

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: GENERAL ENGLISH I

COURSE CODE: EN18101

CREDITS: 3

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):**Students will be able to:**

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: To Distinguish between words which are either spelt or pronounced alike, yet render distinct meanings; imparting a sound clarity on everyday usage of language, and for developing the art of parallel listening and writing.	II Understanding
CO2	CO2: To Construct vocabulary and to gain understanding on the tense component, a pivotal constituent for language structuring and vocabulary building.	III Applying
CO3	CO3: To Identify with economical word constructions, paying specific attention in constructing sound writing skills.	I Remembering
CO4	CO4: To Interpret functional grammar, the basic part involved in sentence constructing to improve linguistic skills.	V Evaluating
CO5	CO5: To Develop communication skills to provide a platform for language efficiency for effective language delivery.	II Understanding

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		S	H	H		S	H	H	H	S	H
C02	H	H		H		H	H	S		S		
C03		H	H	H	H	H		S	S		H	
C04	H	H	H		H		H	S		H		S
C05	H		H	S	H		H	H		H		H

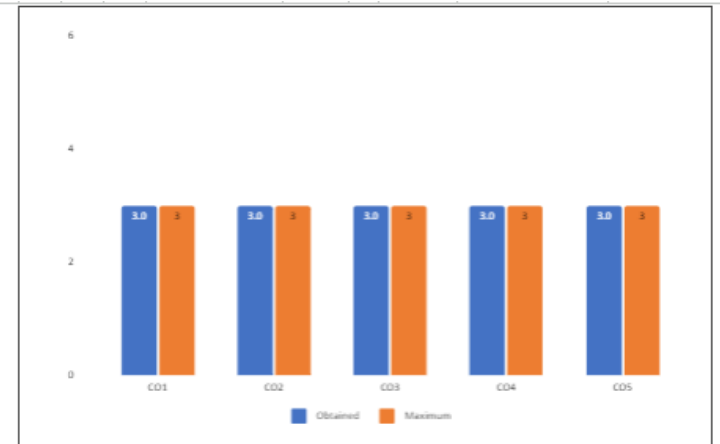
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	93.9	3.0	93.9	3.0	85.7	3.0	3.0	100.0	3.0	3.0	3.0
CO2	100.0	3.0			100.0	3.0			93.9	3.0	85.7	3.0	3.0	100.0	3.0	3.0	3.0
CO3	100.0	3.0	100.0	3.0	100.0	3.0			93.9	3.0	85.7	3.0	3.0	100.0	3.0	3.0	3.0
CO4			100.0	3.0	100.0	3.0			93.9	3.0	85.7	3.0	3.0	100.0	3.0	3.0	3.0
CO5			100.0	3.0	100.0	3.0			93.9	3.0	85.7	3.0	3.0	100.0	3.0	3.0	3.0

AVERAGE	AVERAGE
3	3

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 3			H 3	H 3			H 3
CO2	H 3	H 3		H 3		H 3	H 3	
CO3		H 3	H 3	H 3	H 3	H 3		
CO4	H 3	H 3	H 3		H 3		H 3	
CO5	H 3		H 3		H 3		H 3	H 3
AVERAGE OF COS FOR POS	3	3	3	3	3	3	3	3
AVERAGE OF POS	3	3	3	3	3	3	3	3
AVERAGE	3							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: VALUE EDUCATION & PERSONALITY DEVELOPMENT

COURSE CODE: VE18001

CREDITS: 2

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

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PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Students will be able to differentiate Accepted norms and counter values and be able to identify the various Dimensions of Human Development	IV Analysing
CO2	CO2: Students will be able to demonstrate Love and Experience of God and identify the Basic Issues of Life and Happiness as a life goal	III Applying
CO3	CO3: They will able to understand the importance of concern for others and critique the various problems that deter the growth of the society	II Understanding
CO4	CO4: The students will be able to recognize the traits of a good personality and practice Self exploration	I Remembering
CO5	CO5: Students will be able to interpret the purpose of life and goal setting and demonstrate self-management	II Understanding

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C01	H		H	S	H		H	H		S		
C02	S			H		H		S		H		H
C03	H	S	H	H	H	H	H		H	S		H
C04	S		S		S	S	H	S		H	S	H
C05	H		H			H	S	H		H		S

H: Highly Supportive

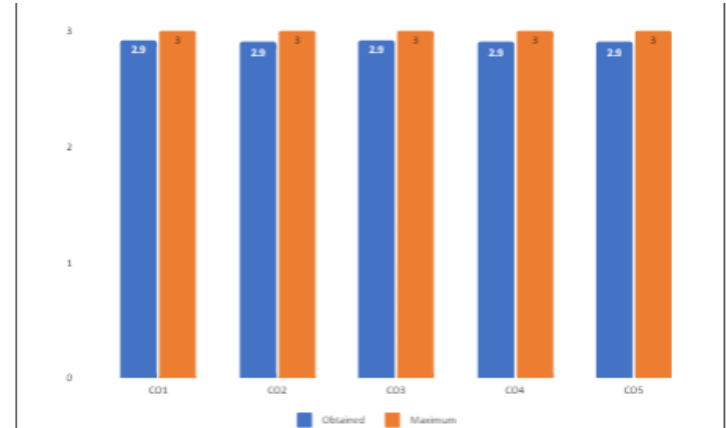
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

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Pass percent between 75% - 85%= 2
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co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	93.9	3.0			95.9	3.0	100.0	3.0	95.9	3.0	79.6	2.0	2.8	100.0	3.0	3.0	2.9
CO2	93.9	3.0			95.9	3.0			95.9	3.0	79.6	2.0	2.8	100.0	3.0	3.0	2.9
CO3	93.9	3.0	87.8	3.0	95.9	3.0			95.9	3.0	79.6	2.0	2.8	100.0	3.0	3.0	2.9
CO4			87.8	3.0	95.9	3.0			95.9	3.0	79.6	2.0	2.8	100.0	3.0	3.0	2.9
CO5			87.8	3.0	95.9	3.0			95.9	3.0	79.6	2.0	2.8	100.0	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.908

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

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OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.92		H 2.92		H 2.92		H 2.92	H 2.92
CO2				H 2.9		H 2.9		
CO3	H 2.92		H 2.92	H 2.92	H 2.92	H 2.92	H 2.92	
CO4							H 2.9	
CO5	H 2.9		H 2.9			H 2.9		H 2.9
AVERAGE OF COS FOR POS	2.913333333		2.913333333	2.91	2.92	2.906666667	2.913333333	2.91
AVERAGE OF POS	.911111111		.911111111	2.91	2.92	.906666666	.911111111	2.905
AVERAGE	2.910714286							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: FUNDAMENTALS OF INFORMATION TECHNOLOGY

COURSE CODE: BS22101

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

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PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Understand basic computer terminology and number systems.	II Understanding
CO2	CO2: Learn about operating systems, and its types.	VI Creating
CO3	CO3: Learn about the applications of Information technology	VI Creating
CO4	CO4: Importance of system development and the phases of SDLC	I Remembering
CO5	CO5: Use of modern means of communications, types of networks and topologies	II Understanding

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S		S				H		S
C02	S	S	S	H	H		S	H		H		H
C03	H	H	S	H	S	H	H	S	H	H		S
C04	H		H	H	H	S		H		H		H
C05	H		S	H	S			H	S	S		H

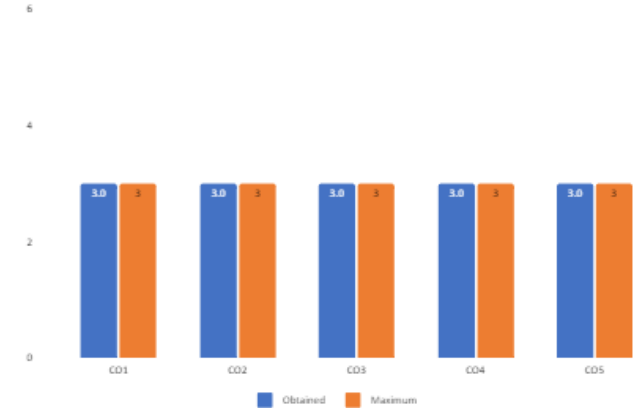
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Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
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 Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	95.9	3.0			100.0	3.0	100.0	3.0	100.0	3.0	98.0	3.0	3.0	100.0	3.0	3.0	3.0
CO2	95.9	3.0			100.0	3.0			100.0	3.0	98.0	3.0	3.0	100.0	3.0	3.0	3.0
CO3	95.9	3.0	100.0	3.0	100.0	3.0			100.0	3.0	98.0	3.0	3.0	100.0	3.0	3.0	3.0
CO4			100.0	3.0	100.0	3.0			100.0	3.0	98.0	3.0	3.0	100.0	3.0	3.0	3.0
CO5			100.0	3.0	100.0	3.0			100.0	3.0	98.0	3.0	3.0	100.0	3.0	3.0	3.0

AVERAGE	AVERAGE
3	3

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

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OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 3		H 3					
CO2				H 3	H 3			H 3
CO3	H 3	H 3		H 3		H 3	H 3	
CO4	H 3		H 3	H 3	H 3			H 3
CO5	H 3			H 3				H 3
AVERAGE OF COS FOR POS	3	3	3	3	3	3	3	3
AVERAGE OF POS	3	3	3	3	3	3	3	3
AVERAGE	3							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DIFFERENTIAL EQUATIONS AND NUMERICAL ANALYSIS

COURSE CODE: DS19102

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

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PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible **approach and derive insights from it.**

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Classify the differential equations with respect to their order and linearity. Solve differential equations of first order using numerical and analytical methods such as Integrating Factors.	IV Analyzing
CO2	CO2: Analyze and Solve basic application problems described by first order differential equations. such as orthogonal trajectories	IV Analyzing
CO3	CO3: Solve second order Homogeneous Equations with Constant Coefficients. Obtain exact and Numerical solutions using differential equations technology.	V Evaluating
CO4	CO4: Analyse and evaluate the accuracy of common numerical methods.	IV Analyzing

CO5	CO5: Select appropriate numerical methods to apply to various types of problems in engineering and science in consideration of the mathematical operations.	V Evaluating
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Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		S	S	H	H	S			S	S	H
C02	H		H	H			H	S		S		S
C03	S			H	H	S	H	H	H	H		H
C04	H		H	S	H	H	H	S	S	H	H	S
C05	H		H	H	S		S	H		H		H

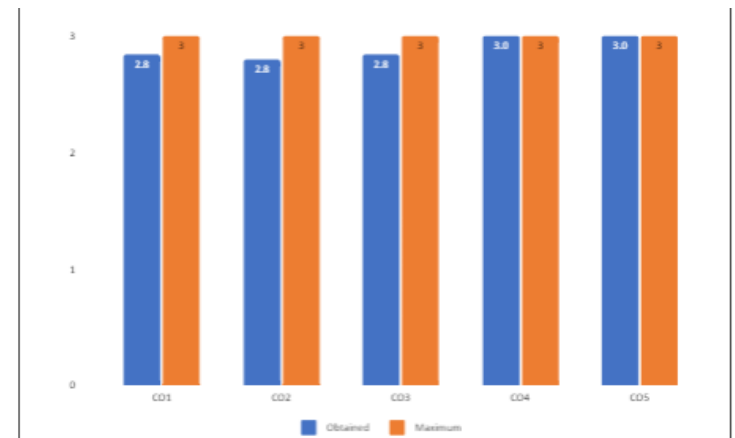
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co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	71.4	1.0			100.0	3.0	100.0	3.0	100.0	3.0	93.9	3.0	2.6	95.9	3.0	3.0	2.8
CO2	71.4	1.0			100.0	3.0			100.0	3.0	93.9	3.0	2.5	95.9	3.0	3.0	2.8
CO3	71.4	1.0	100.0	3.0	100.0	3.0			100.0	3.0	93.9	3.0	2.6	95.9	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	93.9	3.0	3.0	95.9	3.0	3.0	3.0
CO5			100.0	3.0	100.0	3.0			100.0	3.0	93.9	3.0	3.0	95.9	3.0	3.0	3.0

AVERAGE	AVERAGE
3	2.896

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CO1	H 2.84				H 2.84	H 2.84		
CO2	H 2.8		H 2.8	H 2.8			H 2.8	
CO3				H 2.84	H 2.84		H 2.84	H 2.84
CO4	H 3		H 3		H 3	H 3	H 3	
CO5	H 3		H 3	H 3				H 3
AVERAGE OF COS FOR POS	2.91		2.933333333	2.88	2.893333333	2.92	2.88	2.92
AVERAGE OF POS	2.9275		.93333333	2.88	.91111111	2.96	2.88	2.92
AVERAGE	2.915992063							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DESCRIPTIVE STATISTICS & PROBABILITY

COURSE CODE: BS19025

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

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PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Organize , manage and present data and Analyze statistical data using measures of central tendency	VI Creating
CO2	CO2: Analyze the statistical data using dispersion and location.	IV Analyzing
CO3	CO3: Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.	II Understanding
CO4	CO4: Develop the probability density function of transformation of random variables.	III Applying
CO5	CO5: : Identify probabilities, and derive the marginal and conditional distributions of bivariate random variables.	IV Analyzing

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		S	H	H	S	H	H	H	H		H
C02	H	S	H	H		H	H	H		H		H
C03	H	H	S	H	S	H	S	S		S		S
C04	H		H	H	H		H	H		H		S
C05	H	H	H	H	H		H	S		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

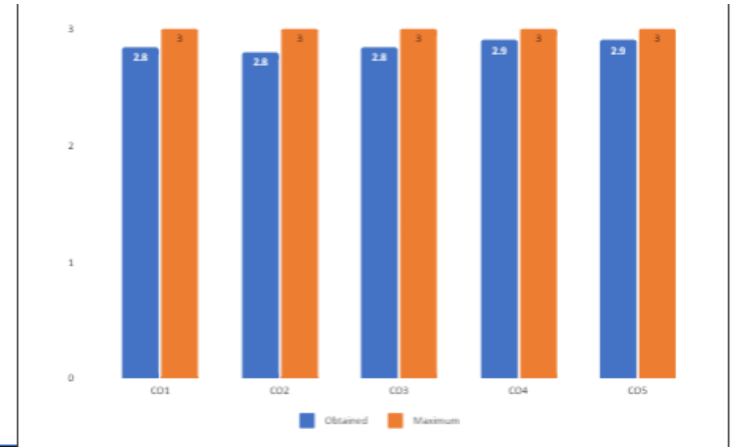
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	83.7	2.0			100.0	3.0	100.0	3.0	100.0	3.0	81.6	2.0	2.6	93.9	3.0	3.0	2.8
CO2	83.7	2.0			100.0	3.0			100.0	3.0	81.6	2.0	2.5	93.9	3.0	3.0	2.8
CO3	83.7	2.0	100.0	3.0	100.0	3.0			100.0	3.0	81.6	2.0	2.6	93.9	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	81.6	2.0	2.8	93.9	3.0	3.0	2.9
CO5			100.0	3.0	100.0	3.0			100.0	3.0	81.6	2.0	2.8	93.9	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.856

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84			H 2.84	H 2.84		H 2.84	H 2.84
CO2	H 2.8		H 2.8	H 2.8		H 2.8	H 2.8	H 2.8
CO3	H 2.84	H 2.84		H 2.84		H 2.84		
CO4	H 2.9		H 2.9	H 2.9	H 2.9		H 2.9	H 2.9
CO5	H 2.9	H 2.9	H 2.9	H 2.9	H 2.9		H 2.9	
AVERAGE OF COS FOR POS	2.856	2.87	2.86666667	2.856	2.88	2.82	2.86	2.84666667
AVERAGE OF POS	2.8592	2.87	.86666666	2.8592	.89333333	2.82	2.865	.84888888
AVERAGE	2.860286111							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: PROBLEM SOLVING AND PROGRAMMING THROUGH C

COURSE CODE: DS22103

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):**Students will be able to:**

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Understand the basic introduction of computer and programming language	II Understanding
CO2	CO2: Identify 'C' data types, operators and data input /output functions	IV Analyzing
CO3	CO3: Categorize 'C' control structures, arrays and string concept.	VI Creating
CO4	CO4: Explain 'C' function, recursion, pointers and dynamic memory allocation	II Understanding
CO5	CO5: Express the concept of structures, union and file handling in 'C'.	I Remembering

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		S	H	H	H	S	H		H		S
C02	H	H	H	S		H	H	S				H
C03	H	H	S	H	S		H	H		S		H
C04	H	S	H	H	H	H	S	H		H		H
C05	H		H	S	H	S	H	S		H		

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

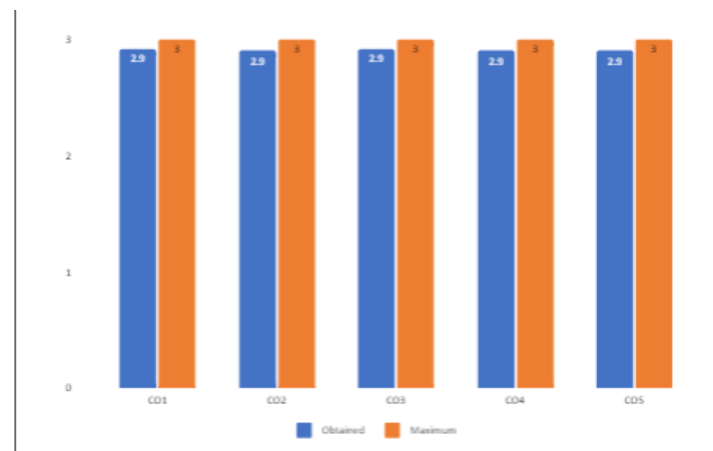
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	91.8	3.0			100.0	3.0	100.0	3.0	100.0	3.0	79.6	2.0	2.8	93.9	3.0	3.0	2.9
CO2	91.8	3.0			100.0	3.0			100.0	3.0	79.6	2.0	2.8	93.9	3.0	3.0	2.9
CO3	91.8	3.0	91.8	3.0	100.0	3.0			100.0	3.0	79.6	2.0	2.8	93.9	3.0	3.0	2.9
CO4			91.8	3.0	100.0	3.0			100.0	3.0	79.6	2.0	2.8	93.9	3.0	3.0	2.9
CO5			91.8	3.0	100.0	3.0			100.0	3.0	79.6	2.0	2.8	93.9	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.908

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.92			H 2.92	H 2.92	H 2.92		H 2.92
CO2	H 2.9	H 2.9	H 2.9			H 2.9	H 2.9	
CO3	H 2.92	H 2.92		H 2.92			H 2.92	H 2.92
CO4	H 2.9		H 2.9	H 2.9	H 2.9	H 2.9		H 2.9
CO5	H 2.9		H 2.9		H 2.9		H 2.9	
AVERAGE OF COS FOR POS	2.908	2.91	2.9	2.913333333	2.906666667	2.906666667	2.906666667	2.913333333
AVERAGE OF POS	2.9056	2.91	2.9	.911111111	.902222222	.902222222	.906666666	.911111111
AVERAGE	2.906116667							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: ENVIRONMENTAL STUDIES AND GENDER SENSITIZATION

COURSE CODE: ES18001

CREDITS: 3

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Understand the importance of environmental education, conservation of natural resources & understand the importance of ecosystems and biodiversity	II Understanding
CO2	CO2: Understand the pollution problems and apply the environmental science knowledge on solid waste management, disaster management	II Understanding
CO3	CO3: Apply the environmental science knowledge to improve the resources Evaluate and understand the sustainable environmental conditions and control methods	III Applying

CO4	CO4: Identify the interactions and intersections of identities (e.g., gender, race, ethnicity, class, sexuality, and so on) and assess the ways in which they contribute to instances of privilege and power dynamics across cultures, space, and time. And their problems	IV Analyzing
CO5	CO5: Understand the gender problems and ways of addressing them, including interactions across local to global scales in communities and overcome inequalities with legislations	II Understanding

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	S	H	S	S	H	S	H	H	S	S	H
C02				H		S	H	S	H	H	H	H
C03	S	H	H	S	H	H	S	H				H
C04	H	S	S		S			H	S	H	S	S
C05	S	H	H	S	S	H	S	H		S		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

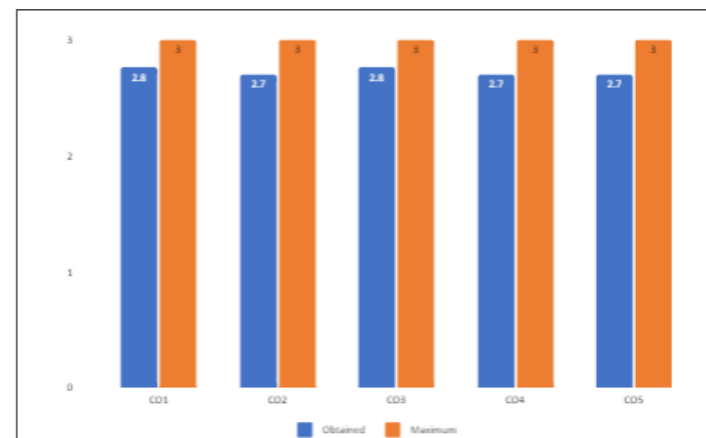
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	50.0	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	50.0	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	50.0	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	50.0	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	50.0	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76			H 2.76		H 2.76
CO2				H 2.7			H 2.7	
CO3		H 2.76	H 2.76		H 2.76	H 2.76		H 2.76
CO4	H 2.7							H 2.7
CO5		H 2.7	H 2.7			H 2.7		H 2.7
AVERAGE OF COS FOR POS	2.73	2.73	2.74	2.7	2.76	2.74	2.7	2.73
AVERAGE OF POS	2.715	2.73	.73333333	2.7	2.76	.73333333	2.7	2.7225
AVERAGE	2.724270833							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: PYTHON PROGRAMMING

COURSE CODE: DS20301

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Implement the structure and components of a Python program.	III Applying
CO2	CO2: Choose appropriate data structures.	II Understanding
CO3	CO3: Interpret how to write classes and create objects.	V Evaluating
CO4	CO4: Explain how to use Inheritance and Threads.	II Understanding
CO5	CO5: Create basic GUI programs and Database Connectivity.	VI Creating

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	H	S		S		S		H
C02	H	S	H	H			H				H	
C03	H		H	S	H	H	H	H		H	H	
C04	H	H	S	S	S	H		S		H	S	S
C05	H		H	H			S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

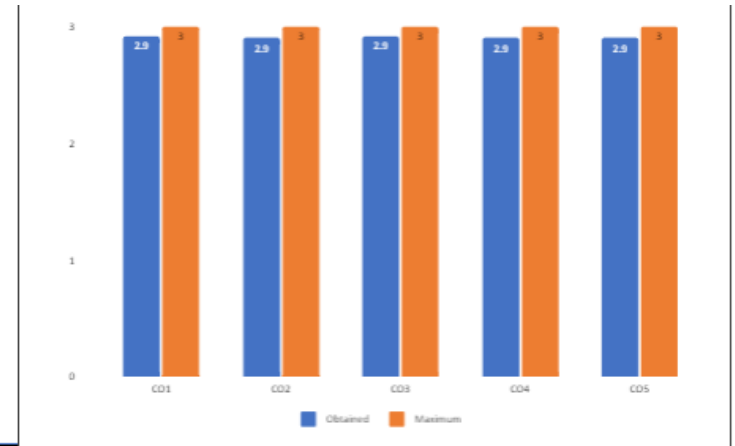
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	76.0	2.0	2.8	100.0	3.0	3.0	2.9
CO2	100.0	3.0			100.0	3.0			100.0	3.0	76.0	2.0	2.8	100.0	3.0	3.0	2.9
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	76.0	2.0	2.8	100.0	3.0	3.0	2.9
CO4			100.0	3.0	100.0	3.0			100.0	3.0	76.0	2.0	2.8	100.0	3.0	3.0	2.9
CO5			100.0	3.0	100.0	3.0			100.0	3.0	76.0	2.0	2.8	100.0	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.908

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.92	H 2.92	H 2.92		H 2.92			
CO2	H 2.9		H 2.9	H 2.9			H 2.9	
CO3	H 2.92		H 2.92		H 2.92	H 2.92	H 2.92	H 2.92
CO4	H 2.9	H 2.9				H 2.9		
CO5	H 2.9		H 2.9	H 2.9				H 2.9
AVERAGE OF COS FOR POS	2.908	2.91	2.91	2.9	2.92	2.91	2.91	2.91
AVERAGE OF POS	2.9056	2.905	2.9075	2.9	2.92	2.91	2.91	2.91
AVERAGE	2.9085125							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: COMPUTER ORGANIZATION

COURSE CODE: DS18302

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Understand basic Circuit designing and number systems	II Understanding
CO2	CO2: Explain about how data transferred from one register to another register	VI Creating
CO3	CO3: Construct designing of control unit and Central Processing Unit	III Applying
CO4	CO4: Classify different types of computer arithmetic operations	IV Analyzing
CO5	CO5: Categorize all peripheral devices and memory	IV Analyzing

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S			S	S		S		H
C02	H	H		H		H	H	H		H		H
C03	S	H	H		H		H	S		H		S
C04	H	S	S	H	H	S	H	S		S		S
C05	H		H	H	S		S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

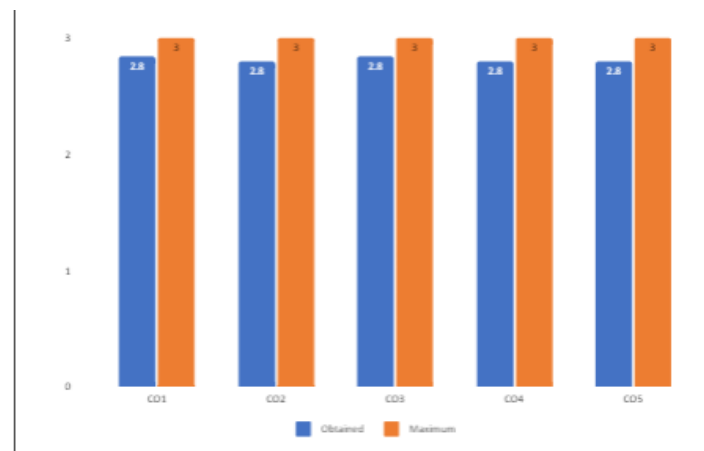
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	90.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	68.0	1.0	2.5	96.0	3.0	3.0	2.8
CO2	90.0	3.0			100.0	3.0			100.0	3.0	68.0	1.0	2.5	96.0	3.0	3.0	2.8
CO3	90.0	3.0	96.0	3.0	100.0	3.0			100.0	3.0	68.0	1.0	2.5	96.0	3.0	3.0	2.8
CO4			96.0	3.0	100.0	3.0			100.0	3.0	68.0	1.0	2.5	96.0	3.0	3.0	2.8
CO5			96.0	3.0	100.0	3.0			100.0	3.0	68.0	1.0	2.5	96.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84		H 2.84					
CO2	H 2.8	H 2.8		H 2.8		H 2.8	H 2.8	H 2.8
CO3		H 2.84	H 2.84		H 2.84		H 2.84	
CO4	H 2.8			H 2.8	H 2.8		H 2.8	
CO5	H 2.8		H 2.8	H 2.8				H 2.8
AVERAGE OF COS FOR POS	2.81	2.82	2.826666667	2.8	2.82	2.8	2.813333333	2.8
AVERAGE OF POS	2.8025	2.82	.82222222	2.8	2.82	2.8	.81333333	2.8
AVERAGE	2.809756944							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: STATISTICAL METHODS

COURSE CODE:BS20038

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Interpret the correlation between two variables.	II Understanding
CO2	CO2: Distinguish the principles of linear regression and correlation, including least square method, predicting a particular value of Y for a given value of X and significance of the correlation coefficient	IV Analyzing
CO3	CO3: Show the association between the attributes.	III Applying
CO4	CO4: Generalize the properties of estimators.	II Understanding
CO5	CO5: Differentiate Maximum likely hood estimation and method of moments	IV Analyzing

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S	H		S	S		S		H
C02	H		S	H			S	H		H	S	H
C03	H		H	S	H		H	S	H	S	H	H
C04	S		H	H	S		H	H	S	H		S
C05	H		S	H	S		S	H	H	H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

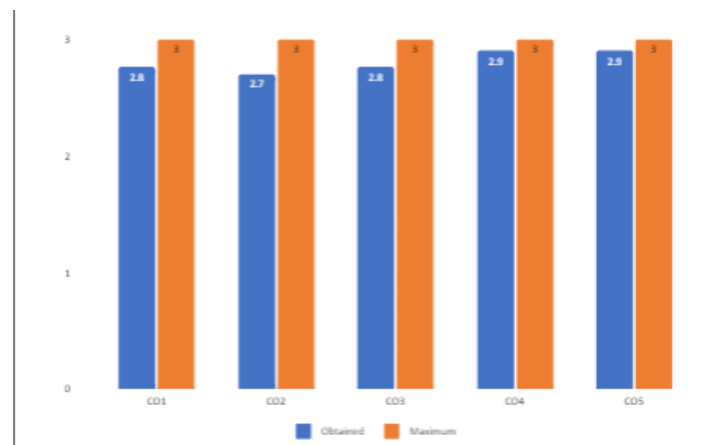
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	70.0	1.0			100.0	3.0	100.0	3.0	100.0	3.0	84.0	2.0	2.4	88.0	3.0	3.0	2.8
CO2	70.0	1.0			100.0	3.0			100.0	3.0	84.0	2.0	2.3	88.0	3.0	3.0	2.7
CO3	70.0	1.0	90.0	3.0	100.0	3.0			100.0	3.0	84.0	2.0	2.4	88.0	3.0	3.0	2.8
CO4			90.0	3.0	100.0	3.0			100.0	3.0	84.0	2.0	2.8	88.0	3.0	3.0	2.9
CO5			90.0	3.0	100.0	3.0			100.0	3.0	84.0	2.0	2.8	88.0	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.804

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76		H 2.76			
CO2	H 2.7			H 2.7				H 2.7
CO3	H 2.76		H 2.76		H 2.76		H 2.76	
CO4			H 2.9	H 2.9			H 2.9	H 2.9
CO5	H 2.9			H 2.9				H 2.9
AVERAGE OF COS FOR POS	2.78		2.806666667	2.833333333	2.76		2.83	2.833333333
AVERAGE OF POS	2.785		.82222222	.83333333	2.76		2.83	.83333333
AVERAGE	2.810648148							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DATABASE MANAGEMENT SYSTEMS

COURSE CODE: DS18303

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: To describe Entity Relationship and Enhanced ER model.	V Evaluating
CO2	CO2: To understand the relational model, reduction to relation schema, relational algebra and normalization.	II Understanding
CO3	CO3: To use SQL- the standard language of relational databases and PL/SQL programming.	III Applying
CO4	CO4: To understand the storage and file structure, storage access, indexing and hashing techniques of the database.	II Understanding

CO5	CO5: To understand the concept of Transactions, recovery system and concurrency control.	II Understanding
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Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	H		S	H		S		H
C02	H		S	H		H	H	S	H	H		H
C03	H	H	H	H	H	H	H	S	H	H		H
C04	H	H	H	H	S	S	H	S	S	H		S
C05	H		H	H	S	H	S	H	H	H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

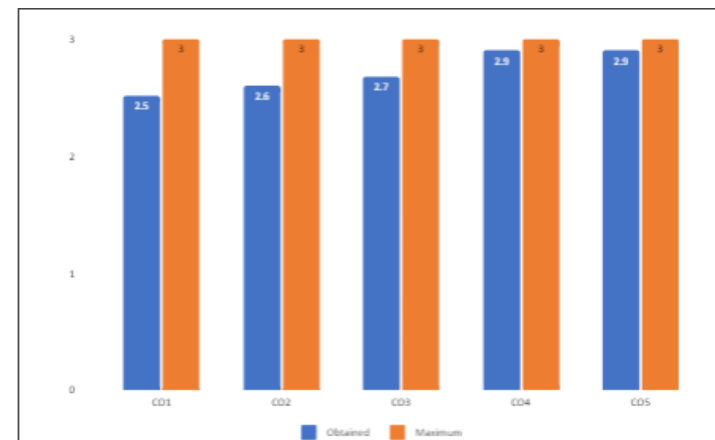
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	40.0	0.0			92.0	3.0	66.0	1.0	100.0	3.0	84.0	2.0	1.8	100.0	3.0	3.0	2.5
CO2	40.0	0.0			92.0	3.0			100.0	3.0	84.0	2.0	2.0	100.0	3.0	3.0	2.6
CO3	40.0	0.0	90.0	3.0	92.0	3.0			100.0	3.0	84.0	2.0	2.2	100.0	3.0	3.0	2.7
CO4			90.0	3.0	92.0	3.0			100.0	3.0	84.0	2.0	2.8	100.0	3.0	3.0	2.9
CO5			90.0	3.0	92.0	3.0			100.0	3.0	84.0	2.0	2.8	100.0	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.72

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.52	H 2.52	H 2.52		H 2.52			H 2.52
CO2	H 2.6			H 2.6		H 2.6	H 2.6	
CO3	H 2.68	H 2.68	H 2.68	H 2.68	H 2.68	H 2.68	H 2.68	
CO4	H 2.9	H 2.9	H 2.9	H 2.9			H 2.9	
CO5	H 2.9		H 2.9	H 2.9		H 2.9		H 2.9
AVERAGE OF COS FOR POS	2.72	2.7	2.75	2.77	2.6	2.726666667	2.726666667	2.71
AVERAGE OF POS	2.76	2.76	2.8075	2.77	2.64	.726666666	.726666666	2.805
AVERAGE	2.749479167							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: OPERATION RESEARCH

COURSE CODE: BS21048

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Identify the various techniques of operations research and to translate a real-world problems, given in words, into a mathematical formulation.	IV Analyzing
CO2	CO2: Construct the simplex table and to plan the optimum results.	III Applying
CO3	CO3: Use the program for optimizing the cost involved in transportation problems.	III Applying
CO4	CO4: Develop and solve transformation models and assignment models.	III Applying
CO5	CO5: Design the sequence of jobs and to make up the total process time.	IV Analyzing

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S	H		S	S		S		H
C02	H		S	H	H	H	H	H		H		H
C03	H		H	H	H	H	H	S		H		H
C04	H		H	H	S	S	H	H		H		S

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

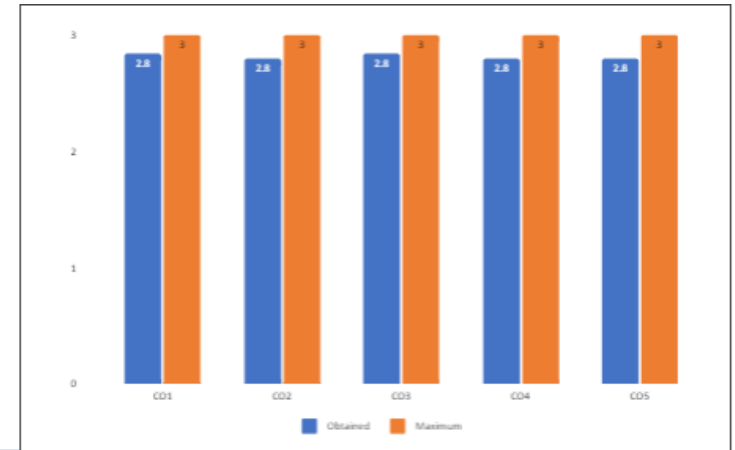
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	96.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	66.0	1.0	2.6	100.0	3.0	3.0	2.8
CO2	96.0	3.0			100.0	3.0			100.0	3.0	66.0	1.0	2.5	100.0	3.0	3.0	2.8
CO3	96.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	66.0	1.0	2.6	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	66.0	1.0	2.5	100.0	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	66.0	1.0	2.5	100.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84		H 2.84		H 2.84			
CO2	H 2.8			H 2.8	H 2.8	H 2.8	H 2.8	H 2.8
CO3	H 2.84		H 2.84	H 2.84	H 2.84	H 2.84	H 2.84	
CO4	H 2.8		H 2.8	H 2.8			H 2.8	H 2.8
CO5	H 2.8		H 2.8	H 2.8				H 2.8
AVERAGE OF COS FOR POS	2.816		2.82	2.81	2.826666667	2.82	2.813333333	2.8
AVERAGE OF POS	2.8112		2.815	2.81	.82222222	2.82	.81333333	2.8
AVERAGE	2.813107937							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DATA VISUALIZATION TOOLS

COURSE CODE:DS21501

CREDITS: 3

DEPARTMENT: B. Sc. MATHEMATICS, STATISTICS & COMPUTER SCIENCE

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Understand the way of representing visual data and its applications.	II Understanding
CO2	CO2: Demonstrate data visualization using combination of various charts.	VI Creating
CO3	CO3: Apply visualizing techniques using matplotlib package.	III Applying
CO4	CO4: Design effective graphical analysis in R.	IV Analyzing
CO5	CO5: Construct data visualizations with Tableau to create customized dashboards and report.	III Applying

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S	H		S	S		S		H
C02	H		H	H		H	H	H		H		H
C03	S		H	H	H	H	H	H		H		H
C04	H		H	H	S	S	H	H		H		S
C05	H		H	H	S		S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

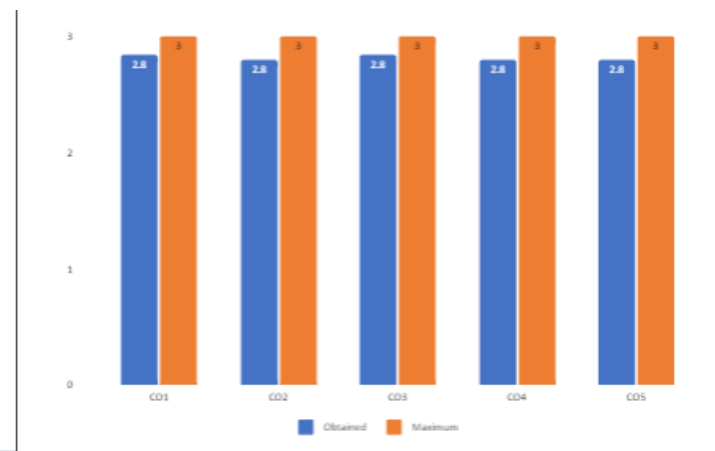
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	70.0	1.0	2.6	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	70.0	1.0	2.5	100.0	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	70.0	1.0	2.6	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	70.0	1.0	2.5	100.0	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	70.0	1.0	2.5	100.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84		H 2.84		H 2.84			
CO2	H 2.8		H 2.8	H 2.8		H 2.8	H 2.8	H 2.8
CO3			H 2.84	H 2.84	H 2.84	H 2.84	H 2.84	H 2.84
CO4	H 2.8		H 2.8	H 2.8			H 2.8	H 2.8
CO5	H 2.8		H 2.8	H 2.8				H 2.8
AVERAGE OF COS FOR POS	2.81		2.816	2.81	2.84	2.82	2.813333333	2.81
AVERAGE OF POS	2.8025		2.8112	2.81	2.84	2.82	.81333333	2.81
AVERAGE	2.815290476							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: SOFTWARE ENGINEERING

COURSE CODE: DS21502A

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Explain engineering through various process models.	V Evaluating
CO2	CO2: Identify analyze Requirements, Object Oriented and various modeling's.	IV Analyzing
CO3	CO3: Categorize design and architecture	IV Analyzing
CO4	CO4: Classify Components, golden rules and design evaluation	IV Analyzing
CO5	CO5: To understand testing techniques to evaluate quality metrics	II Understanding

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S	H		S	S		S		H
C02	H	H	H	H		H	H	H		H	H	H
C03	S		H	H	H	H	H	H	S	H	H	H
C04	H	H	H	H	S		H	H	H	H		S
C05	H	S	H	H	S		S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

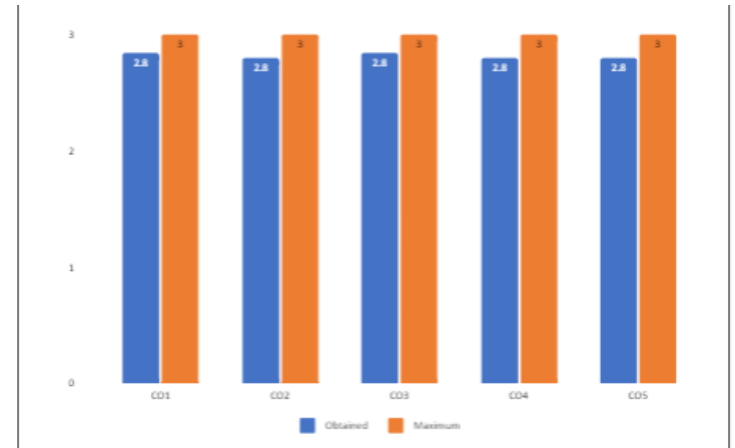
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	69.6	1.0	2.5	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	69.6	1.0	2.5	100.0	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	69.6	1.0	2.5	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	69.6	1.0	2.5	100.0	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	69.6	1.0	2.5	100.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84		H 2.84		H 2.84			
CO2	H 2.8	H 2.8	H 2.8	H 2.8		H 2.8	H 2.8	H 2.8
CO3			H 2.84	H 2.84	H 2.84	H 2.84	H 2.84	H 2.84
CO4	H 2.8	H 2.8	H 2.8	H 2.8			H 2.8	H 2.8
CO5	H 2.8		H 2.8	H 2.8				H 2.8
AVERAGE OF COS FOR POS	2.81	2.8	2.816	2.81	2.84	2.82	2.813333333	2.81
AVERAGE OF POS	2.8025	2.8	2.8112	2.81	2.84	2.82	.81333333	2.81
AVERAGE	2.813379167							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: TEXT DATA ANALYTICS

COURSE CODE: DS21502B

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	Students will be able to understand the basic issues and types of text analytics.	V Evaluating
CO2	To understand the role played by text mining in Information Retrieval and Extraction.	IV Analyzing
CO3	To appreciate the current trends in text analytics.	IV Analyzing
CO4	Students will be able to identify the different features that can be mined from text and web documents	IV Analyzing
CO5	Students will be able to use available open source classification and clustering tools on some standard text data sets.	II Understanding

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S	H		S	S				H
C02	S	H	S	H		H	H	H		H	H	H
C03	S		H	H	H	H	H	H		S	S	H
C04	H	S	H	H	S		H	S		H		S
C05	H	H	H	H	S	S	S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

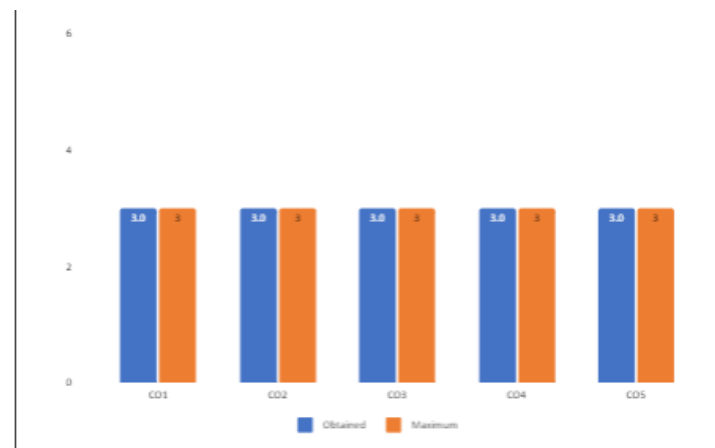
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	96.3	3.0			100.0	3.0	100.0	3.0	100.0	3.0	100.0	3.0	3.0	100.0	3.0	3.0	3.0
CO2	96.3	3.0			100.0	3.0			100.0	3.0	100.0	3.0	3.0	100.0	3.0	3.0	3.0
CO3	96.3	3.0	96.3	3.0	100.0	3.0			100.0	3.0	100.0	3.0	3.0	100.0	3.0	3.0	3.0
CO4			96.3	3.0	100.0	3.0			100.0	3.0	100.0	3.0	3.0	100.0	3.0	3.0	3.0
CO5			96.3	3.0	100.0	3.0			100.0	3.0	100.0	3.0	3.0	100.0	3.0	3.0	3.0

AVERAGE	AVERAGE
3	3

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 3		H 3		H 3			
CO2		H 3		H 3		H 3	H 3	H 3
CO3			H 3	H 3	H 3	H 3	H 3	H 3
CO4	H 3		H 3	H 3			H 3	
CO5	H 3	H 3	H 3	H 3				H 3
AVERAGE OF COS FOR POS	3	3	3	3	3	3	3	3
AVERAGE OF POS	3	3	3	3	3	3	3	3
AVERAGE	3							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: MACHINE LEARNING TECHNIQUES

COURSE CODE: DS18503

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	II Understanding
CO2	CO2: Classify the learning algorithms and apply to the given data set.	IV Analyzing
CO3	CO3: Identify the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.	IV Analyzing
CO4	CO4: Evaluate and interpret the results of the algorithms.	II Understanding
CO5	CO5: Design and implement machine learning solutions to classification, regression and clustering problems	IV Applying

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H		H	S	S		S	S		S		H
C02	S		S	H		H	H	S	H	H		H
C03	H		H	H	H	H	H	H	H	H	S	H
C04	H		H	H	S	S	H	H	S	H	H	S
C05	H		H	H	S		S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

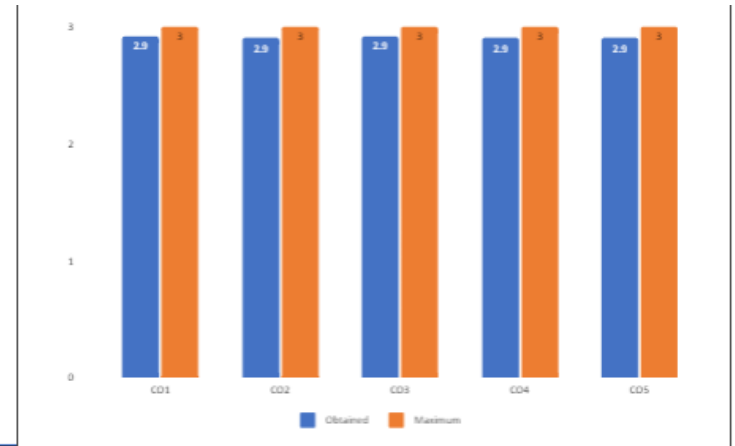
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	82.0	2.0	2.8	100.0	3.0	3.0	2.9
CO2	100.0	3.0			100.0	3.0			100.0	3.0	82.0	2.0	2.8	100.0	3.0	3.0	2.9
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	82.0	2.0	2.8	100.0	3.0	3.0	2.9
CO4			100.0	3.0	100.0	3.0			100.0	3.0	82.0	2.0	2.8	100.0	3.0	3.0	2.9
CO5			100.0	3.0	100.0	3.0			100.0	3.0	82.0	2.0	2.8	100.0	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.908

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.92		H 2.92					
CO2				H 2.9		H 2.9	H 2.9	
CO3	H 2.92		H 2.92	H 2.92	H 2.92	H 2.92	H 2.92	H 2.92
CO4	H 2.9		H 2.9	H 2.9			H 2.9	H 2.9
CO5	H 2.9		H 2.9	H 2.9				H 2.9
AVERAGE OF COS FOR POS	2.91		2.91	2.905	2.92	2.91	2.906666667	2.906666667
AVERAGE OF POS	2.9075		2.9075	2.905	2.92	2.91	.90666666	.90666666
AVERAGE	2.909047619							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: Artificial Intelligence

COURSE CODE: DS21504

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	IV Applying
CO2	CO2: Understand predicate logic and transform the real life information in different representation.	II Understanding
CO3	CO3: Understand formal methods of knowledge representation.	II Understanding
CO4	CO4: Analyze the underlying mathematical relationships and build expert system.	IV Analyzing
CO5	CO5: Demonstrate Knowledge representation techniques.	V Evaluating

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	H	S	S	H		S		H
C02	H	S	H	H		H	H	S	H	H	H	H
C03	S	H	H	H	H	H	H	H	S	H	H	H
C04	H		H	H	S	S	H	S		H		S
C05	H		H	H	S	H	S	H		H	S	H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

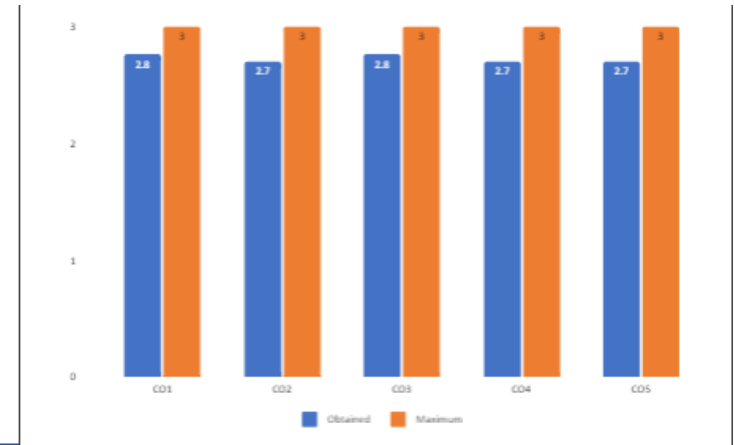
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	46.0	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	46.0	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	46.0	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	46.0	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	46.0	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76	H 2.76	H 2.76		H 2.76			H 2.76
CO2	H 2.7		H 2.7	H 2.7		H 2.7	H 2.7	
CO3		H 2.76	H 2.76	H 2.76	H 2.76	H 2.76	H 2.76	H 2.76
CO4	H 2.7		H 2.7	H 2.7			H 2.7	
CO5	H 2.7		H 2.7	H 2.7		H 2.7		H 2.7
AVERAGE OF COS FOR POS	2.715	2.76	2.724	2.715	2.76	2.72	2.72	2.74
AVERAGE OF POS	2.70375	2.76	2.7168	2.715	2.76	2.72	2.72	.73333333
AVERAGE	2.728610417							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: APPLIED STATISTICS

COURSE CODE: DS21507

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	IV Applying
CO2	CO2: Understand predicate logic and transform the real life information in different representation.	II Understanding
CO3	CO3: Understand formal methods of knowledge representation	II Understanding
CO4	CO4: Analyze the underlying mathematical relationships and build expert system	IV Analyzing
CO5	CO5: Demonstrate Knowledge representation techniques	V Evaluating

Table 1: CO, PO, PSO MAPPING

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	H	H	S	S		S		H
C02	H	S	S	H	H	H	H	H	S	H	H	H
C03	H		H	H	H	H	H	H	S	H		H
C04	S		H	H	S	H	H	S	H	H	H	S
C05	H		H	H	S		S	H		H		H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

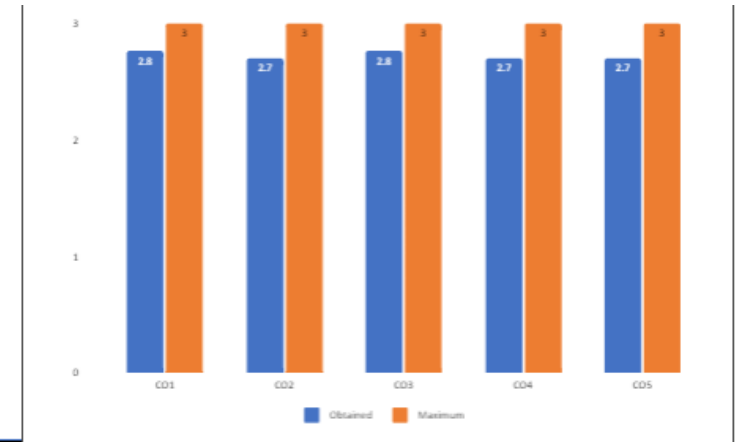
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam			co wise total average
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average	
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	58.0	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	58.0	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	94.0	3.0	100.0	3.0			100.0	3.0	58.0	0.0	2.4	100.0	3.0	3.0	2.8
CO4			94.0	3.0	100.0	3.0			100.0	3.0	58.0	0.0	2.3	100.0	3.0	3.0	2.7
CO5			94.0	3.0	100.0	3.0			100.0	3.0	58.0	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76	H 2.76	H 2.76		H 2.76	H 2.76		
CO2	H 2.7			H 2.7	H 2.7	H 2.7	H 2.7	H 2.7
CO3	H 2.76		H 2.76	H 2.76	H 2.76	H 2.76	H 2.76	H 2.76
CO4			H 2.7	H 2.7		H 2.7	H 2.7	
CO5	H 2.7		H 2.7	H 2.7				H 2.7
AVERAGE OF COS FOR POS	2.73	2.76	2.73	2.715	2.74	2.73	2.72	2.72
AVERAGE OF POS	2.7225	2.76	2.7225	2.715	.73333333	2.7225	2.72	2.72
AVERAGE	2.726979167							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: GENERAL ENGLISH II

COURSE CODE: EN18201

CREDITS: 3

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern technology and IT tools to complex science and technological activities
- **PO5: Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable Development.
- **PO6: Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7: Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	To Identify a sound understanding on the formation of words and to demonstrate the functional grammatical component in the sentence. (IV analyze)	I Remembering
CO2	To Paraphrase ideas and thoughts in a coherent, neat and organized manner in order to utilize the writing skills for sound writing propagandas. (II understand)	II Understanding
CO3	To Create an understanding on Indian Literature, alongside to develop and chisel their communication skills. (VI create)	VI Creating
CO4	To Recognize the moral element which underlies in the short story; an exposure to informal language.(I knowledge)	VI Creating
CO5	To Develop listening and speaking skills through effective sentence constructions and efficient delivery .(VI create)	II Understanding

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H		S	H				S		H	S
C02			S			S	H			S		
C03	H			H				S		H		
C04		S			S				H			
C05	H		H			H	S	S			S	H

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

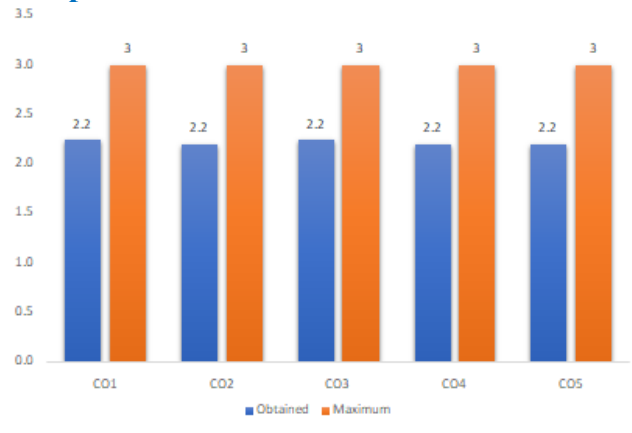
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	98.0	3.0			98.0	3.0	100.0	3.0	100.0	3.0	67.3	1.0	2.6	75.5	2.0	2.0	2.2
CO2	98.0	3.0			98.0	3.0			100.0	3.0	67.3	1.0	2.5	75.5	2.0	2.0	2.2
CO3	98.0	3.0	100.0	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.6	75.5	2.0	2.0	2.2
CO4			100.0	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.5	75.5	2.0	2.0	2.2
CO5			100.0	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.5	75.5	2.0	2.0	2.2

AVERAGE	AVERAGE
2	2.216

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 2.24			H 2.24			
CO2							H 2.2	
CO3	H 2.24			H 2.24				
CO4								
CO5	H 2.2		H 2.2			H 2.2		
AVERAGE OF COS FOR POS	2.22	2.24	2.2	2.24	2.24	2.2	2.2	
AVERAGE OF POS	2.22	2.24	2.2	2.24	2.24	2.2	2.2	
AVERAGE	2.22							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: INDIAN HERITAGE AND CULTURE

COURSE CODE: ICI9001

CREDITS: 2

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern technology and IT tools to complex science and technological activities
- **PO5: Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable Development.
- **PO6: Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7: Communication:** Communicate effectively on complex science & technology activities

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	The student can understand better about the origin of ancient Indian culture and the contributions of great rulers from both north and south India for Indian culture in ancient days	II Understanding
CO2	Students will analyze how Persian culture entered into India and how it influenced the Fine Arts of Indian society like Classical Music, Dance and Architecture.	IV Analyzing
CO3	Student can able to assess how the Indian orthodox society turn into modern and western society in the 19th century .It also edifies the students with spiritual doctrines of various Religions	V Evaluating
CO4	Students will evaluate various challenges face by the youth and the evil affects of terrorism on society	V Evaluating
CO5	The topics in the unit create belongingness among the students by bringing awareness of the rights and duties to make the world a better place and it throw light on gender sensitization issues of women, Children and LGBT.	VI Creating

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H		S	H				S		H	H
C02						S	H	S		S		S
C03	H	H		H						H		
C04		S			S				H			
C05	H		H			H	S	S			S	H

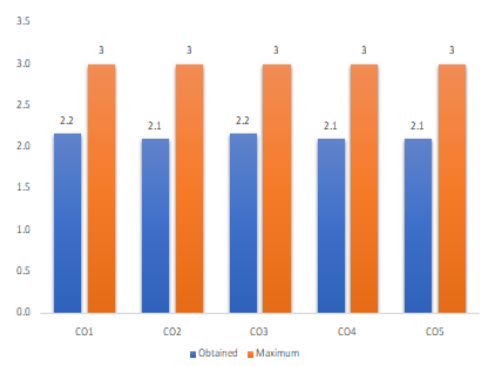
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam			co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level		co wise external average
CO1	100.0	3.0			98.0	3.0	100.0	3.0	100.0	3.0	63.3	0.0	2.4	77.6	2.0	2.0	2.2
CO2	100.0	3.0			98.0	3.0			100.0	3.0	63.3	0.0	2.3	77.6	2.0	2.0	2.1
CO3	100.0	3.0	100.0	3.0	98.0	3.0			100.0	3.0	63.3	0.0	2.4	77.6	2.0	2.0	2.2
CO4			100.0	3.0	98.0	3.0			100.0	3.0	63.3	0.0	2.3	77.6	2.0	2.0	2.1
CO5			100.0	3.0	98.0	3.0			100.0	3.0	63.3	0.0	2.3	77.6	2.0	2.0	2.1

AVERAGE	AVERAGE
2	2.124

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 2.16			H 2.16			
CO2							H 2.1	
CO3	H 2.16	H 2.16		H 2.16				
CO4								
CO5	H 2.1		H 2.1			H 2.1		
AVERAGE OF COS FOR POS	2.13	2.16	2.1	2.16	2.16	2.1	2.1	
AVERAGE OF POS	2.13	2.16	2.1	2.16	2.16	2.1	2.1	
AVERAGE	2.13							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: ABSTRACT ALGEBRA

COURSE CODE: DS18201

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	Demonstrate important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element	II Understanding
CO2	Analyze different types of subgroups such as normal subgroups, cyclic subgroups and understand the structure and characteristics of these subgroups	VI Creating
CO3	Solve the algebraic problems using appropriate techniques.	VI Creating
CO4	Analyze the knowledge and understanding of fundamental concepts including groups, subgroups, normal subgroups, homomorphism and isomorphism	I Remembering
CO5	\ Demonstrate knowledge and understanding of rings, fields and their properties.	II Understanding

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	S	H			H	H		S	H	H
C02	H		H	H	S	H		H	S			
C03		S			H	H	H		S	H		H
C04		H		S			S			H	H	S
C05			H				H	H				

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

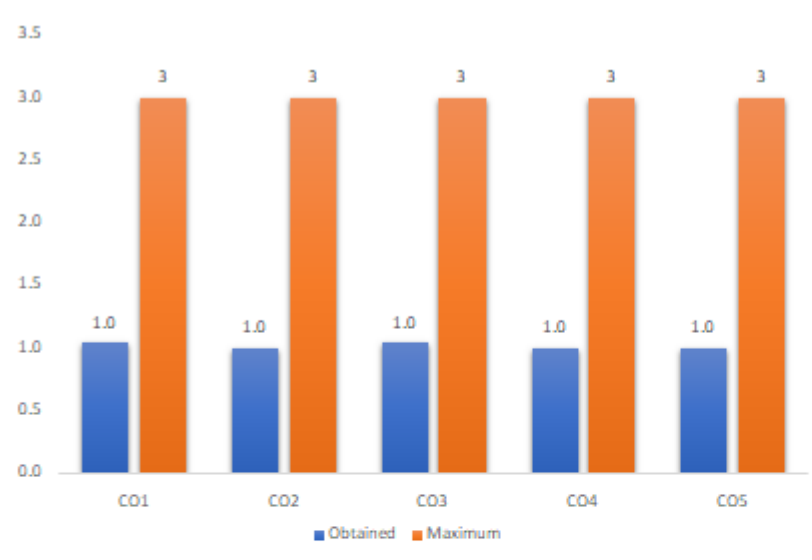
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average
CO1	91.8	3.0			98.0	3.0	100.0	3.0	100.0	3.0	67.3	1.0	2.6	49.0	0.0	0.0
CO2	91.8	3.0			98.0	3.0			100.0	3.0	67.3	1.0	2.5	49.0	0.0	0.0
CO3	91.8	3.0	98.0	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.6	49.0	0.0	0.0
CO4			98.0	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.5	49.0	0.0	0.0
CO5			98.0	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.5	49.0	0.0	0.0

AVERAGE
0

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 1.04	H 1.04		H 1.04			H 1.04	H 1.04
CO2	H 1		H 1	H 1		H 1		H 1
CO3					H 1.04	H 1.04	H 1.04	
CO4		H 1						
CO5			H 1				H 1	H 1
AVERAGE OF COS FOR POS	1.02	1.02	1	1.02	1.04	1.02	1.02666667	1.01333333
AVERAGE OF POS	1.01	1.01	1	1.01	1.04	1.02	1.022222	1.004444
AVERAGE	1.01458333							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: OPERATING SYSTEMS

COURSE CODE: BS19030

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible **approach and derive insights from it.**

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	Identify the main components of an OS & their functions	IV Analyzing
CO2	Analyze various issues in Inter Process Communication (IPC) and the role of OS in IPC	IV Analyzing
CO3	Explain Process synchronization, Deadlocks-deadlock characterization, methods for handling deadlocks.	V Evaluating
CO4	Compare the concepts and implementation Memory management policies and virtual memory	IV Analyzing
CO5	Understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS	V Evaluating

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	S	H			H	H		S	H	H
C02	H		H	H	S	H			S			
C03		S			H	H	S		S	H		H
C04		H		S			S			H	H	
C05			H				H	H				

H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

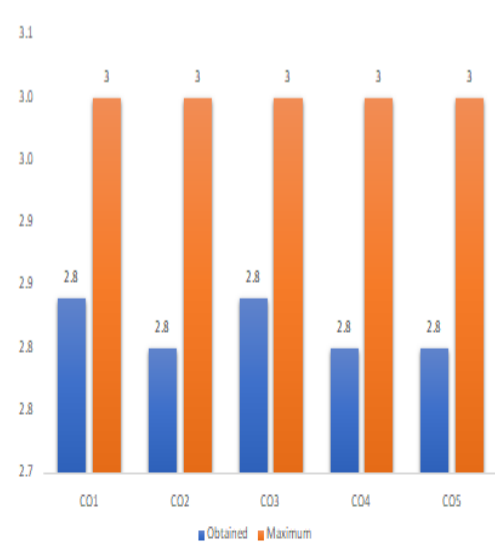
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			98.0	3.0	100.0	3.0	100.0	3.0	67.3	1.0	2.6	85.7	3.0	3.0	2.8
CO2	100.0	3.0			98.0	3.0			100.0	3.0	67.3	1.0	2.5	85.7	3.0	3.0	2.8
CO3	100.0	3.0	95.9	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.6	85.7	3.0	3.0	2.8
CO4			95.9	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.5	85.7	3.0	3.0	2.8
CO5			95.9	3.0	98.0	3.0			100.0	3.0	67.3	1.0	2.5	85.7	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84	H 2.84		H 2.84			H 2.84	H 2.84
CO2	H 2.8		H 2.8	H 2.8		H 2.8		
CO3					H 2.84	H 2.84		
CO4		H 2.8						
CO5			H 2.8				H 2.8	H 2.8
AVERAGE OF COS FOR POS	2.82	2.82	2.8	2.82	2.84	2.82	2.82	2.82
AVERAGE OF POS	2.81	2.81	2.8	2.81	2.84	2.82	2.81	2.81
AVERAGE	2.81375							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: PROBABILITY DISTRIBUTIONS

COURSE CODE: BS22211

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	CO1: Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions	VI Creating
CO2	CO2: Identify the characteristics of different discrete distributions.	IV Analyzing
CO3	CO3: Apply the normal probability distribution including standard normal curve calculations of appropriate areas.	II Understanding
CO4	CO4: Choose exponential, beta and Gamma distributions to solve statistical problems.	III Applying
CO5	CO5: Develop different distributions to solve various statistical problems.	IV Analyzing

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H	H	H	S		H	H		S	H	H
C02	H		S		S	H		S	S		S	
C03		S		H	H	S	S					H
C04			H	S			H		H	H	H	
C05	S	H					H	H				S

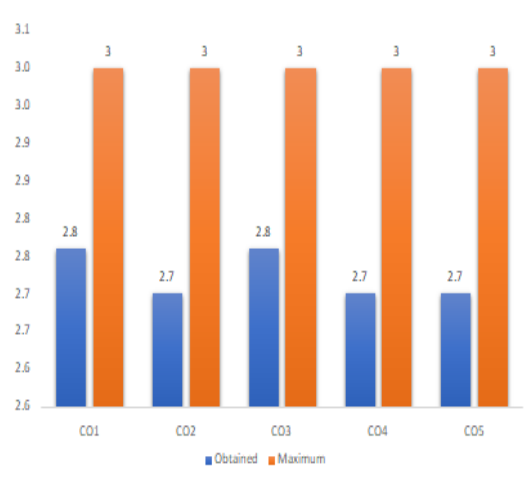
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	87.8	3.0			100.0	3.0	100.0	3.0	100.0	3.0	63.3	0.0	2.4	87.8	3.0	3.0	2.8
CO2	87.8	3.0			100.0	3.0			100.0	3.0	63.3	0.0	2.3	87.8	3.0	3.0	2.7
CO3	87.8	3.0	93.9	3.0	100.0	3.0			100.0	3.0	63.3	0.0	2.4	87.8	3.0	3.0	2.8
CO4			93.9	3.0	100.0	3.0			100.0	3.0	63.3	0.0	2.3	87.8	3.0	3.0	2.7
CO5			93.9	3.0	100.0	3.0			100.0	3.0	63.3	0.0	2.3	87.8	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 2.76	H 2.76	H 2.76			H 2.76	H 2.76
CO2	H 2.7					H 2.7		
CO3				H 2.76	H 2.76			
CO4			H 2.7				H 2.7	
CO5		H 2.7					H 2.7	H 2.7
AVERAGE OF COS FOR POS	2.7	2.73	2.73	2.76	2.76	2.7	2.72	2.73
AVERAGE OF POS	2.7	2.715	2.715	2.76	2.76	2.7	2.706667	2.715
AVERAGE	2.721458333							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DATA STRUCTURES THROUGH C

COURSE CODE: DS18202

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	Choose appropriate data structures to represent data items in real world problems	II Understanding
CO2	Illustrate non-linear data structures like linked list	IV Analyzing
CO3	Organize the data using sorting in various linear data structures and determine time complexity	VI Creating
CO4	Construct data with nonlinear data structure using trees.	II Understanding
CO5	the concept of graphs and b trees	I Remembering

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H		S	H	S	S	H		S	H	H
C02	S		H		H	H		H	H	H		
C03		H		S		S	H		S		S	
C04	H		S	H						H	H	
C05	S	S	S				S	H	S			S

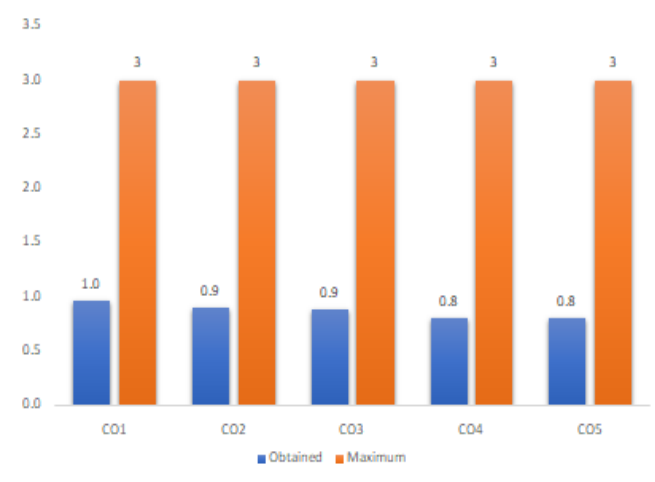
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	85.7	3.0			100.0	3.0	100.0	3.0	100.0	3.0	59.2	0.0	2.4	59.2	0.0	0.0	1.0
CO2	85.7	3.0			100.0	3.0			100.0	3.0	59.2	0.0	2.3	59.2	0.0	0.0	0.9
CO3	85.7	3.0	77.6	2.0	100.0	3.0			100.0	3.0	59.2	0.0	2.2	59.2	0.0	0.0	0.9
CO4			77.6	2.0	100.0	3.0			100.0	3.0	59.2	0.0	2.0	59.2	0.0	0.0	0.8
CO5			77.6	2.0	100.0	3.0			100.0	3.0	59.2	0.0	2.0	59.2	0.0	0.0	0.8

AVERAGE	AVERAGE
0	0.868

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 0.96			H 0.96			H 0.96
CO2			H 0.9		H 0.9	H 0.9		H 0.9
CO3		H 0.88					H 0.88	
CO4	H 0.8			H 0.8				
CO5								H 0.8
AVERAGE OF COS FOR POS	0.8	0.92	0.9	0.8	0.93	0.9	0.88	0.886666667
AVERAGE OF POS	0.8	0.9	0.9	0.8	0.915	0.9	0.88	0.862222
AVERAGE	0.869652778							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: Accounting and Financial Management

COURSE CODE: DS18401

CREDITS: 3

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: To Describe the need and importance of accounting and infer the various principles of accounting	I Remembering
CO2	CO2: To Explain about branches of accounting	II Understanding
CO3	CO3: To Analyze the financial position of an organization	IV Analyzing
CO4	CO4: To Interpret the sources of finance.	V Evaluating
CO5	CO5: To Create budgets for key factors of organization.	VI Creating

Table 1: CO, PO, PSO MAPPING

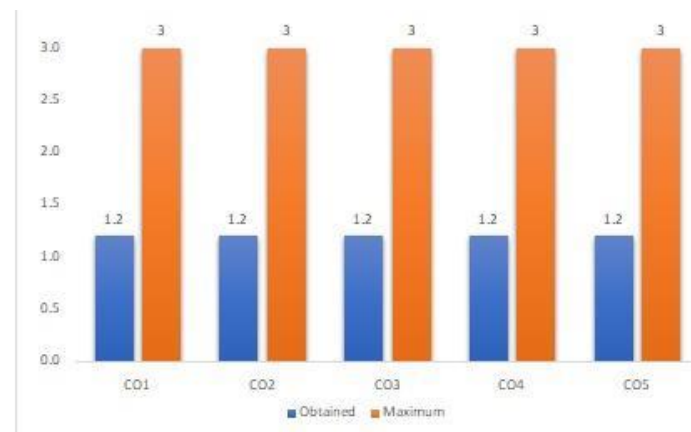
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H	H		H			H	S		H	H
C02				H		S	H	S		S		S
C03	S	S		S					S	H	S	
C04		S	S		S	H	H	H	H			S
C05	H		H	H		S		S	S	H	S	H

H: Highly Supportive
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam			co wise total average
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average	
CO1	100.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	88.0	3.0	3.0	10.0	0.0	0.0	1.2
CO2	100.0	3.0			100.0	3.0			100.0	3.0	88.0	3.0	3.0	10.0	0.0	0.0	1.2
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	88.0	3.0	3.0	10.0	0.0	0.0	1.2
CO4			100.0	3.0	100.0	3.0			100.0	3.0	88.0	3.0	3.0	10.0	0.0	0.0	1.2
CO5			100.0	3.0	100.0	3.0			100.0	3.0	88.0	3.0	3.0	10.0	0.0	0.0	1.2

AVERAGE	AVERAGE
0	1.2

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 1.2	H 1.2		H 1.2			H 1.2
CO2				H 1.2			H 1.2	
CO3								
CO4						H 1.2	H 1.2	H 1.2
CO5	H 1.2		H 1.2	H 1.2				
AVERAGE OF COS FOR POS	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
AVERAGE OF POS	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
AVERAGE	1.2							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: R PROGRAMMING

COURSE CODE: DS18402

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
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CO1	CO1: Understand basic concept of R.	II Understanding
CO2	CO2: Demonstrate programming concepts and data structures in R.	II Understanding
CO3	CO3: Analyze a large problem by sub dividing it into smaller components using functions	IV Analyzing
CO4	CO4: Choose an appropriate graphic for analysis and analyze data using summary statistics.	III APPLYING
CO5	CO5: Choose the type of regression based on data set.	III APPLYING

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S		H	S	H			S	S	H	S	H
C02	H	S		H		S	H		S			S
C03			H	S	H			H		S	H	
C04	S	H			S	H	H		H	H	H	H
C05		S	H	H		H		S	S		S	H

Table 2: COURSE OUTCOME ATTAINMENT

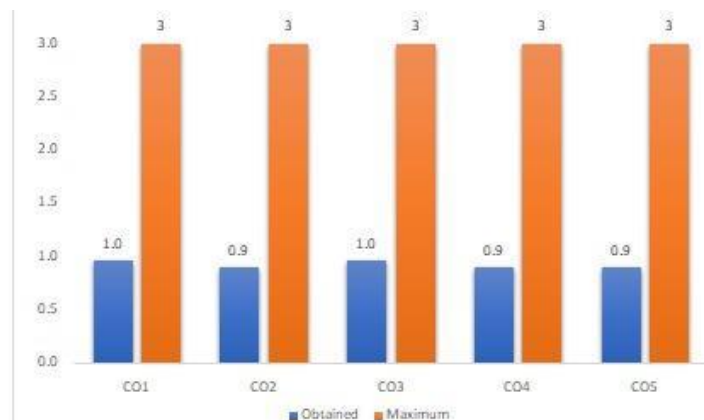
ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2

Pass percent between 65%- 75%= 1

Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	100.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	54.0	0.0	2.4	58.0	0.0	0.0	1.0
CO2	100.0	3.0			100.0	3.0			100.0	3.0	54.0	0.0	2.3	58.0	0.0	0.0	0.9
CO3	100.0	3.0	96.0	3.0	100.0	3.0			100.0	3.0	54.0	0.0	2.4	58.0	0.0	0.0	1.0
CO4			96.0	3.0	100.0	3.0			100.0	3.0	54.0	0.0	2.3	58.0	0.0	0.0	0.9
CO5			96.0	3.0	100.0	3.0			100.0	3.0	54.0	0.0	2.3	58.0	0.0	0.0	0.9

AVERAGE	AVERAGE
0	0.924

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1			H 0.96		H 0.96			
CO2	H 0.9			H 0.9			H 0.9	
CO3			H 0.96		H 0.96			H 0.96
CO4		H 0.9				H 0.9	H 0.9	
CO5			H 0.9	H 0.9		H 0.9		
AVERAGE OF COS FOR POS	0.9	0.9	0.94	0.9	0.96	0.9	0.9	0.96
AVERAGE OF POS	0.9	0.9	0.933333	0.9	0.96	0.9	0.9	0.96
AVERAGE	0.919166667							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DATA WAREHOUSING & DATA MINING

COURSE CODE: DS20403

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: To understand the concepts of Data Warehousing and its importance	II Understanding
CO2	CO2: Analyze different Data Mining methods using algorithms	IV Analyzing
CO3	CO3: Explain the classification of data	II Understanding
CO4	CO4: Express clustering methods using algorithms.	V Evaluating
CO5	CO5: Identify importance of Text Mining and related algorithms	III Applying

Table 1: CO, PO, PSO MAPPING

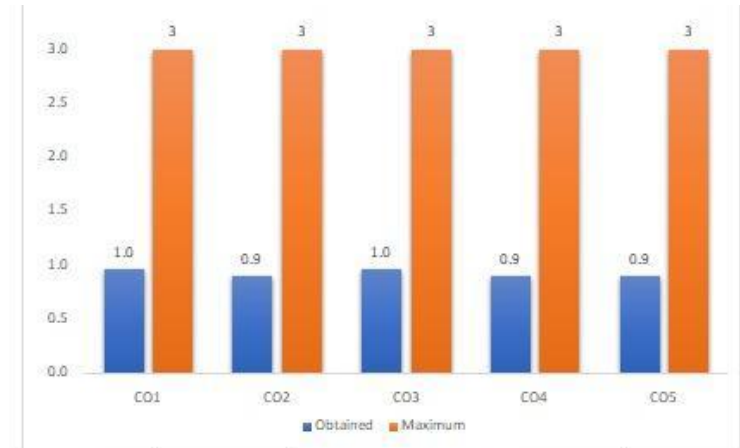
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H	H		H			H	S		H	H
C02				H		S	H	S		S		S
C03	S	H		S						H	H	
C04		S	S		S	H	H	H	H			
C05	H		H	H		H		S	S	H	S	H

H: Highly Supportive
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam			co wise total average
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average	
CO1	86.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	34.0	0.0	2.4	30.0	0.0	0.0	1.0
CO2	86.0	3.0			100.0	3.0			100.0	3.0	34.0	0.0	2.3	30.0	0.0	0.0	0.9
CO3	86.0	3.0	96.0	3.0	100.0	3.0			100.0	3.0	34.0	0.0	2.4	30.0	0.0	0.0	1.0
CO4			96.0	3.0	100.0	3.0			100.0	3.0	34.0	0.0	2.3	30.0	0.0	0.0	0.9
CO5			96.0	3.0	100.0	3.0			100.0	3.0	34.0	0.0	2.3	30.0	0.0	0.0	0.9

AVERAGE	AVERAGE
0	0.924

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.
2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]
3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 0.96	H 0.96		H 0.96			H 0.96
CO2				H 0.9			H 0.9	
CO3		H 0.96						
CO4						H 0.9	H 0.9	H 0.9
CO5	H 0.9		H 0.9	H 0.9		H 0.9		
AVERAGE OF COS FOR POS	0.9	0.96	0.93	0.9	0.96	0.9	0.9	0.93
AVERAGE OF POS	0.9	0.96	0.915	0.9	0.96	0.9	0.9	0.915
AVERAGE	0.91875							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: COMPUTER NETWORKS

COURSE CODE: BS20404

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	CO1: Understand and identify basic computer network topologies and protocols and explain Data Communication System components	II Understanding
CO2	CO2: Describe the functions of each layer in OSI model and its protocols	I Remembering
CO3	CO3: Classify different error detecting techniques	II Understanding
CO4	CO4: Build skills of sub-netting and routing mechanisms	III Applying
CO5	CO5: Classify the routing protocols and analyze how to assign the IP addresses for the given network.	II Understanding

Table 1: CO, PO, PSO MAPPING

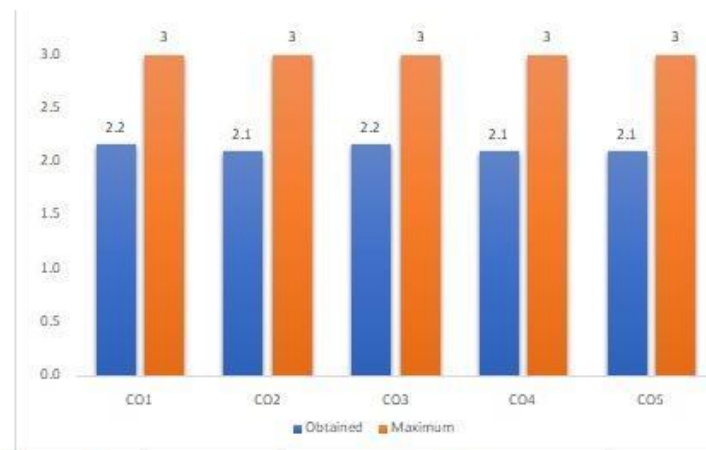
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	S	H		H			S	S	H		H
C02	S	H		H	S	H	S		H		S	S
C03			S	H	H		H	S		S	H	
C04		H		S	S	H			H	S	S	H
C05	H	S	H			S	S	H	S			S

H: Highly Supportive
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
 Pass percent between 75% - 85%= 2
 Pass percent between 65%- 75%= 1
 Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	64.0	0.0	2.4	76.0	2.0	2.0	2.2
CO2	100.0	3.0			100.0	3.0			100.0	3.0	64.0	0.0	2.3	76.0	2.0	2.0	2.1
CO3	100.0	3.0	94.0	3.0	100.0	3.0			100.0	3.0	64.0	0.0	2.4	76.0	2.0	2.0	2.2
CO4			94.0	3.0	100.0	3.0			100.0	3.0	64.0	0.0	2.3	76.0	2.0	2.0	2.1
CO5			94.0	3.0	100.0	3.0			100.0	3.0	64.0	0.0	2.3	76.0	2.0	2.0	2.1

AVERAGE	AVERAGE
2	2.124

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.16		H 2.16		H 2.16			
CO2		H 2.1		H 2.1		H 2.1		
CO3				H 2.16	H 2.16		H 2.16	
CO4		H 2.1				H 2.1		
CO5	H 2.1		H 2.1					H 2.1
AVERAGE OF COS FOR POS	2.13	2.1	2.13	2.13	2.16	2.1	2.16	2.1
AVERAGE OF POS	2.115	2.1	2.115	2.13	2.16	2.1	2.16	2.1
AVERAGE	2.1225							

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: STATISTICAL INFERENCE

COURSE CODE: BS20040

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Develop the distributional results needed for statistical inference.	III Applying
CO2	CO2: Analyze hypotheses tests of means, proportions and variances using both one-and two-sample data sets	IV Analysing
CO3	CO3: Explain Chi-Squared test for independence of attributes and goodness of fit.	II Understanding
CO4	CO4: Differentiate between the tests statistics to be used for dependent and independent samples	IV Analysing
CO5	CO5: Design the test statistic to be used when the nature of the distribution is unknown	V Creating

Table 1: CO, PO, PSO MAPPING

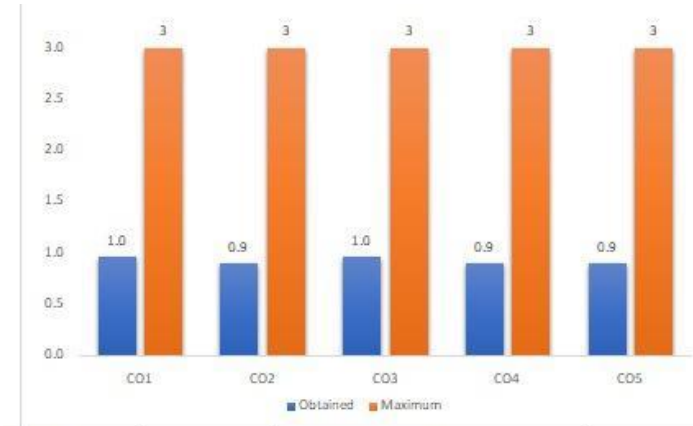
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	S	H	S	H			S	S	H	S	H
C02	H	H		H		S	H		S			S
C03		S	H	S	H			H		S	H	
C04	S	H			S	H	H		H	H	H	H
C05			H	H		H		S	S		S	H

H: Highly Supportive
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	92.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	56.0	0.0	2.4	64.0	0.0	0.0	1.0
CO2	92.0	3.0			100.0	3.0			100.0	3.0	56.0	0.0	2.3	64.0	0.0	0.0	0.9
CO3	92.0	3.0	98.0	3.0	100.0	3.0			100.0	3.0	56.0	0.0	2.4	64.0	0.0	0.0	1.0
CO4			98.0	3.0	100.0	3.0			100.0	3.0	56.0	0.0	2.3	64.0	0.0	0.0	0.9
CO5			98.0	3.0	100.0	3.0			100.0	3.0	56.0	0.0	2.3	64.0	0.0	0.0	0.9

AVERAGE	AVERAGE
0	0.924

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1			H 0.96		H 0.96			
CO2	H 0.9	H 0.9		H 0.9			H 0.9	
CO3			H 0.96		H 0.96			H 0.96
CO4		H 0.9				H 0.9	H 0.9	
CO5			H 0.9	H 0.9		H 0.9		
AVERAGE OF COS FOR POS	0.9	0.9	0.94	0.9	0.96	0.9	0.9	0.96
AVERAGE OF POS	0.9	0.9	0.933333	0.9	0.96	0.9	0.9	0.96
AVERAGE	0.919166667							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: JAVA PROGRAMMING

COURSE CODE: BS18436

CREDITS: 4

:

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	CO1: Write java programs and differentiate between object-oriented programming and procedure-oriented programming.	IV Analyzing
CO2	CO2: Apply object-oriented programming features for solving a given problem.	III Applying
CO3	CO3: Incorporate exception handling mechan	II Understanding
CO4	CO4: Implement Use of java standard API library to handle file operations.	II Understanding
CO5	CO5: Develop interactive programs using applet and swing	III Applying

Table 1: CO, PO, PSO MAPPING

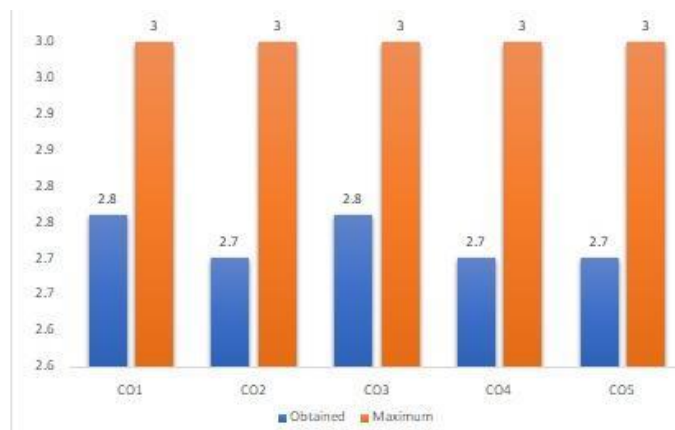
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H	H		H			S	S	H		H
C02	H	S		S		S	S		S		H	S
C03			H		H		H	H		S		
C04	S	H		H	S	H			H	H	S	H
C05		S	H			H	S	S	S			H

H: Highly Supportive
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
 Pass percent between 75% - 85%= 2
 Pass percent between 65%- 75%= 1
 Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	88.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	62.0	0.0	2.4	90.0	3.0	3.0	2.8
CO2	88.0	3.0			100.0	3.0			100.0	3.0	62.0	0.0	2.3	90.0	3.0	3.0	2.7
CO3	88.0	3.0	98.0	3.0	100.0	3.0			100.0	3.0	62.0	0.0	2.4	90.0	3.0	3.0	2.8
CO4			98.0	3.0	100.0	3.0			100.0	3.0	62.0	0.0	2.3	90.0	3.0	3.0	2.7
CO5			98.0	3.0	100.0	3.0			100.0	3.0	62.0	0.0	2.3	90.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H 2.76	H 2.76		H 2.76			
CO2	H 2.7							
CO3			H 2.76		H 2.76		H 2.76	H 2.76
CO4		H 2.7		H 2.7		H 2.7		
CO5			H 2.7			H 2.7		
AVERAGE OF COS FOR POS	2.7	2.73	2.74	2.7	2.76	2.7	2.76	2.76
AVERAGE OF POS	2.7	2.715	2.733333	2.7	2.76	2.7	2.76	2.76
AVERAGE	2.728541667							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DATA SECURITY

COURSE CODE: DS18601A

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6. Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
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CO1	CO1: Identify some of the factors driving the need for data security	IV Analyzing
CO2	CO2: Examine and classify particular examples of attacks	IV Analyzing
CO3	CO3: Classify the terms vulnerability, threat and attack	II Understanding
CO4	CO4: Analyze physical points of vulnerability in simple networks	IV Analyzing
CO5	CO5: Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.	II Understanding

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H			S			S		H		S	
C02		S			H					S		H
C03	S			H		H	H	S				S
C04		H			H	H		H	H		H	S
C05	H		H		S		S					H

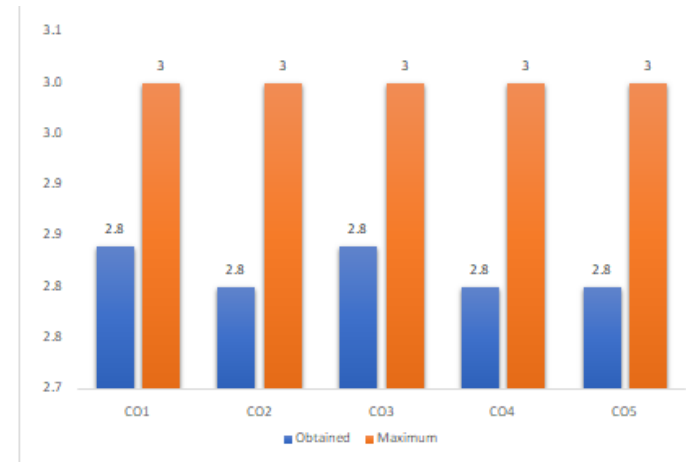
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	73.9	1.0	2.6	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	73.9	1.0	2.5	100.0	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	73.9	1.0	2.6	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	73.9	1.0	2.5	100.0	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	73.9	1.0	2.5	100.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84							
CO2					H 2.8			
CO3				H 2.84		H 2.84	H 2.84	
CO4		H 2.8			H 2.8	H 2.8		H 2.8
CO5	H 2.8		H 2.8					
AVERAGE OF COS FOR POS	2.82	2.8	2.8	2.84	2.8	2.82	2.84	2.8
AVERAGE OF POS	2.81	2.8	2.8	2.84	2.8	2.82	2.84	2.8
AVERAGE	2.81375							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: CLOUD COMPUTING

COURSE CODE:DS18601B

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
- **PO3. Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
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- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	CO1: Understand distributed systems for cloud computing	II Understanding
CO2	CO2: Identify cloud servers, types and components	IV Analyzing
CO3	CO3: Analyse cloud architectural information in the present generation of market	IV Analyzing
CO4	CO4: Compare types of clients in the cloud and virtualization	II Understanding
CO5	CO5: Examine virtual machines the market and usage	IV Analyzing

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H			S			S		H		S	
C02		S			H					S		H
C03	S			H			H	S				S
C04		H			S				H			S
C05	H		H		S		S					H

H: Highly Supportive

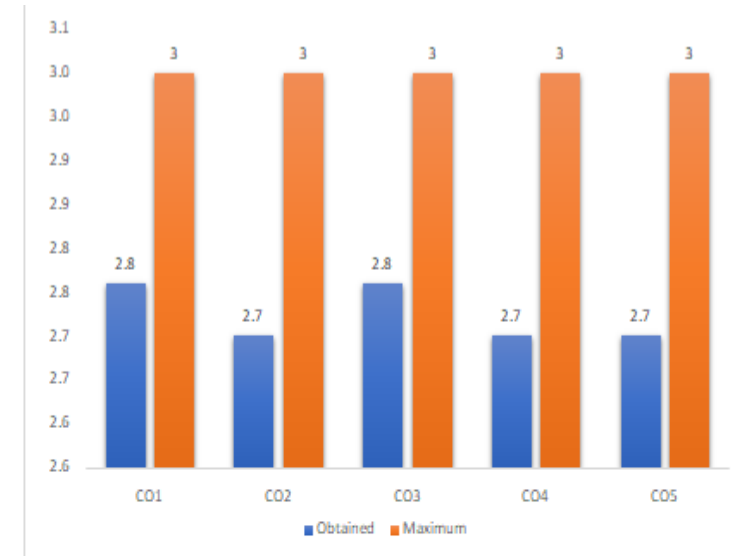
S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3

Pass percent between 75% - 85%= 2
 Pass percent between 75%- 65%= 1
 Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		External Exam				
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	63.0	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	63.0	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	63.0	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	63.0	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	63.0	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76							
CO2					H 2.7			
CO3				H 2.76			H 2.76	
CO4		H 2.7						
CO5	H 2.7		H 2.7					
AVERAGE OF COS FOR POS	2.73	2.7	2.7	2.76	2.7		2.76	
AVERAGE OF POS	2.715	2.7	2.7	2.76	2.7		2.76	
AVERAGE	2.7225							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: SOFTWARE TESTING AND QUALITY

COURSE CODE: DS21602A

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
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- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
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CO1	CO1: Analyze importance of testing in software development process, apply glass-box testing, black- box testing, and how to report and analyze bugs.	IV Analyzing
CO2	CO2: Identify problem tracking system, different types of testing and test case design.	III Applying
CO3	CO3: To understand how to build testing strategy, establishing software testing methodology and software testing techniques.	II Understanding
CO4	CO4: Explain the definition of quality, metrics for software quality and inspection techniques.	II Understanding
CO5	CO5: Classify software configuration management, software reengineering and software restructuring techniques.	II Understanding

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H			S			S		H		S	
C02		S	S		H					S		H
C03	S			H		H	H	S				S
C04		H			H			H	H		H	
C05	H		H		S		S					H

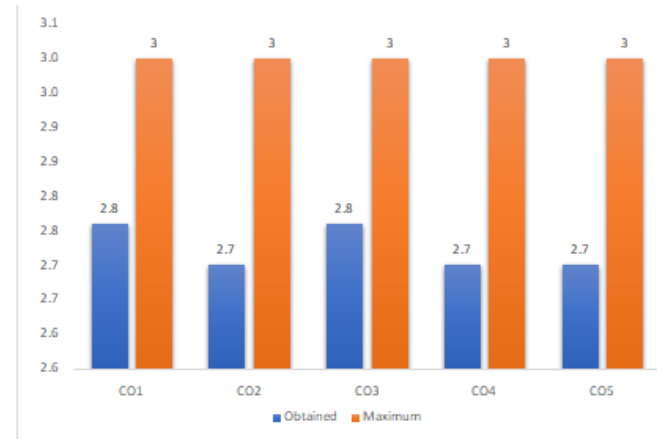
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
 Pass percent between 75% - 85%= 2
 Pass percent between 65%- 75%= 1
 Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	47.6	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	47.6	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	47.6	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	47.6	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	47.6	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76							
CO2					H 2.7			
CO3				H 2.76		H 2.76	H 2.76	
CO4		H 2.7			H 2.7			H 2.7
CO5	H 2.7		H 2.7					
AVERAGE OF COS FOR POS	2.73	2.7	2.7	2.76	2.7	2.76	2.76	2.7
AVERAGE OF POS	2.715	2.7	2.7	2.76	2.7	2.76	2.76	2.7
AVERAGE	2.724375							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: MARKETING DATA ANALYTICS

COURSE CODE: DS21602B

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
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- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

PSO3: Demonstrate, identify, formulate and analyse diverse big data problems helping in business decision making. Apply supervised and unsupervised machine learning methodologies.

PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	CO1: Understand market research methods.	II Understanding
CO2	CO2: Analyze consumer behaviour and marketing strategy.	IV Analyzing
CO3	CO3: Identify market basket analysis.	III Applying
CO4	CO4: Examine survival analysis.	IV Analyzing
CO5	CO5: Classify customer segmentation.	II Understanding

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H			S			S		H		S	
C02		S			H					S		H
C03	S			H			H	S				S
C04		H			S				H			S
C05	H		H		S		S					H

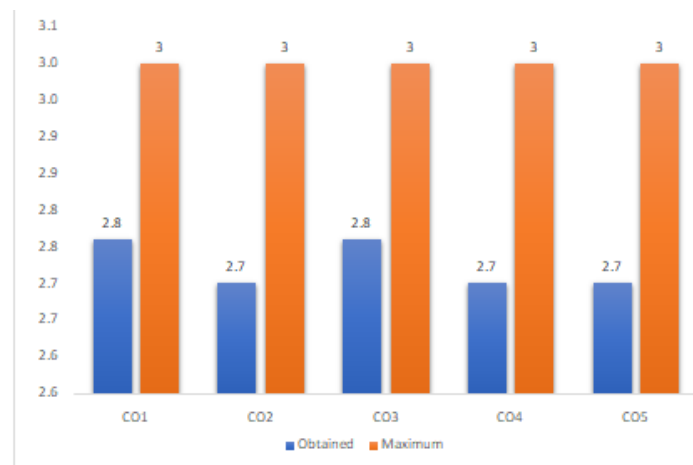
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
 Pass percent between 75% - 85%= 2
 Pass percent between 65%- 75%= 1
 Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	96.6	3.0			100.0	3.0	100.0	3.0	100.0	3.0	51.7	0.0	2.4	100.0	3.0	3.0	2.8
CO2	96.6	3.0			100.0	3.0			100.0	3.0	51.7	0.0	2.3	100.0	3.0	3.0	2.7
CO3	96.6	3.0	100.0	3.0	100.0	3.0			100.0	3.0	51.7	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	51.7	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	51.7	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

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OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76							
CO2					H 2.7			
CO3				H 2.76			H 2.76	
CO4		H 2.7						
CO5	H 2.7		H 2.7					
AVERAGE OF COS FOR POS	2.73	2.7	2.7	2.76	2.7		2.76	
AVERAGE OF POS	2.715	2.7	2.7	2.76	2.7		2.76	
AVERAGE	2.7225							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: BIG DATA ANALYTICS

COURSE CODE: DS21603

CREDITS: 4

DEPARTMENT: B. Sc. Computer Data Science and Data Analytics Engineering

Programme Outcomes – (B. Sc.)

B. Sc.:

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
- **PO2. 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.
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PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):

Students will be able to:

PSO1: Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

PSO2: Understand the fundamentals of Computer Organization, Operating Systems and networking related concepts and apply the knowledge of computer systems in designing and building software solutions.

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PSO4: Apply appropriate Data Mining and Text Mining techniques for cleaning, processing and transforming the data. Analyze and interpret the data using an ethically responsible approach and derive insights from it.

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
--	------------------------	-------------------------------

CO1	CO1: Explain the motivation for big data systems and identify the main sources of Big Data in the real world.	V Evaluating
CO2	CO2: Develop technical skills in predicative and prescriptive modeling to support business decision-making.	VI Creating
CO3	CO3: Implement several Data Intensive tasks using the Map Reduce Paradigm.	III Applying
CO4	CO4: Understand Hadoop ecosystem such as YARN and HIVE-QL for structured databases.	II Understanding
CO5	CO5: Demonstrate an ability map-reduce programming using PIG and NoSQL databases for storing purpose and process for Big Data Analytics	II Understanding

Table 1: CO, PO, PSO MAPPING

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H			S			S		H		S	
C02		S			H					S		H
C03	S			H			H	S				S
C04		H			S				H			S
C05	H		H		S		S					H

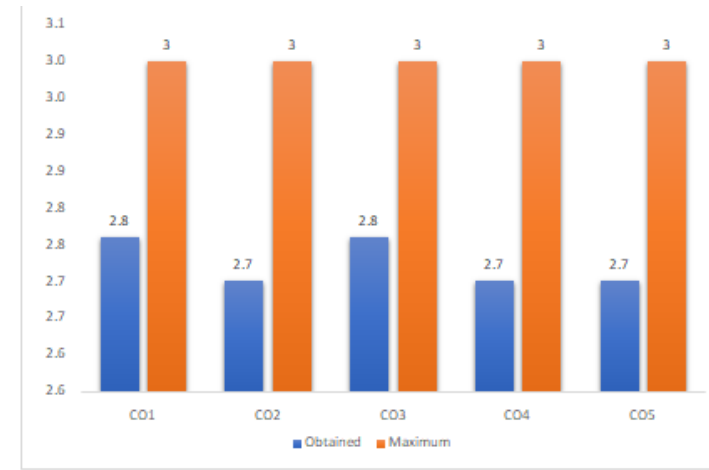
H: Highly Supportive

S: Supportive

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
- Pass percent between 65%- 75%= 1
- Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance		co wise internal average	External Exam		co wise total average	
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level		
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	36.0	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	36.0	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	98.0	3.0	100.0	3.0			100.0	3.0	36.0	0.0	2.4	100.0	3.0	3.0	2.8
CO4			98.0	3.0	100.0	3.0			100.0	3.0	36.0	0.0	2.3	100.0	3.0	3.0	2.7
CO5			98.0	3.0	100.0	3.0			100.0	3.0	36.0	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

- 1. Copy the completed table 1.**
- 2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the ‘S’ points]**
- 3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]**



OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76							
CO2					H 2.7			
CO3				H 2.76			H 2.76	
CO4		H 2.7						
CO5	H 2.7		H 2.7					
AVERAGE OF COS FOR POS	2.73	2.7	2.7	2.76	2.7		2.76	
AVERAGE OF POS	2.715	2.7	2.7	2.76	2.7		2.76	
AVERAGE	2.7225							