.1- PO4	H	Understanding the concept of cellular wireless networks and how the different protocols work in mobile environment
100004IT/701B.2- PO2	L	Understanding the GSM System architecture and also the various functions involved in GPRS
100004IT/701B.2- PO4	M	Studies about the various routing techniques, frequency allocation ,method, handover and security mechanism in GSM
100004IT/701B.3- PO2	M	Understanding the Network layer and Transport layer protocols in mobile computing environment
100004IT/701B.3- PO4	M	Analyzing and comparing how the network layer and transport layer protocols function when operating in a mobile setting
100004IT/701B.4- PO2	M	Understanding the working, properties, applications and functions of Mobile Adhoc Networks
100004IT/701B.4- PO4	M	Studies about how routing protocols and algorithms work in Mobile Adhoc Networks and how security is attained
100004IT/701B.5- PO1	M	Understanding the Wireless Application Protocol and how all the different layers behave
100004IT/701B.5- PO2	L	They could apply the knowledge acquired on developing various mobile application using Android
100004IT/701B.5- PO5	H	Developing an M-Commerce application using various tools available

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
1	Designing and developing programs that implements various protocols	PO3, PO4, PO5	Lab Session

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

Sl. No	DESCRIPTION	Mapping to P O
1	Implementation/ simulation of the protocols	PO3, PO4, PO5

**WEB SOURCE REFERENCES:**

1	<a href="http://en.wikipedia.org/wiki/">en.wikipedia.org/wiki/</a>
2	<a href="https://www.cise.ufl.edu/class/cen5531fa06/notes/intro-mobilecomputing.pdf">https://www.cise.ufl.edu/class/cen5531fa06/notes/intro-mobilecomputing.pdf</a>
3	<a href="https://pdfs.semanticscholar.org/presentation/3988/08c5f21b28fad6075e22dc080d9e45b7fe6f.pdf">https://pdfs.semanticscholar.org/presentation/3988/08c5f21b28fad6075e22dc080d9e45b7fe6f.pdf</a>
4	<a href="https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf">https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf</a>
5	<a href="https://disco.ethz.ch/courses/ss04/mobicomp/lecture/6/Chapter6MobileIPandTCP4Slides.pdf">https://disco.ethz.ch/courses/ss04/mobicomp/lecture/6/Chapter6MobileIPandTCP4Slides.pdf</a>
6	<a href="http://user.it.uu.se/~erikn/files/DK2-adhoc.pdf">http://user.it.uu.se/~erikn/files/DK2-adhoc.pdf</a>
7	<a href="https://www.cs.cmu.edu/~bam/uicourse/830spring09/BFeiginMobileApplicationDevelopment.pdf">https://www.cs.cmu.edu/~bam/uicourse/830spring09/BFeiginMobileApplicationDevelopment.pdf</a>
8	<a href="https://www.harding.edu/fmccown/android/android-workshop-2011.pdf">https://www.harding.edu/fmccown/android/android-workshop-2011.pdf</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

• CHALK & TALK	• STUD. ASSIGNMENT	• WEB RESOURCES
• LCD/SMART BOARDS	• STUD. SEMINARS	ADD-ON COURSES

**ASSESSMENT METHODOLOGIES-DIRECT**

• ASSIGNMENTS	STUD. SEMINARS	• TESTS/MODEL EXAMS	• UNIV. EXAMINATION
• STUD. LAB PRACTICES	STUD. VIVA	MINI/MAJOR PROJECTS	CERTIFICATIONS
ADD-ON COURSES	OTHERS		

**ASSESSMENT METHODOLOGIES-INDIRECT**

• ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	• STUDENT FEEDBACK ON FACULTY (ONCE)
ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	OTHERS

**Prepared by**  
**Mathews Abrham**

**Approved by**  
**Dr.Neeba E A**  
**(H.O.D)**

### 3.2 Course Plan

Sl No	Day	Module	Topic
1	Day 1	1	Introduction
2	Day 2	1	Issues in mobile computing
3	Day 3	1	Wireless Communication Technologies- Cellular Wireless networks ,Wireless(802.11), TCP/IP in the mobile setting
4	Day 4	1	Geolocation and Global Positioning System (GPS) Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision
5	Day 5	1	IMT 2000
6	Day 6	1	Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000
7	Day 7	1	Quality of services in 3G
8	Day 8	2	GSM- System Architecture-Protocols
9	Day 9	2	Connection Establishment-Frequency Allocation
10	Day 10	2	Routing-Handover-Security
11	Day 11	2	GPS Security, GPRS
12	Day 12	3	Mobile Network Layer : Mobile IP
13	Day 13	3	Mobile Ip

14	Day 14	3	Mobile IP
15	Day 15	3	DHCP
16	Day 16	4	Mobile Transport Layer : Traditional TCP, Indirect TCP
17	Day 17	4	Snooping TCP, Mobile TCP
18	Day 18	4	Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission
19	Day 19	4	Transaction oriented TCP
20	Day 20	5	Mobile Adhoc Networks (MANETs): Overview
21	Day 21	5	Properties of a MANET, spectrum of MANET applications, routing
22	Day 22	5	Routing and various routing algorithms
23	Day 23	5	Security in MANETs
24	Day 24	5	security in MANETs
25	Day 25	6	Protocols and Tools : Wireless Application Protocol-WAP
26	Day 26	6	WAP
27	Day 27	6	WAP
28	Day 28	6	Mobile Application Development(Android) M-commerce
29	Day 29	6	Mobile Application Development(Android) M-commerce
30	Day 30	6	Mobile Application Development(Android) M-commerce
31	Day 31	6	App development
32	Day 32	6	App development
33	Day	6	App development

### 3.3 ASSIGNMENT

**ASSIGNMENT 1** submission date (12/10/2023)

1. Explain the following.
  1. Broadcast Systems
  2. Cyclical repetition of data
  3. Digital audio broadcasting
  4. Digital video broadcasting
  5. DVB data broadcasting
  6. Convergence of broadcasting and mobile communications

**ASSIGNMENT 2** submission date (25/11/2023)

1. Encapsulation and DE encapsulation in Mobile ip.
2. Ip-in Ip encapsulation
3. Minimal encapsulation
4. GRE encapsulation

### 3.4 Tutorial Questions

1. Android System Architecture
2. Different types of Mobile Operating Systems

# ARTIFICIAL INTELLIGENCE

### 4.1 COURSE INFORMATION SHEET

PROGRAMME: Information Technology	DEGREE: BTECH
COURSE: Artificial Intelligence	SEMESTER: S7 CREDITS: 3(3L)
COURSE CODE: 100004/IT702B REGULATION: 2021	COURSE TYPE: ELECTIVE
COURSE AREA/DOMAIN: Artificial Intelligence	CONTACT HOURS: 4hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY):	LAB COURSE NAME:

#### SYLLABUS:

<b>Module 1: OVERVIEW OF ARTIFICIAL INTELLIGENCE</b>	
<p><b>Introduction:</b> Artificial Intelligence, Agents- Environments and its types, AI Application areas. Problems, Problem space, Problem characteristics, Production systems. Search algorithm terminologies, Example problems – toy and real world, uninformed searches.</p>	
<b>Module 2: INFORMED SEARCH</b>	
<p><b>Informed Search:</b> Generate and Test, Best First Search, Heuristics Search, A*, Problem reduction, AO*, Constraint Satisfaction problems, Hill climbing, Simulated annealing.  <b>Adversarial Search:</b> Min-max search, Alpha beta cut-offs.</p>	
<b>Module 3: KNOWLEDGE REPRESENTATION</b>	
<p><b>Knowledge Representation:</b> Types of Knowledge, Knowledge based system and reasoning, frames, and semantic nets. <b>Logic and Inferences:</b> Propositional logic (PL) and Predicate Logic (FOPL), Inference rules, Conversion to clausal form, Unification, Forward &amp; backward Chaining, Resolution refutation proof for PL and FOPL.</p>	
<b>Module 4: LEARNING AND REASONING</b>	
<p><b>Learning:</b> Rote learning, Learning by Taking Advice, Learning in Problem-solving, Learning from example: induction, Explanation-based learning. Inductive Learning, Winston learning program, Version space, Candidate elimination algorithm, Decision tree.  <b>Reasoning in uncertain environments:</b> Probabilistic reasoning, Bayes theorem.</p>	
<b>Module 5: NEURAL NETWORK AND EXPERT SYSTEM</b>	
<p><b>Neural Network:</b> Basics of Neural Network, Back Propagation, Applications of Neural Networks, Natural Language Processing.  <b>Expert system (ES) :</b> Components of Expert System, Expert System Technology, Stages in the development of an Expert System, Expert System Tools, Benefits and Application of Expert Systems.</p>	
<b>TOTAL HOURS</b>	<b>60</b>



**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	1. E Rich, K Knight, Artificial Intelligence, 3/e, Tata McGraw Hil, 2009.
T	2. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach , 3 <sup>rd</sup> Edition, Prentice Hall, 2010
T	3. George.F.Luger, Artificial Intelligence- Structures and Strategies for Complex Problem Solving, 4/e, Pearson Education. 2002.
T	1. Peter Norvig, Paradigms of Artificial Intelligence Programming Case Studies inCommon Lisp, Elsevier Science, 2014
T	2. Ivan Bratko, Prolog: Programming for Artificial Intelligence, 3/E, Pearson Education, 2001
T	3. D. Poole and A. Mackworth. Artificial Intelligence: Foundations of ComputationalAgents, Cambridge University Press, 2010 Available online: <a href="http://artint.info/">http://artint.info/</a>
T	4. Dan W Patterson, Introduction to Artificial Intelligence,Pearson,2009
T	5. Deepak Khemeni, A First course in Artificial Intelligence,Tata McGraw Hill,2013
T	6. Maja J. Mataric ,Robotics Primer,MIT press,2007
R	7. Patrick Henry Winston, Artificial intelligence, Addison wessley,1992
R	8. Stefan Edelkamp, Stefan Schroedl, Heuristic Search: Theory and Applications, Morgan Kaufman, 2011

**COURSE PRE-REQUISITES:**

Basic Programming in Python, Data Structures

**Preamble:** This course will deal with the fundamentals of Artificial Intelligence including the various search techniques, knowledge representation, reasoning, planning and learning. The course also offers a working knowledge of PROLOG and LISP used for developing solutions to AI problems.

**COURSE OUTCOMES:**

**Students will be able to:**

CO No.	Course Outcome (CO)	Bloom's Category Level
CO 1	Discuss the fundamental foundations of artificial intelligence (AI) and familiarize with the search terminologies and uninformed search.	Level 2: Understand
CO 2	Demonstrate various informed search methods to solve AI application problems.	Level 3: Apply
CO 3	Illustrate the concepts of knowledge representation through logics, inference rules and deduce solutions using the principle of resolution.	Level 3: Apply

CO 4	Explain the concept of learning and explore uncertainty with probabilistic reasoning.	Level 3: Apply
CO 5	Describe the basics of neural network and the concepts of expert systems.	Level 2: Understand

**CO MAPPING WITH PO, PSO**

CO No.	Programme Outcomes (POs)												Programme-Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	1	2	2	2	1									
CO 2	3	2	3	2	2	1									
CO 3	3	2	3	2	2	1									2
CO 4	3	2	3	2	2	1									
CO 5	3	2	3	2	2	1									2
<b>100008/IT500D</b>															

**JUSTIFICATION FOR CO-PO-PSO CORRELATION:  
JUSTIFICATION FOR CO-PO MAPPING**

MAPPING	LEVEL	JUSTIFICATION
100008/IT500D.1-PO1	1	Fundamental understanding of the history of artificial intelligence (AI) and its foundations and appreciate the scope and limits of AI applies the knowledge of engineering .
100008/IT500D.1-PO2	1	Fundamental understanding of the history of artificial intelligence (AI) and its foundations and appreciate the scope and limits of AI identifies complex engineering problems reaching substantiated conclusions using engineering sciences.
100008/IT500D.1-PO3	2	Fundamental understanding of the history of artificial intelligence (AI) and its foundations and appreciate the scope and limits of AI designs solutions for complex engineering problems.
100008/IT500D.1-	2	Fundamental understanding of the history of artificial intelligence (AI)

PO4		and its foundations and appreciate the scope and limits of AI uses research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
100008/IT500D.1-PO5	2	Fundamental understanding of the history of artificial intelligence (AI) and its foundations and appreciate the scope and limits of AI creates appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
100008/IT500D.1-PO6	1	Fundamental understanding of the history of artificial intelligence (AI) and its foundations and appreciate the scope and limits of AI applies reasoning informed by the contextual knowledge to assess societal, health issues and the consequent responsibilities relevant to the professional engineering practice.
100008/IT500D.2-PO1	3	Understanding various search algorithms (uninformed, heuristic, game search and constraint satisfaction) for problem solving applies the knowledge of engineering
100008/IT500D.2-PO2	2	Comparing various search algorithms (uninformed, heuristic, game search and constraint satisfaction) for problem solving identifies complex engineering problems reaching substantiated conclusions using engineering sciences.
100008/IT500D.2-PO3	3	Applying various search algorithms (uninformed, heuristic, game search and constraint satisfaction) for problem solving designs solutions for complex engineering problems.
100008/IT500D.2-PO4	2	Applying various search algorithms (uninformed, heuristic, game search and constraint satisfaction) for problem solving uses research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
100008/IT500D.2-PO5	2	Applying various search algorithms (uninformed, heuristic, game search and constraint satisfaction) for problem solving creates appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
100008/IT500D.2-PO6	1	Applying various search algorithms (uninformed, heuristic, game search and constraint satisfaction) for problem solving applies reasoning informed by the contextual knowledge to assess societal, health issues and the consequent responsibilities relevant to the professional

		engineering practice.
100008/IT500D.3-PO1	3	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs applies the knowledge of engineering
100008/IT500D.3-PO2	2	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs identifies complex engineering problems reaching substantiated conclusions using engineering sciences.
100008/IT500D.3-PO3	3	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs designs solutions for complex engineering problems.
100008/IT500D.3-PO4	2	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs uses research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
100008/IT500D.3-PO5	2	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs creates appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
100008/IT500D.3-PO6	1	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs applies reasoning informed by the contextual knowledge to assess societal, health issues and the consequent responsibilities relevant to the professional engineering practice.
100008/IT500D.4-PO1	3	Understanding the fundamentals of knowledge representation, inference, reasoning and planning applies the knowledge of engineering
100008/IT500D.4-PO2	2	Understanding the fundamentals of knowledge representation, inference, reasoning and planning identifies complex engineering problems reaching substantiated conclusions using engineering sciences.
100008/IT500D.4-PO3	3	Understanding the fundamentals of knowledge representation, inference, reasoning and planning designs solutions for complex engineering problems.
100008/IT500D.4-PO4	2	Understanding the fundamentals of knowledge representation, inference, reasoning and planning uses research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

100008/IT500D.4-PO5	2	Understanding the fundamentals of knowledge representation, inference, reasoning and planning creates appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
100008/IT500D.4-PO6	1	Understanding the fundamentals of knowledge representation, inference, reasoning and planning applies reasoning informed by the contextual knowledge to assess societal, health issues and the consequent responsibilities relevant to the professional engineering practice.
100008/IT500D.5-PO1	3	Understanding various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and genetic algorithms applies the knowledge of engineering
100008/IT500D.5-PO2	2	Understanding various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and genetic algorithms identifies complex engineering problems reaching substantiated conclusions using engineering sciences.
100008/IT500D.5-PO3	3	Understanding various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and genetic algorithms designs solutions for complex engineering problems.
100008/IT500D.5-PO4	2	Applying various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and genetic algorithms uses research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
100008/IT500D.5-PO5	2	Applying various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and genetic algorithms creates appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
100008/IT500D.5-PO6	1	Applying various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and genetic algorithms applies reasoning informed by the contextual knowledge to assess societal, health issues and the consequent responsibilities relevant to the professional engineering practice.

### JUSTIFICATION FOR CO-PSO MAPPING

MAPPING	LEVEL	JUSTIFICATION
100008/IT500D.3-PSO3	2	Demonstrating working knowledge in PROLOG and LISP to write simple PROLOG and LISP programs and be able to explore more sophisticated programs <i>develop strong skills in providing IT solutions for different domains which helps in the betterment of life.</i>
100008/IT500D.5-PSO3	2	Applying various learning techniques like decision trees, explanation-based learning and reinforcement learning and have a basic knowledge about expert systems and <i>genetic algorithms develop strong skills in providing IT solutions for different domains which helps in the betterment of life.</i>

### TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

S No:	DESCRIPTION	PO MAPPING
1	Unification algorithm	1, 2, 3, 4, 5, 6

### DESIGN AND ANALYSIS TOPICS:

Sl. No.	DESCRIPTION	PO MAPPING
1	Game implementations	1, 2, 3, 4, 5, 12

### WEB SOURCE REFERENCES:

1	<a href="https://nptel.ac.in/courses/106105077">https://nptel.ac.in/courses/106105077</a>
2	<a href="https://onlinecourses.nptel.ac.in/noc22_cs56/preview">https://onlinecourses.nptel.ac.in/noc22_cs56/preview</a>
3	<a href="https://nptel.ac.in/courses/106105078">https://nptel.ac.in/courses/106105078</a>
4	<a href="https://onlinecourses.nptel.ac.in/noc22_ge29/preview">https://onlinecourses.nptel.ac.in/noc22_ge29/preview</a>
	<a href="https://onlinecourses.nptel.ac.in/noc22_cs83/preview">https://onlinecourses.nptel.ac.in/noc22_cs83/preview</a>

### DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input type="checkbox"/> WEB RESOURCES	<input type="checkbox"/> STUD. LAB PRACTICES
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<input checked="" type="checkbox"/> LCD/SMART BOARDS	<input type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> ADD-ON COURSES	
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**ASSESSMENT METHODOLOGIES-DIRECT**

<input checked="" type="checkbox"/> ASSIGNMENTS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

**ASSESSMENT METHODOLOGIES-INDIRECT**

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

**Prepared by**
**Ajith Jacob**
**Approved by**
**Dr. Neeba E.A**
**(Faculty in Charge)**
**4.2 Course Plan**

No	Topic	No. of Lectures
<b>1</b>	<b>Module1 - Overview of Artificial Intelligence</b>	
1.1	Artificial Intelligence, Agents- Environments and its types, AI Application areas	1
1.2	Problems, Problem space, Problem characteristics	1
1.3	Production systems	1
1.4	Search algorithm terminologies	1
1.5	Example problems - Toy and real world	1
1.6	Uninformed searches	1
1.7	Continue - Uninformed searches and comparison	1

<b>2</b>	<b>Module 2 - Informed Search</b>	
2.1	Informed Search, Generate and Test, Best First Search	1
2.2	Heuristics Search, A*	1
2.3	Problem reduction	1
2.4	Constraint Satisfaction problems	1
2.5	Hill climbing its types	1
2.6	Simulated annealing, Min-max search	1
2.7	Alpha beta cut-offs	1
<b>3</b>	<b>Module 3 - Knowledge Representation</b>	
3.1	Knowledge Representation, Types of Knowledge, Knowledge based system and reasoning	1
3.2	Frames, and semantic nets	1
3.3	Propositional logic (PL)	1
3.4	Predicate Logic (FOPL), Inference rules	1
3.5	Conversion to clausal form	1
3.6	Unification, Forward & backward Chaining	1
3.7	Resolution refutation proof for PL and FOPL	1
<b>4</b>	<b>Module 4 - Learning and Reasoning</b>	
4.1	Rote learning, Learning by Taking Advice	1
4.2	Learning in Problem-solving, Learning from example: induction	1
4.3	Explanation-based learning	1
4.4	Inductive Learning, Winston learning program, Version space	1
4.5	Candidate elimination algorithm	1



4.6	Decision tree	1
4.7	Probabilistic reasoning, Bayes theorem.	1
<b>5</b>	<b>Module 5 - Neural Network and Expert System (ES)</b>	
5.1	Basics of Neural Network, Applications of Neural Networks	1
5.2	Back Propagation	1
5.3	Natural Language Processing	1
5.4	Expert system, Components of Expert System, Expert System Technology	1
5.5	Stages in the development of an Expert System	1
5.6	Expert System Tool	1
5.7	Benefits and Application of Expert Systems.	1

#### 4.3 ASSIGNMENT

##### ASSIGNMENT QUESTIONS

1. Explain Problem Reduction with examples
2. Explain Winston Learning program with examples

##### ASSIGNMENT 2 QUESTIONS

3. Explain Problem Reduction with examples
4. Explain Winston Learning program with examples.

#### 4.4 TUTORIAL QUESTIONS

1. Write initial state, goal state, set of rules and solution search tree for the 8-puzzle problem.
2. Write initial state, goal state, set of rules and solution search tree for Tower of Hanoi problem.
3. Write initial state, goal state, set of rules and solution search tree for travelling salesman problem
4. Write initial state, goal state, set of rules and solution search tree for 8-Queen problem
5.
  - John likes all kinds of food.
  - Apples are food.
  - Chicken is food.
  - Anything anyone eats and isn't killed by is food.
  - Bill eats peanuts and is still alive.
  - Sue eats everything Bill eats.

- a) Translate these sentences into formulas in predicate language. b) Prove that John like peanuts using forward chaining.  
c) Prove that John like peanuts using Backward chaining.

6.

- Steve only likes easy courses
- Science courses are hard
- All the courses in the basket weaving department are easy • BK301 is a basket weaving course

a) Translate these sentences into formulas in predicate language.

b) Prove that Steve like Basket weaving course using forward chaining.

c) Prove that Steve like Basket weaving course using Backward chaining.

7. Q3.

1. Marcus was a man.
2. Marcus was a Pompeian.
3. Marcus was born in 40 A.D.
4. All men are mortal.
5. All Pompeians died when the volcano erupted in 79 A.D.
6. No mortal lives longer than 150 years.
7. It is now 1991 A.D.

a) Translate these sentences into formulas in predicate language.

b) Apply backward chaining and prove “Marcus not alive now”.

c) Apply forward chaining and prove “Marcus not alive now”.



Rajagiri School of Engineering & Technology, Autonomous

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# INDUSTRIAL SAFETY ENGINEERING

### 5.1 COURSE INFORMATION SHEET

<b>PROGRAMME:</b> ME/ECE/CSE/AEI/IT/EEE/CE/AD	<b>DEGREE: BTECH</b> <b>UNIVERSITY: RSET(Autonomous)</b>
<b>COURSE:</b> INDUSTRIAL SAFETY ENGINEERING	<b>SEMESTER:</b> VII <b>CREDITS:</b> 0
<b>COURSE CODE:</b> 100908-CO700D <b>REGULATION:</b> 2020	<b>COURSE TYPE:</b> NON CREDIT MANDATORY
<b>COURSE AREA/DOMAIN:</b> Production, Industrial Engineering and Management	<b>CONTACT HOURS:</b> 2 (Lecture) + 1 (Tutorial) hours/week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b> NA	<b>LAB COURSE NAME:</b> NA

#### SYLLABUS:

UNI T	DETAILS	HOURS
I	Need for safety. Safety and productivity. Definitions: Accident, Injury, Unsafe act, Unsafe Condition, Dangerous Occurrence, Reportable accidents. Theories of accident causation. Safety organization- objectives, types, functions, Role of management, supervisors, workmen, unions, government and voluntary agencies in safety. Safety policy. Safety Officer-responsibilities, authority. Safety committee-need, types, advantages.	5
II	Personal protection in the work environment, Types of PPEs, Personal protective equipment- respiratory and non-respiratory equipment. Standards related to PPEs. Monitoring Safety Performance: Frequency rate, severity rate, incidence rate, activity rate. Housekeeping: Responsibility of management and employees. Advantages of good housekeeping. 5 s of housekeeping. Work permit system- objectives, hot work and cold work permits. Typical industrial models and methodology. Entry into confined spaces.	7

<b>III</b>	Introduction to construction industry and safety issues in construction Safety in various construction operations – Excavation and filling – Under-water works – Under-pinning & Shoring – Ladders & Scaffolds – Tunnelling – Blasting – Demolition – Confined space – Temporary Structures. Familiarization with relevant Indian Standards and the National Building Code provisions on construction safety. Relevance of ergonomics in construction safety. Ergonomics Hazards - Musculoskeletal Disorders and Cumulative Trauma Disorders.	7
<b>IV</b>	Machinery safeguard-Point-of-Operation, Principle of machine guarding -types of guards and devices. Safety in turning, and grinding. Welding and Cutting-Safety Precautions of Gas welding and Arc Welding. Material Handling-Classification-safety consideration- manual and mechanical	8

	handling. Handling assessments and techniques- lifting, carrying, pulling, pushing, palletizing and stocking. Material Handling equipment-operation & maintenance. Maintenance of common elements-wire rope, chains slings, hooks, clamps. Hearing Conservation Program in Production industries.	
<b>V</b>	Hazard and risk, Types of hazards –Classification of Fire, Types of Fire extinguishers, fireexplosion and toxic gas release, Structure of hazard identification and risk assessment. Identification of hazards: Inventory analysis, Fire and explosion hazard rating of process plants- The Dow Fire and Explosion Hazard Index, Preliminary hazard analysis, Hazard and Operability study (HAZOP)) – methodology, criticality analysis, corrective action and follow-up. Control of Chemical Hazards, Hazardous properties of chemicals, Material Safety Data Sheets (MSDS).	8
<b>TOTAL HOURS</b>		<b>35</b>

**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
<b>T1</b>	R.K Jain (2000) Industrial Safety, Health and Environment management systems, Khanna Publications.
<b>T2</b>	Paul S V (2000), Safety management System and Documentation training Programme handbook, CBS Publication.
<b>T3</b>	Krishnan, N.V. (1997). Safety management in Industry. Jaico Publishing House, New Delhi.

<b>T4</b>	John V. Grimaldi and Rollin H. Simonds. (1989) Safety management. All India Traveller Book Seller, Delhi.
<b>R1</b>	Ronald P. Blake. (1973). Industrial safety. Prentice Hall, New Delhi.
<b>R2</b>	Alan Waring. (1996). Safety management system. Chapman & Hall, England.
<b>R3</b>	Vaid, K.N., (1988). Construction safety management. National Institute of Construction Management and Research, Mumbai.
<b>R4</b>	AICHe/CCPS. (1992). Guidelines for Hazard Evaluation Procedures. (second edition). Centre for Chemical Process Safety, American Institute of Chemical Engineers, New York.

**COURSE PRE-REQUISITES: Not Applicable**

**COURSE OBJECTIVES:**

**COURSE OUTCOMES:**

<b>SL NO</b>	<b>DESCRIPTION</b>	<b>Bloom's Taxonomy Level</b>
<b>100908-CO700D.1</b>	Describe the theories of accident causation and preventive measures of industrial accidents.	Understand (level 2)
<b>100908-CO700D.2</b>	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping.	Understand (level 2)
<b>100908-CO700D.3</b>	Explain different issues in construction industries	Understand (level 2)
<b>100908-CO700D.4</b>	Describe various hazards associated with different machines and mechanical material handling.	Understand (level 2)
<b>100908-CO700D.5</b>	Utilize different hazard identification tools in different industries with the knowledge of different types of chemical hazards.	Apply (level 3)

**CO-PO AND CO-PSO MAPPING**

SL NO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 1	PS 2	PS 3
100908-CO700 D.1	2	2				2	2	2				1	-	-	-
100908-CO700 D.2	2	1	2		1	1	1	1				1	-	-	-
100908-CO700 D.3	2	2	2		1	1	1	1	1	1		1	-	-	-
100908-CO700 D.4	2	2	2		1	1	1	1	1	1		1	-	-	-
100908-CO700 D.5	2	2	2	1	1	1	1	1	1	1		1	-	-	-
100908-CO700 D (Avg.)	2	1.8	2	1	1	1.2	1.2	1.2	1	1	-	1	-	-	-

### JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/ MEDIUM/ HIGH	JUSTIFICATION
100908-CO700 OD.1- PO1	M	Students understand the importance of safety in industries and apply their basic engineering fundamentals to avoid accidents
100908-CO700 OD.1-PO2	M	Using first principle of engineering sciences they are capable of identifying problems in workplaces and to create safety awareness among others

<b>100908-CO70 0D.1-PO6</b>	M	Students are aware of the professional engineering practise regarding health safety and legal issues of society
<b>100908-CO70 0D.1-PO7</b>	M	Students understand the impact of engineering solutions towards the safety and health issues of society and the need of sustainable systems to avoid accidents and health issues in industry.
<b>100908-CO70 0D.1-PO8</b>	M	Importance of professional ethics is conveyed to students. They are aware of promoting the importance of safety to co-workers and can give instructions and motivate them.
<b>100908-CO70 0D.1-PO12</b>	L	They are aware of the need of lifelong learning and research in the area of industrial safety.
<b>100908-CO70 0D.2-PO1</b>	M	Students understand the importance of PPE, their selection and importance of proper housekeeping in industries.
<b>100908-CO70 0D.2-PO2</b>	L	Using first principle of engineering sciences they are capable of identifying problems in workplaces and to select proper safety kits for avoiding accidents.
<b>100908-CO70 0D.2-PO3</b>	M	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-CO70 0D.2-PO5</b>	L	Students understand the usage of new methodologies and safety measures in industries to avoid accidents.
<b>100908-CO70 0D.2-PO6</b>	L	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-CO70</b>	L	Students understand the impact of engineering solutions towards the safety and health issues of society and the need of sustainable systems to avoid accidents and health issues in



<b>0D.2-P07</b>		industry.
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<b>100908-C070 0D.2-P08</b>	L	Importance of professional ethics is conveyed to students. They are aware of promoting the importance of safety to co-workers and can give instructions and motivate them.
<b>100908-C070 0D.2-P012</b>	L	They are aware of the need of lifelong learning and research in the area of industrial safety.
<b>100908-C070 0D.2-P01</b>	M	Students understand the importance of safety in construction sites and apply their basic engineering fundamentals to avoid accidents
<b>100908-C070 0D.3-P02</b>	M	Using first principle of engineering sciences they are capable of identifying problems in construction sites and to create safety awareness among others
<b>100908-C070 0D.3-P03</b>	M	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-C070 0D.3-P05</b>	L	Students understand the usage of new methodologies, tools and safety measures in construction sites to avoid accidents.
<b>100908-C070 0D.3-P06</b>	L	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-C070 0D.3-P07</b>	L	Students understand the impact of engineering solutions towards the safety and health issues of society and the need of sustainable systems to avoid accidents and health issues in construction sites.

<b>100908-CO70 0D.3-PO8</b>	L	Importance of professional ethics is conveyed to students. They are aware of promoting the importance of safety to co-workers and can give instructions and motivate them.
<b>100908-CO70 0D.3-PO9</b>	L	They are aware of the importance of creating a team working safely and executing projects carefully without accidents in an industry. Thereby improving the production and economy of the organisation.
<b>100908-CO70 0D.3-PO10</b>	L	Can develop safety plans and communicate effectively to co-workers to create a safe workplace
<b>100908-CO70 0D.3-PO12</b>	L	They are aware of the need of lifelong learning and research in the area of industrial safety.
<b>100908-CO70 0D.4-PO1</b>	M	Students understand the importance of safety in industries and apply their basic engineering fundamentals to avoid accidents
<b>100908-CO70 0D.4-PO2</b>	M	Using first principle of engineering sciences they are capable of identifying problems in industries and to create safety awareness among others

<b>100908-CO70 0D.4-PO3</b>	M	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-CO70 0D.4-PO5</b>	L	Students understand the usage of new methodologies, tools and safety measures in industries to avoid accidents.
<b>100908-CO70 0D.4-PO6</b>	L	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-</b>	L	Students understand the impact of engineering solutions towards the safety and health issues of society and the need of

<b>CO70</b>		
<b>0D.4-PO7</b>		sustainable systems to avoid accidents and health issues in industries.
<b>100908-CO70</b> <b>0D.4-PO8</b>	L	Importance of professional ethics is conveyed to students. They are aware of promoting the importance of safety to co-workers and can give instructions and motivate them.
<b>100908-CO70</b> <b>0D.4-PO9</b>	L	They are aware of the importance of creating a team working safely and executing projects carefully without accidents in an industry. Thereby improving the production and economy of the organisation.
<b>100908-CO70</b> <b>0D.4-PO10</b>	L	Can develop safety plans and communicate effectively to co-workers to create a safe workplace
<b>100908-CO70</b> <b>0D.4-PO12</b>	L	They are aware of the need of lifelong learning and research in the area of industrial safety.
<b>100908-CO70</b> <b>0D.5-PO1</b>	M	Students understand the importance of safety in construction sites and apply their basic engineering fundamentals to avoid accidents
<b>100908-CO70</b> <b>0D.5-PO2</b>	M	Using first principle of engineering sciences they are capable of identifying problems in construction sites and to create safety awareness among others
<b>100908-CO70</b> <b>0D.5-PO3</b>	M	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-CO70</b> <b>0D.5-PO4</b>	M	Students are aware of the professional engineering practise regarding health safety and legal issues of society
<b>100908-CO70</b> <b>0D.5-PO5</b>	L	Students are capable of conducting investigation on issues or accidents in workplace and to suggest remedial measures.

<b>100908-CO70</b> <b>OD.5-PO6</b>	L	They are capable of designing fundamental solutions for safety related issues with appropriate consideration for public health and safety
<b>100908-CO70</b> <b>OD.5-PO7</b>	L	Students understand the impact of engineering solutions towards the safety and health issues of society and the need of sustainable systems to avoid accidents and health issues in industries.
<b>100908-CO70</b> <b>OD.5-PO8</b>	L	Importance of professional ethics is conveyed to students. They are aware of promoting the importance of safety to co-workers and can give instructions and motivate them.
<b>100908-CO70</b> <b>OD.5-PO9</b>	L	They are aware of the importance of creating a team working safely and executing projects carefully without accidents in an industry. Thereby improving the production and economy of the organisation.
<b>100908-CO70</b> <b>OD.5-PO10</b>	L	Can develop safety plans and communicate effectively to co-workers to create a safe workplace
<b>100908-CO70</b> <b>OD.5-PO12</b>	L	They are aware of the need of lifelong learning and research in the area of industrial safety.

**JUSTIFICATIONS FOR CO-PSO MAPPING:** Not Applicable

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSIONAL REQUIREMENTS:**

<b>SL NO</b>	<b>DESCRIPTION</b>	<b>RELEVENCE TO PO\PSO</b>	<b>PROPOSED ACTIONS</b>
<b>1</b>	Job safety analysis	PO3,PO2,,PO6, P07.	Presentation

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

SL NO	TOPIC	RELEVANCE TO PO\PSO
1	Case study- Chernobyl disaster, Bhopal Tragedy	PO3,PO2,PO6, P07

**WEB SOURCE REFERENCES:**
**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	<input checked="" type="checkbox"/> LCD/SMART BOARDS
<input checked="" type="checkbox"/> STUD. SEMINARS	• ADD-ON COURSES		

**ASSESSMENT METHODOLOGIES-DIRECT**

<input checked="" type="checkbox"/> ASSIGNMENTS	• STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
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• STUD. LAB PRACTICES	• STUD. VIVA	• MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
• ADD-ON COURSES	• OTHERS		

**ASSESSMENT METHODOLOGIES-INDIRECT**

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
• ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	• OTHERS

**Prepared by**  
Emi Elizabeth

**Approved by**  
HOD

## 5.2 Course Plan Report

**Class : 2023S7IT**

**Subject : 100908/CO700D:INDUSTRIAL**

**Code SAFETY ENGINEERING**

Sl.No	Module	Planned Date	Planned	Actual Taken	Status	Extra Taken	Done By	Date of Entry
1	1	11-Sep-2023	Introduction to ISE	Introduction to ISE	Completed 09/11/2023		EMIEJ	09/18/2023 9:15:43 PM
2	1	13-Sep-2023	Industrial Accidents, Safety, Accidents	Industrial Accidents, Safety, Accidents	Completed 10/04/2023		EMIEJ	10/05/2023 10:30:55 AM
3	1	15-Sep-2023	Injury, Dangerous occurrence, Reportable accidents, Introduction to Industry Safety, Safety Committee	Injury, Dangerous occurrence, Reportable accidents, Introduction to Industry Safety, Safety Committee	Completed 09/15/2023		EMIEJ	09/18/2023 9:01:09 PM
4	1	18-Sep-2023	Safety organization - objectives, types, functions	Safety organization - objectives, types, functions	Completed 09/18/2023		EMIEJ	09/18/2023 8:54:02 PM
5	1	20-Sep-2023	Role of management, supervisors, workmen, unions, government and voluntary agencies in safety. Safety policy. Safety Officer.	Role of management, supervisors, workmen, unions, government and voluntary agencies in safety. Safety policy. Safety Officer.	Completed 10/04/2023		EMIEJ	10/05/2023 10:30:55 AM
6	1	25-Sep-2023	Theories of accident causation	Theories of accident causation	Completed 09/29/2023		EMIEJ	09/30/2023 1:14:52 PM

7	1	29-Sep-2023	Theories of accident causation (contd...)	Theories of accident causation (contd...)	Completed 09/27/2023		EMIEJ	09/27/2023 4:09:59 PM
8	1	4-Oct-2023	Tutorial 1	Tutorial 1	Completed 10/06/2023		EMIEJ	10/09/2023 8:46:53 AM
9	2	6-Oct-2023	Personal protection in the work environment, PPE, Types of PPEs	Personal protection in the work environment, PPE, Types of PPEs	Completed 11/20/2023		EMIEJ	11/23/2023 3:32:42 PM
10	2	9-Oct-2023	Monitoring Safety Performance, Housekeeping	Monitoring Safety Performance, Housekeeping	Completed 11/20/2023		EMIEJ	11/23/2023 3:32:42 PM
11	2	11-Oct-2023	Work permit system	Work permit system	Completed 11/22/2023		EMIEJ	11/23/2023 3:56:35 PM

12	2	13-Oct-2023	Hot work and cold work permits. Entry into confined spaces.	Hot work and cold work permits. Entry into confined spaces.	Completed 11/22/2023		EMIEJ	11/23/2023 3:56:35 PM
13	2	16-Oct-2023	Tutorial 2	Tutorial 2	Completed 11/22/2023		EMIEJ	11/23/2023 3:56:35 PM
14	3	18-Oct-2023	Introduction to construction industry and safety issues in construction	Introduction to construction industry and safety issues in construction	Completed 11/22/2023		EMIEJ	11/23/2023 3:56:35 PM

15	3	20-Oct-2023	Safety in various construction operations: Excavation, Filling, Under-water works	Safety in various construction operations: Excavation, Filling, Under-water works	Completed 11/22/2023	EMIEJ	11/23/2023 3:56:35 PM
16	1	26-Oct-2023	First internal examination	First internal examination	Completed 10/26/2023	EMIEJ	12/21/2023 2:16:50 PM
17	3	30-Oct-2023	Safety in various construction operations: Under-pinning & Shoring	Safety in various construction operations: Under-pinning & Shoring	Completed 11/22/2023	EMIEJ	11/23/2023 3:56:35 PM
18	3	1-Nov-2023	Safety in various construction operations: Ladders & Scaffolds	Safety in various construction operations: Ladders & Scaffolds	Completed 11/22/2023	EMIEJ	11/23/2023 3:56:35 PM
19	3	3-Nov-2023	Safety in various construction operations: Tunneling, Blasting, Demolition	Safety in various construction operations: Tunneling, Blasting, Demolition	Completed 11/22/2023	EMIEJ	11/23/2023 3:56:35 PM
20	3	6-Nov-2023	Safety in various construction operations: Confined space, Temporary structures	Safety in various construction operations: Confined space, Temporary structures	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM
21	3	8-Nov-2023	Familiarization with relevant Indian Standards and the National Building Code provisions on construction safety.	Familiarization with relevant Indian Standards and the National Building Code provisions on construction safety.	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM



22	3	10-Nov-2023	Relevance of ergonomics in construction safety.	Relevance of ergonomics in construction safety.	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM
			Ergonomics Hazards - Musculoskeletal Disorders and Cumulative Trauma Disorders.	Ergonomics Hazards - Musculoskeletal Disorders and Cumulative Trauma Disorders.			
23	3	13-Nov-2023	Tutorial 3	Tutorial 3	Completed 11/22/2023	EMIEJ	11/23/2023 3:56:35 PM
24	4	15-Nov-2023	Machinery safeguard - Point- of- Operation, Principle of machine guarding	Machinery safeguard - Point- of- Operation, Principle of machine guarding	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM
25	4	17-Nov-2023	Safety in Power Presses, primary & secondary operations - shearing - bending - rolling ? drawing.	Safety in Power Presses, primary & secondary operations - shearing - bending - rolling ? drawing.	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM
26	4	20-Nov-2023	Safety in turning, boring, milling, planning and grinding	Safety in turning, boring, milling, planning and grinding	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM
27	4	22-Nov-2023	Welding and Cutting - Safety Precautions of Gas welding and Arc Welding, Cutting and Finishing.	Welding and Cutting - Safety Precautions of Gas welding and Arc Welding, Cutting and Finishing.	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM

28	4	24- Nov- 2023	Material Handling- Classification- safety consideration- manual and mechanical handling. Handling assessments and techniques- lifting, carrying, pulling, pushing, palletizing and stocking.	Material Handling- Classification- safety consideration- manual and mechanical handling. Handling assessments and techniques- lifting, carrying, pulling, pushing, palletizing and stocking.	Completed 11/24/2023	EMIEJ	11/24/2023 12:05:06 PM
29	4	27- Nov- 2023	Material Handling equipment- operation & maintenance. Maintenance of common elements - wire rope, chains slings, hooks, clamps. Hearing Conservation Program in  Production industries.	Material Handling equipment- operation & maintenance. Maintenance of common elements - wire rope, chains slings, hooks, clamps. Hearing Conservation Program in  Production industries.	Completed 11/27/2023	EMIEJ	11/28/2023 12:50:22 PM
30	4	29- Nov- 2023	Tutorial 4	Tutorial 4	Completed 12/18/2023	EMIEJ	12/19/2023 2:02:19 PM
31	5	1- Dec- 2023	Hazard and risk, Types of hazards ? Classification of Fire	Hazard and risk, Types of hazards ? Classification of Fire	Completed 11/29/2023	EMIEJ	11/29/2023 4:04:01 PM
32	1	4- Dec- 2023	Second internal examination	Second internal examination	Completed 12/04/2023	EMIEJ	12/21/2023 2:19:26 PM

33	5	8-Dec-2023	Types of Fire extinguishers fire, explosion and toxic gas release. Structure of hazard identification and risk assessment.	Types of Fire extinguishers fire, explosion and toxic gas release. Structure of hazard identification and risk assessment.	Completed 12/01/2023	EMIEJ	12/01/2023 3:35:04 PM
34	5	11-Dec-2023	Identification of hazards: Inventory analysis, Fire and explosion hazard rating of process plants	Identification of hazards: Inventory analysis, Fire and explosion hazard rating of process plants	Completed 12/06/2023	EMIEJ	12/07/2023 1:14:51 PM
35	5	13-Dec-2023	The Dow Fire and Explosion Hazard Index.	The Dow Fire and Explosion Hazard Index.	Completed 12/08/2023	EMIEJ	12/08/2023 3:25:40 PM
36	5	15-Dec-2023	Preliminary hazard analysis, Hazard and Operability study (HAZOP) - ? methodology, criticality analysis, corrective action and follow-up.	Preliminary hazard analysis, Hazard and Operability study (HAZOP) - ? methodology, criticality analysis, corrective action and follow-up.	Completed 12/08/2023	EMIEJ	12/08/2023 3:25:40 PM
37	5	18-Dec-2023	Chemical hazard-Classifications, Control of Chemical Hazards.	Chemical hazard-Classifications, Control of Chemical Hazards.	Completed 12/13/2023	EMIEJ	12/14/2023 9:00:53 AM
38	5	20-Dec-2023	Hazardous properties of chemicals. Material Safety Data Sheets (MSDS).	Hazardous properties of chemicals. Material Safety Data Sheets (MSDS).	Completed 12/13/2023	EMIEJ	12/14/2023 9:00:53 AM
39	5	20-Dec-2023	Tutorial 5	Tutorial 5	Completed 12/20/2023	EMIEJ	12/21/2023 2:09:57 PM

405	22-Dec-2023	Hazardous properties of chemicals. Material Safety Data Sheets (MSDS).	Hazardous properties of chemicals. Material Safety Data Sheets (MSDS).	Completed 12/13/2023	EMIEJ	12/14/2023 9:00:53 AM
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### 5.3 ASSIGNMENT

#### ASSIGNMENT 1

2023S7IT

13<sup>th</sup> October, 2023

1. Write a report on a case study on any industrial accidents in the past **with an inference**

#### ASSIGNMENT 2

2023S7IT

9<sup>th</sup> December, 2023

1. How do you maintain the following elements

- a. Wire rope
- b. Chain slings
- c. Hooks
- d. Clamps

### 5.4 Tutorial (2023S7 IT)

1. What is the importance of a safety committee in an organization?

(29<sup>th</sup> September, 2023)

2. Using the given data calculate the (a, b, c, d, e, f) of accident in an industrial plant where only one accident occurred during the year involving total disability of a worker.

- Number of workers=2000
- Number of injuries per year= 5

- Number of days lost in a year due to accident=100
- Average number of hours worked by worker per year=2000
- Safety Activity Number = 4
- (a) Frequency Rate (FR) (b) Severity Rate (SR) (c) Frequency Severity Rate (FSR) (d) Frequency Severity Indicator (FSI) (e) Incident Rate (IR) (f) Activity Rate (AR)  
(1<sup>st</sup> November, 2023)

3. What are MSDs? Explain any five MSDs in detail.

(22<sup>nd</sup> November, 2023)

4. Why Hearing Conservation Program is important?

(29<sup>th</sup> November, 2023)

5. Write a note on HAZOP

(20<sup>th</sup> December, 2023)



Rajagiri School of Engineering & Technology, Autonomous

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# DATA ANALYTICS LAB

## 6.1 COURSE INFORMATION SHEET

<b>PROGRAMME:</b> INFORMATION TECHNOLOGY	<b>DEGREE:</b> BTECH
<b>COURSE:</b> DATA ANALYTICS LAB	<b>SEMESTER:</b> III <b>CREDITS:</b> 4
<b>COURSE CODE:</b> 100004/ IT722S <b>REGULATION:</b> 2020	<b>COURSE TYPE:</b> LAB Course
<b>COURSE AREA/DOMAIN:</b> DATA ANALYTICS, BIG DATA	<b>CONTACT HOURS:</b> 3 hours/Week.

### SYLLABUS:

DETAILS
<p><b>Data Analysis using EXCEL</b></p> <ol style="list-style-type: none"> <li>1.Descriptive Statistics*</li> <li>2.Linear Regression*</li> <li>3.Histogram*</li> </ol>
<p><b>R programming</b></p> <ol style="list-style-type: none"> <li>1. Basic Concepts of R - Data structures , Control flow , Functions, Packages*</li> <li>2 Data reshaping and merging using R *</li> <li>3.Text Data Analysis using appropriate datasets.*</li> <li>4. Data Visualisation in R (Scatter plot, Histogram, Box and Whisker, Dot plots, ggplot package).*</li> <li>5.Exercises to implement Time series Analysis using R.</li> <li>6.Exercises to create Dashboard, analytics report for a dataset.</li> <li>7.Recommender systems like product recommendation or movie recommendation</li> </ol>
<p><b>Machine Learning algorithms using R</b></p> <ol style="list-style-type: none"> <li>1.Statistics using R – Mean, Mode, median*</li> <li>2.Linear Regression and logistic regression*</li> <li>3.Decision Tree based Classification*</li> <li>4.K-Means Clustering*</li> <li>5.S VM classification</li> <li>6.Neural Network based classification</li> <li>7. Principal Component Analysis</li> </ol>

**Big Data Tools and Techniques**

1. Installation and configuration of Hadoop\*
2. Manipulation of HDFS files using commands\*
3. Implementation of Map Reduce programs \*
4. Interactive Data Visualization with Tableau Public\*
5. Installing and configuring Hive and implementing partitioning and bucketing in Hive
6. Exercises to implement map reduce in MongoDB

**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
R	1. Joseph Schmuller. Statistical Analysis with Excel For Dummies (4th. edn.)2016. 2. <a href="https://cran.r-project.org/manuals.html">https://cran.r-project.org/manuals.html</a> 3. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. Wiley Publishing.(1st. ed.). 2015. 4. <a href="https://bradleyboehmke.github.io/HOML/index.html">https://bradleyboehmke.github.io/HOML/index.html</a> 5. <a href="https://hadoop.apache.org/">https://hadoop.apache.org/</a> 6. <a href="https://hadoop.apache.org/docs/current/hadoop-mapreduce-client/hadoop-mapreduce-client-core/MapReduceTutorial.html">https://hadoop.apache.org/docs/current/hadoop-mapreduce-client/hadoop-mapreduce-client-core/MapReduceTutorial.html</a> 7. <a href="https://hive.apache.org/">https://hive.apache.org/</a> 8. <a href="https://www.tableau.com/community/academic">https://www.tableau.com/community/academic</a>

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM
100004/IT300B	Data Structures	Design of algorithms and to choose appropriate data structures to solve real world problems.	S3
100004/IT400D	Database Management Systems	Basic principles of Database Management System	S4
100902/MA400B	Probability, Statistics and Advanced Graph theory	Basics about statistics and numerical techniques	S4
100004/IT600C	Data Science	Study of algorithms used in statistical data analysis and visualization	S6

**COURSE OBJECTIVES:**

1	The implementation of machine learning algorithms using R and experimenting with the dynamic,
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	interactive visualization techniques using Tableau will equip the students to pursue careers in the data analytics domain.
2	A familiarization of the popular analytic tools like Hadoop can help in academic projects or to carry out data analysis in new application areas.

### COURSE OUTCOMES:

SNO	DESCRIPTION	Blooms' Taxonomy Level
CO1	Solve simple problems of statistical analysis of data using Microsoft Excel	Level 3: Apply
CO2	Analyze the textual data and time series data with the data visualization techniques in R	Level 3: Analyze
CO3	Implement the basic statistical techniques and machine learning algorithms using R	Level 3: Apply
CO4	Execute HDFS commands and apply Map Reduce technologies associated with big data analytics using HADOOP	Level 3: Apply
CO5	Analyze real world data by applying the suitable visualization techniques in Tableau	Level 4: Analyze

### CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	3	-	-	-	-	-	-	2	-	-	-
CO 2	3	3	3	3	3	2	2	2	2	2	-	2	2	2	2
CO 3	3	3	3	2	3	-	-	-	-	-	-	2	2	2	2
CO 4	3	3	3	2	3	-	-	-	-	-	-	2	2	-	-
CO 5	3	3	3	3	3	2	2	2	2	2	-	2	-	2	2

**JUSTIFICATIONS FOR CO-PO AND CO-PSO MAPPING**

<b>MAPPING</b>	<b>LOW/MEDIUM/HIGH</b>	<b>JUSTIFICATION</b>
CO1-P01	H	Students will acquire knowledge of data analysis using Excel.
CO1-P02	H	Students will be able to understand how data used for analysis and also to generate random dataset.
CO1-P03	H	Using the knowledge of data analysis obtained, we can design and develop solutions for complex engineering problems
CO1-P04	H	Students can be able to analyse and interpret data and synthesize the information to provide valid conclusions.
CO1-P05	H	Use Microsoft office Excel's Data Analysis ToolPack for analysing the given data.
CO1-PO12	M	Information acquired after analysing the data provides lifelong learning in the context of Data Analytics.
CO2-P01	H	Studies about the various concepts in R programming help the students to understand about its basic functionalities specially the advantages over other programming languages.
CO2-P02	H	Programs on R data structure, array, vector, list etc help the students to improve their programming skills.
CO2-P03	H	Students gain the knowledge of R which help them in analysing the data.
CO2-P04	H	Knowledge of various programming concepts can be used to design and conduct experiments to provide valid conclusions.
CO2-P05	H	Expertise developed, which will enable the student to become a productive member of a design team
CO2-P06	M	Put in reasoning informed by the knowledge to assess legal and cultural issues relevant to the professional engineering practice.
CO2-P07	M	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
CO2-P08	M	Apply ethical principles and responsibilities in the engineering practice.
CO2-P09	M	Invoke and encourage the ability to lead a project involving data manipulation using analysis and mining as well as conduct it without error or difficulty.
CO2-PO10	M	Effective communication requiring knowledge of the basics and advanced aspects of data analysis and data mining.
CO2-P012	M	Studies about the various concepts in R provide lifelong learning in

		the context of Data analysis.
CO2-PS01	M	Students should be able to demonstrate suitable classification and clustering models to solve complex problems in an efficient manner.
CO2-PS02	M	Students will be able to analyze different functionalities provided for database design in the domain of big data.
CO2-PS03	M	Simulation using data analysis tool helps in contribution of engineering skills in design of IT solutions.
CO3-P01	H	Knowledge about machine learning algorithms
CO3-P02	H	Studies about the concepts of different machine learning algorithms and programming.
CO3-P03	H	Students familiarize about R programming on various machine learning algorithms.
CO3-P04	M	The concept of data analysis can be used to design and conduct experiments to provide valid conclusions.
CO3-P05	H	The usage of state-of-the-art tools and facilities to enhance the quality of statistical data analysis.
CO3-PO12	M	Information acquired from programming using R provides lifelong learning in the design of software development.
CO3-PS01	M	Using the knowledge of theoretical foundations of classification and clustering techniques students will be able to independently carry out research investigation and development work to solve practical problems.
CO3-PS02	M	Students could apply the knowledge of generating dataset and using it for various analysis helps in the field of database design.
CO3-PS03	M	Students can be able to apply the skills in developing, implementing and testing different solutions for IT problems.
CO4-P01	H	Students gain the ability to learn about the commands in HDFS.
CO4-P02	H	Students will understand the map reduce program to analyze various data.
CO4-P03	H	The students could understand to write and implement various HDFS commands
CO4-P04	M	The knowledge of data analysis and data mining algorithms and models can be used to design and conduct experiments to provide valid conclusions
CO4-P05	H	Study of Hadoop framework will equip the students to pursue careers in the data analytics domain.

CO4-PO12	M	Information acquired from HDFS and Hadoop provides lifelong learning in data analytic field.
CO4-PSO1	M	Identification, formulation and justification in technical aspects will be based on acquiring skills in design and development of algorithms.
CO5-PO1	H	Students will be obtaining basic knowledge of data visualization concepts.
CO5-PO2	H	Students will understand of use of suitable visualization techniques in Tableau for analysing real world data.
CO5-PO3	H	Students could design solutions for complex engineering problems by using visualization techniques.
CO5-PO4	H	Students can able to interpret, improve and redefine technical aspects for design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
CO5-PO5	H	Create, select and apply appropriate techniques, and modern engineering and IT tools including prediction and modelling to complex engineering problems.
CO5-PO6	M	Study of data classification methods involves solving complex engineering problems relevant to the society.
CO5-PO7	M	Identification and justification of various aspects of data analysis demonstrates the need for sustainable development.
CO5-PO8	M	Apply professional ethics and responsibilities in engineering practice of development
CO5-PO9	M	Expertise developed, which will enable the student to become a productive member of a design team
CO5-PO10	M	Presenting results obtained using data visualization techniques require communicating effectively with the engineering community and with society.
CO5-PO12	M	Students could apply the knowledge of data visualization techniques for lifelong learning in the context of big data.

CO5-PSO2	M	Students will be acquiring knowledge to apply the engineering skills in database design and implementation.
CO5-PSO3	M	Students can develop their skills in planning, developing, testing, implementing and providing IT solutions for data analytic domains.

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

SNO	DESCRIPTION	PROPOSED ACTIONS
1	Understand and Implement Pig commands	Seminar

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

**WEB SOURCE REFERENCES:**

1	<a href="https://hadoop.apache.org/">https://hadoop.apache.org/</a>
2	<a href="https://hive.apache.org/">https://hive.apache.org/</a>
3	<a href="https://docs.mongodb.com/manual/installation/">https://docs.mongodb.com/manual/installation/</a>
4	<a href="https://www.tableau.com/community/academic">https://www.tableau.com/community/academic</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

<input checked="" type="checkbox"/> CHALK & TALK	<input type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	<input checked="" type="checkbox"/> Lab Sessions
<input type="checkbox"/> LCD/SMART BOARDS	<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> ADD-ON COURSES	

**ASSESSMENT METHODOLOGIES-DIRECT**

<input type="checkbox"/> ASSIGNMENTS	<input type="checkbox"/> SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input checked="" type="checkbox"/> STUD. LAB PRACTICES	<input checked="" type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

**ASSESSMENT METHODOLOGIES-INDIRECT**

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
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<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS
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**Prepared by**

**Approved by**

**Dr. Ranju S Kartha**  
(Faculty in Charge)

**Dr. Neeba E A(HOD)**

## 6.2 COURSE PLAN

Sl. No	Experiment	No. of Hours
1	STUDY OF DATA ANALYSIS USING MS - EXCEL	3 Hours
2	BASIC OF R PROGRAMMING	3 Hours
3	DATA RESHAPING AND MERGING USING R	3 Hours
4	DATA VISUALIZATION IN R	3 Hours
5	MACHINE LEARNING ALGORITHMS USING R	3 Hours
6	TEXT DATA ANALYSIS	3 Hours
7	BIG DATA TOOLS AND TECHNIQUES	3 Hours
8	INTERACTIVE DATA VISUALIZATION WITH TABLEAU PUBLIC	3 Hours

## 6.3 LAB CYCLE

### INSTRUCTIONS TO STUDENTS

Students should be regular and come prepared for the lab practice.

1. In case a student misses a class, it is his/her responsibility to complete that missed experiment(s) before he or she comes for the second lab after the missed class.
2. Students should maintain a lab record with cycle stuck. Prescribed textbook and class notes can be kept ready for reference if required.
3. Once the experiment(s) get executed, they should show the results to the instructors and copy the same in their observation book.

### PROCEDURE FOR EVALUATION

Mark distribution

Total Marks	CIE	ESE	ESE Duration
150	75	75	2.5 hours

### Continuous Internal Evaluation Pattern:

Attendance : 15 marks  
 Continuous Assessment : 30 marks  
 Internal Test (Immediately before the second series test) : 30 marks  
 End Semester Examination Pattern:

The following guidelines should be followed regarding award of marks

- a. Preliminary work : 15 Marks
- b. Implementing the work/Conducting the experiment : 10 Marks
- c. Performance, result and inference : 25 Marks
- d. Viva voce : 20 marks
  - e. Record : 5 Marks

**EXPERIMENT 1: STUDY OF DATA ANALYSIS USING MS - EXCEL**

- Use Excel's Descriptive Statistics data analysis tool to show the descriptive statistics for the two samples generated by using the Random Number Generation tool in the Analysis ToolPak.
- The given data shows the age of individuals and their average medical expenses per month. Apply linear regression in Excel to draw the regression line and predict the average medical expenses of specific individuals.

Age (X)	Average Amount spent on medical expenses (per month in Rs) (Y)
15	100
20	135
25	135
37	150
40	250
45	270
48	290
50	360
55	375
61	400
64	500
67	1000

70	1500
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3. Consider the waiting time (in Mins) of the customer at the cash counter of the SBI bank branch during peak hours, which was observed by the cashier. Create a histogram in Excel for the randomly generated data.

### **EXPERIMENT 2: BASIC OF R PROGRAMMING**

#### 1. Basic Concepts of R

Perform the basic operations in R programming: Assignment operator, Arithmetic operations, Functions, Control flow, Implementation of vector and List data objects operations

1. Write a R program to get the first 10 fibonacci numbers.
2. Write a R program to find the factors of a given number using function
3. Write a R program to create an array with three columns,three rows and two “tables”, taking two vectors as input to the array.
4. Write a R program to create a 3\*3 3-dimensional array of 27 elements.
5. Write a R program to create a vector which contains 10 random integer values between -50 and +50. (Hint : sample())
6. Create a list of 5 strings. Check whether an item exists in the list. Illustrate addition and removal of an item in the list
7. Create 3 lists and merge them together and display the length of the merged list.

### **EXPERIMENT 3: DATA RESHAPING AND MERGING USING R**

Implementation of various operations on Matrix and data frames in R:

1. Matrix Multiplication , Transpose of a matrix, Inverse of a matrix
2. a) Create three vectors(name,age,CGPA) to store the details of 5 students and merge them horizontally (Hint: by columns using cbind()).  
b) Create a dataframe with attributes name,age,CGPA to store the details of another 5 students.  
c) Merge the above data (a and b) vertically. (Hint: by rows using rbind()).
3. Write a R program to create a Data Frames which contain details of 10 employees (Name, Designation, Gender, Salary, Hire date).
  - a) Extract 3rd and 5th rows with 1st and 3rd columns from a given data frame.
  - b) Create a frequency table for employee with respect to gender
  - c) Draw a histogram for salary

### **EXPERIMENT 4 : DATA VISUALIZATION IN R (Scatter plot, Histogram, Box and Whisker, Dot Plots, ggplot package)**

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1. Implement the analysis of single variable data using histogram, boxplot, barplot and scatter plot (Use the default iris dataset in R)
2. Illustrate the following with **ggplot2** using **mtcars** data set
  - a. Make a Scatterplot of **mpg vs. hp**. Set colour to **am** (Convert **am** to Categorical before plotting)
  - b. Make a Boxplot of mpg by number of gears (convert **no. of gears** to categorical before plotting)
- c. Make a densityplot: **cyl vs wt**,
  - i. Facet it by **am**
  - ii. Add a theme layer for the plot (graph title, background color etc)

### EXPERIMENT 5: MACHINE LEARNING ALGORITHMS USING R

#### 1. Implementation of Statistical functions :

Calculate Arithmetic, Geometric, Harmonic mean, Median and Mode, First quartile, 56<sup>th</sup> percentile for the given data using R.

The data about average rainfall in every month in the year of 2017.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	10	10	10	10	10	560	640	520	320	90	20	10

2. Interpret the data in the Anscombe dataset in R with linear regression.
3. Using decision trees, predict whether to play golf given factors such as weather outlook, temperature, humidity, and wind.
4. Group 620 high school seniors based on their grades in three subject areas: English, mathematics, and science with K-means clustering method.

### EXPERIMENT 6 : TEXT DATA ANALYSIS

1. Write an R program to perform sentiment analysis using the movie review dataset.  
(Dataset: <https://ai.stanford.edu/~amaas/data/sentiment/>)
2. Write an R program to create a corpus of documents and preprocess them in R using stemming, stop word removal, whitespace removal, convert them to lowercase and remove punctuations.

### EXPERIMENT 7: BIG DATA TOOLS AND TECHNIQUES

1. Installation and configuration of Hadoop
2. Manipulation of HDFS files using commands
  - Create a directory on HDFS in home directory.
  - Create two directories in a single command in home directory.
  - List the directories created in HDFS.
  - Create a sample text file in any of the directories created above.

- Copy file/files from local file system to one of the directories created on HDFS.
- Verify the file upload.
- Copy a file from HDFS to local file system
- Copy the file from one directory to another directory in HDFS.
- Move the file from one directory to another directory in HDFS.
- Copy a file from/To Local file system to HDFS.
- Display the last few lines from the file in HDFS.
- Display the size of the file in KB and MB in the HDFS.
- Append a file from Local File system to file in HDFS
- Merge two file contents (in HDFS) in to one file ( in Local file system)
- Copy one directory structure to another.
- Set the replication to the file created to 4
- Remove a file from the directory in HDFS.
- Remove a directory in HDFS.

#### **EXPERIMENT 8 : INTERACTIVE DATA VISUALIZATION WITH TABLEAU PUBLIC**

- 1) Consider the three Customer Segments in the Superstore Dataset. Find the percent of the Total Profits associated with the Corporate Segment. Visualize using Tableau.
- 2) Calculate the “average delay to ship using Tableau.”The data set considered should have information regarding order date and ship date for four different regions.

#### **6.4 OPEN QUESTIONS**

1. Two vectors, v1 and v2, are created with the following R code: `v1 <- 1:5` `v2 <- 6:2` What are the results of `cbind(v1,v2)` and `rbind(v1,v2)`?
2. Study and implementation of various control structures in R : If-Else and Nested If-Else, For Loop, while loop, Break Function, OR and AND Operators.
3. Data visualization using line graph.
4. Implementation of logistic regression.
5. Download the Iris flower dataset or any other dataset into a DataFrame. ([eghttps://archive.ics.uci.edu/ml/datasets/Iris](https://archive.ics.uci.edu/ml/datasets/Iris)). Use R and Perform following –
  - a. How many features are there and what are their types (e.g., numeric, nominal)?

- b. Compute and display summary statistics for each feature available in the dataset. (eg.minimum value, maximum value, mean, range, standard deviation, variance and percentiles.
  - c. Data Visualization-Create a histogram for each feature in the dataset to illustrate the featured distributions. Plot each histogram.
  - d. Create a boxplot for each feature in the dataset. All of the boxplots should be combined into a single plot. Compare distributions and identify outliers
6. Illustrate Simple Linear Regression in R and plot the regression line using ggp
7. Illustrate Multiple Linear Regression in R and give the interpretation.

### **6.5 ADVANCED QUESTIONS**

1. Using the ruspini dataset provided with the cluster package in R, perform a k-means analysis. Document the findings and justify the choice of k. Hint: use data(ruspini) to load the dataset into the R workspace.
  2. Illustrate the following with ggplot2 using diamonds data set.
    - a) Create a histogram of "carat" with a border color and fill color
    - b) Set the bin width of the histogram to 0.01
    - c) Make a scatterplot: carat vs price, set the color to clarity
    - d) Make a scatterplot: carat vs price, set the color to clarity. Also add trendline to the plot
    - e) Make a scatterplot: carat vs price, Facet it by clarity
    - f) Add a theme layer for the plot(graph title, background color etc) .
    - g) Show carat vs cut, make a violin and a boxplot
    - h) Use Pig to perform a word count on the specified dataset.
  3. Use Hive to perform a word count on the specified dataset.
  4. Implementation of an MR program that processes a weather dataset
-

5. Implement support vector machine (SVM) to find optimum hyper plane (Line in 2D, 3D hyper plane) which maximize the margin between two classes.



Rajagiri School of Engineering & Technology, Autonomous

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# SEMINAR

### 7.1 COURSE INFORMATION SHEET

PROGRAMME: Information Technology	DEGREE: B.Tech
COURSE: Seminar	SEMESTER: S7 CREDITS: 2
COURSE CODE: 100004IT722T	COURSE TYPE: Core
COURSE AREA/DOMAIN: NIL	CONTACT HOURS: 3 Hours / Week
CORRESPONDING LAB COURSE CODE : NA	LAB COURSE NAME: NA

#### SYLLABUS:

DETAILS
<p>The course ‘Seminar’ is intended to enable a B.Tech graduate to read, understand, present and prepare report about an academic document. The learner shall search in the literature including peer reviewed journals, conference, books, project reports etc., and identify an appropriate paper/thesis/report in her/his area of interest, in consultation with her/his seminar guide. This course can help the learner to experience how a presentation can be made about a selected academic document and also empower her/him to prepare a technical report.</p>

#### COURSE PRE-REQUISITES:

Good Presentation Skills.

#### COURSE OBJECTIVES:

1	To do literature survey in a selected area of study.
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2	To understand an academic document from the literature and to give a presentation about it.
3	To prepare a technical report.

**COURSE OUTCOMES:**

Ref. No.	DESCRIPTION	Blooms' Taxonomy Level
C01	Identify academic documents from the literature which are related to her/his areas of interest.	Apply
C02	Read and apprehend an academic document from the literature which is related to her/his areas of interest.	Analyze
C03	Prepare a presentation about an academic document.	Create
C04	Give a presentation about an academic document.	Apply
C05	Prepare a technical report.	Create

**CO-PO AND CO-PSO MAPPING:**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C01	2	2	1	1		2	1					3	1		
C02	3	3	2	3		2	1					3	1		
C03	3	2			3			1		2		3	2		
C04	3				2			1		3		3			1
C05	3	3	3	3	2	2		2		3		3			2

## JUSTIFICATIONS FOR CO-PO MAPPING

<b>MAPPING</b>	<b>LOW/MEDIUM/HIGH</b>	<b>JUSTIFICATION</b>
C01-PO1	M	Students will apply the engineering knowledge to analyze a current topic of professional interest in the Information Technology field.
C01-PO2	M	Students will be able to select papers, identify and analyze complex engineering problems relevant to their area of interest.
C01-PO3	L	Students shall identify solutions to their problem of interest and study them.
C01-PO4	L	Students shall conduct user surveys & research and analyze complex data to arrive at conclusions as part of analyzing complex engineering problems.
C01-PO6	M	Students shall apply reasoning and assess the social relevance of the problem selected by them.
C01-PO7	L	Students will be able to understand the impact of professional engineering solutions in society by conducting efficient literature surveys.
C01-PO12	H	Students will be able to read new papers and identify new technologies which enable lifelong learning.
C01-PS01	L	By identifying academic documents of their interest from the literature, students will be able to design solutions appropriately for the problems.
C02-PO1	H	Students shall apply engineering knowledge to read and apprehend the papers in their literature survey.



CO2-PO2	H	Students shall identify and analyze how the solutions are revised to complex engineering problems.
CO2-PO3	M	Students will be able to design solutions to their problem of interest by reading good literature works in their area of interest.
CO2-PO4	H	Students shall analyze the research surveys conducted in previous works and incorporate those into their own works..
CO2-PO6	M	Students will be able to understand and select topics of social relevance for their seminar.
CO2-PO7	L	Students will be able to understand the impact of professional engineering solutions in society by reading and apprehending academic documents.
CO2-PO12	H	Students will be able to read new papers and identify new technologies which enable lifelong learning.
CO2-PS01	L	Students shall improve their coding skills by getting enough knowledge through academic documents to solve a problem.
CO3-PO1	H	Students shall apply engineering knowledge to prepare a presentation about an academic document.
CO3-PO2	M	Students will be able to identify and analyze how the solutions are revised to complex engineering problems and present them effectively.

CO3-PO5	H	Students will be able to present modern tools used for solving their problems by conducting efficient literaturesurvey.
CO3-PO8	L	Students shall prepare the academic document presentation by applying ethical principles and committo professional ethics.
CO3-PO10	M	Students shall develop their communication skills through presentation.
CO3-PO12	H	Students shall incorporate suggestions given during the presentation preparation for their future works.
CO3-PS01	M	Students shall prepare a presentation properly by analyzing the algorithms and methodologies used in the selected topic.
CO4-PO1	H	Students shall apply engineering knowledge to give a proper presentation about an academic document and for answering basic questions.
CO4-PO5	M	Students will be able to present modern tools used for solving their problems by conducting efficient literature survey.
CO4-PO8	L	Students shall present the academic document by applying ethical principles and commit to professional ethics.
CO4-PO10	H	Students shall develop their communication skills through presentation.

CO4-PO12	H	Students shall incorporate suggestions given during the presentation for their future works.
CO4-PSO3	L	By giving an academic presentation, students shall develop their planning and developing skills in providing IT solutions.
CO5-PO1	H	Students shall apply engineering knowledge to prepare a technical report about their presentation of seminar.
CO5-PO2	H	Students will be able to identify and analyze how the solutions are revised to complex engineering problems and prepare the report effectively.
CO5-PO3	H	Students will be able to design solutions to their problems of interest by reading good literature works in their area of interest and write in the report.
CO5-PO4	H	Students shall analyze the research surveys conducted in previous works and incorporate those into their own technical report.
CO5-PO5	M	Students will be able to write about modern tools used for solving their problems by conducting efficient literature survey.
CO5-PO6	M	Students will be able to discuss the social relevance of their seminar topic in the report.
CO5-PO8	M	Students shall prepare the seminar report by applying ethical principles and commit to professional ethics.
CO5-PO10	H	Students shall prepare efficient technical reports by having proper communication with their guides and

		incorporating their suggestions.
CO5-PO12	H	Students will be able to develop their technical writing skills by preparing reports which will be useful for them in writing reports for their project in future.
CO5-PSO3	M	Students shall gain enough knowledge in planning, developing and analyzing IT solutions by writing technical reports.

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

<input type="checkbox"/> <b>CHALK &amp; TALK</b>	<input type="checkbox"/> <b>STUD. ASSIGNMENT</b>	<input type="checkbox"/> <b>WEB RESOURCES</b> √
<input type="checkbox"/> <b>LCD/SMART BOARDS</b> √	<input type="checkbox"/> <b>STUD. SEMINARS</b> √	<b>ADD-ON-COURSES</b>

**ASSESSMENT METHODOLOGIES-DIRECT:**

<input type="checkbox"/> <b>ASSIGNMENTS</b>	<input type="checkbox"/> <b>STUD. PRESENTATIONS</b> √	<input type="checkbox"/> <b>TESTS/MODEL EXAMS</b>	<input type="checkbox"/> <b>UNIV. EXAMINATION</b>
<input type="checkbox"/> <b>STUD. LAB PRACTICES</b>	<input type="checkbox"/> <b>STUD. VIVA</b> √	<input type="checkbox"/> <b>MINI/MAJOR PROJECT</b>	<input type="checkbox"/> <b>CERTIFICATIONS</b>
<input type="checkbox"/> <b>ADD-ON COURSES</b>	<input type="checkbox"/> <b>OTHERS</b>		

ASSESSMENT METHODOLOGIES-INDIRECT:

<input type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)✓	<input type="checkbox"/> STUDENT FEEDBACK ON FACULTY (ONCE) ✓
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY INTERNAL COMMITTEE✓	<input type="checkbox"/> OTHERS

Prepared by  
ALOOBA DILU

Approved by  
(HOD)

# PROJECT PHASE I

## 8.1 COURSE INFORMATION SHEET

PROGRAMME: INFORMATION TECHNOLOGY	DEGREE: BTECH
COURSE: <b>Project Phase 1</b>	SEMESTER: VII CREDITS: 2
COURSE CODE: 100004/IT722U REGULATION: 2020	COURSE TYPE: PCC
COURSE AREA/DOMAIN: PROGRAMMING, SOFTWARE DEVELOPMENT MANAGEMENT	CONTACT HOURS: 6 (Practical) hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): NA	LAB COURSE NAME: NA

### SYLLABUS:

PHASE	DETAILS	HOURS
COURSE PLAN	<p>Student Groups with 3 or 4 members should identify a topic of interest in consultation with a Faculty/Advisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carry out the design/fabrication or develop codes/programs to achieve the objectives by strictly following steps specified in the teaching plan. Innovative design concepts, performance, scalability, reliability considerations, aesthetics/ergonomic, user experience and security aspects taken care of in the project shall be given due weight.</p> <p>The progress of the mini project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department comprising HoD or a senior faculty member, Project coordinator and project guide. The internal evaluation shall be made based on the progress/outcome of the project, reports and a viva-voce examination, conducted internally by a 3-member committee. A project report is required at the end of the semester. The project has to be demonstrated for its full design specifications.</p> <p>Importance should be given to address societal problems and developing indigenous technologies.</p>	36 (12 WEEKS)

### COURSE PRE-REQUISITES:

A sound knowledge in any programming language and fundamental concepts of Software Engineering.

### **COURSE OBJECTIVES:**

1. To apply engineering knowledge in practical problem solving.
2. To foster innovation in design of products, processes or systems.
3. To develop creative thinking in finding viable solutions to engineering problems.

### **COURSE OUTCOMES:**

After completion of the course the student will be able to

<b>Si.NO</b>	<b>DESCRIPTION</b>	<b>Blooms' Taxonomy Level</b>
C01	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level:Apply).	Level 3: Apply
C02	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level:Apply).	Level 3: Apply
C03	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level:Apply).	Level 3: Apply
C04	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).	Level 3: Apply
C05	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level:Analyze).	Level 4: Analyze
C06	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).	Level 3: Apply



### CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	2	2	2	1	2	2	2	1	1	1	1	2			
CO 2	2	2	2		1	3	3	1	1		1	1			
CO 3									3	2	2	1			
CO 4					2			3	2	2	3	2			
CO 5	2	3	3	1	2							1			
CO 6					2			2	2	3	1	1			

3/2/1: high/medium/low

### JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/MEDIUM/HIGH	JUSTIFICATION
CO1-PO1	M	Knowledge acquired in the selected area of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of project development.
CO1-PO2	M	Knowledge acquired in the selected area of project development can be used to Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions.
CO1-PO3	M	Can use the acquired knowledge in designing solutions to complex problems.
CO1-PO4	L	Can use research-based knowledge in the design & development of project.
CO1-PO5	M	Knowledge in the area of technology for project development using IT tools makes better modelling.
CO1-PO6	M	Creative project development assess societal, health, safety, legal and cultural issues and the consequent responsibilities.
CO1-PO7	M	Project development based on societal and environmental context solution identification is the need for sustainable development.
CO1-PO8	L	Project development should be based on

		professional ethics and responsibilities.
C01-P011	L	Project development in systematic approach based on managemental principles will provides teamwork.
C01-P012	M	Project brings technological changes in the society.
C01-PS01	H	Acquiring knowledge for project development gather skills in design, analyse, develop and implementation of algorithms.
C01-PS02	H	Knowledge for project development contributes engineering skills in computing & information gatherings.
C01-PS03	H	Knowledge acquire for project development will also include systematic planning, developing, testing and implementation IT solutions in various domain.
C02-P01	H	Projects design and development in systematic approach brings knowledge in mathematics and engineering fundamentals.
C02-P02	H	Identify, formulate and analyse of project makes a systematic approach.
C02-P03	H	Systematic approach is the tip of solving complex problems in various domains.
C02-P04	H	Systematic approach in the technical and design aspects provide valid conclusions.
C02-P05	H	Systematic approach in the technical and design aspects demonstrate the knowledge of sustainable development.
C02-P07	M	Identification and justification of technical aspects of project development demonstrates the need for sustainable development.
C02-P08	H	Apply professional ethics and responsibilities in engineering practice of development.
C02-P010	H	Systematic approach also includes effective reporting and documentation which gives clear instructions.
C02-P011	M	Project development in systematic approach based on managemental principles will provides teamwork.
C02-P012	H	Project development as a team in identification and analysis bring ability to engage in independent and lifelong learning.
C02-	H	Identification, formulation and justification in

PS01		technical aspects will be based on acquiring skills in design and development of algorithms.
C02-PS03	H	Identification, formulation and justification in technical aspects provides the betterment of life in various domains.
C03-P01	H	Students can able to interpret, improve and redefine technical aspects with mathematics, science and engineering fundamentals for the solutions of complex problems.
C03-P02	H	Students can able to interpret, improve and redefine technical aspects with identification formulation and analysis of complex problems.
C03-P03	H	Students can able to interpret, improve and redefine technical aspects meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
C03-P04	H	Students can able to interpret, improve and redefine technical aspects for design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
C03-P05	H	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for interpret, improve and redefine.
C03-P06	M	Students can able to interpret, improve and redefine technical aspects by applying contextual knowledge to assess societal, health and consequential responsibilities relevant to professional engineering practices.
C03-P07	H	Students can able to interpret, improve and redefine technical aspects demonstrate the knowledge of, and need for sustainable development.
C03-P08	H	Students can able to interpret, improve and redefine technical aspects apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C03-P010	M	Students can able to interpret, improve and redefine technical aspects 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.
C03-PO11	H	Students can able to interpret, improve and redefine technical aspects demonstrate knowledge and understanding of the engineering and management principle in multidisciplinary environments.
C03-PO12	H	Students can able to interpret, improve and redefine technical aspects 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.
C03-PSO1	M	Students can able to interpret, improve and redefine technical aspects in acquiring skills to design, analyse and develop algorithms and implement those using high-level programming languages.
C03-PSO2	M	Students can able to interpret, improve and redefine technical aspects contribute their engineering skills in computing and information engineering domains like network design and administration, database design and knowledge engineering.
C03-PSO3	M	Students can able to interpret, improve and redefine technical aspects develop strong skills in systematic planning, developing, testing, implementing and providing IT solutions for different domains which helps in the betterment of life.
C04-PO1	H	Students will be able to associate with a team as an effective team player for the development of technical projects by apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
C04-PO2	H	Students will be able to associate with a team as an effective team player for Identify, formulate, review research literature, and analyze complex engineering problems
C04-PO3	M	Students will be able to associate with a team as an

		effective team player for designing solutions to complex engineering problems and design system components
C04-P04	M	Students will be able to associate with a team as an effective team player use research-based knowledge and research methods including design of experiments, analysis and interpretation of data
C04-P08	H	Students will be able to associate with a team as an effective team player need to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
C04-P09	H	Students will be able to associate with a team as an effective team player will function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
C04-P010	H	Students will be able to associate with a team as an effective team player communicate effectively on complex engineering activities with the engineering community
C04-P011	H	Students will be able to associate with a team as an effective team player 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
C04-P012	H	Students will be able to associate with a team as an effective team player 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
C05-P01	H	Students will be able to report effectively the project related activities and findings by applying engineering specialization to the solution of complex engineering problems.
C05-P05	M	Students will be able to report effectively the project related activities and findings by apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
C05-P08	H	Students will be able to report effectively the project related activities and findings by apply

		ethical principles and commit to professional ethics and responsibilities
C05-PO9	M	Students will be able to report effectively the project related activities and findings which Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
C05-PO10	H	Students will be able to report effectively the project related activities and findings to give and receive clear instructions
C05-PO11	M	Students will be able to report effectively the project related activities and findings to manage projects and in multidisciplinary environments
C05-PO12	3	Students will be able to report effectively the project related activities and findings to engage in independent and life-long learning in the broadest context of technological change

## Marks Distribution

Total Marks
100

### Continuous Internal Evaluation Pattern:

Total: 100 marks (Minimum required to pass: 50 marks).

Project progress evaluation by guide: 30

Marks.Interim evaluation by the Evaluation Committee: 20

Marks.Final Evaluation by the Evaluation Committee: 30

Marks.Project Phase -I Report (By Evaluation Committee): 20

Marks.(The evaluation committee comprises HoD or a senior faculty member, Project coordinator and project supervisor).

### DELIVERY/INSTRUCTIONAL METHODOLOGIES:

CHALK & TALK	STUD. ASSIGNMENT	• WEB RESOURCES
• LCD/SMART BOARDS	• STUD. SEMINARS	<input type="checkbox"/> ADD-ON COURSES

### ASSESSMENT METHODOLOGIES-DIRECT

<input type="checkbox"/> ASSIGNMENTS	<ul style="list-style-type: none"> <li>STUD. SEMINARS</li> </ul>	<input type="checkbox"/> TESTS/MODEL EXAMS	<input type="checkbox"/> UNIV. EXAMINATION
<ul style="list-style-type: none"> <li>STUD. LAB PRACTICES</li> </ul>	<ul style="list-style-type: none"> <li>STUD. VIVA</li> </ul>	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<ul style="list-style-type: none"> <li>ADD ON COURSES</li> </ul>	<input type="checkbox"/> OTHERS		

### ASSESSMENT METHODOLOGIES-INDIRECT

<ul style="list-style-type: none"> <li>ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)</li> </ul>	<ul style="list-style-type: none"> <li>STUDENT FEEDBACK ON FACULTY (TWICE)</li> </ul>
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

**Prepared by**

**Ms.Taniya Shirley Stalin**

**Approved by**

**Dr.Neeba E.A, HOD-IT**

### 8.2 COURSE PLAN

Sl.No	Planned Date	Planned
1	14-Sep-2023	Group and problem statement identification
2	21-Sep-2023	Submission of Project Proposal
3	28-Sep-2023	Abstract Presentation
4	28-Sep-2023	Abstract Presentation
5	3-Oct-2023	Preliminary Presentation

6	6-Oct-2023	Weekly Review
7	10-Oct-2023	Draft final project ppt and project phase1 report submission
8	13-Oct-2023	Design Presentation
9	17-Oct-2023	Design Presentation
10	2-Nov-2023	Submission of Final Project Report