

## COURSE OUTCOME MAPPING

### MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

**COURSE TITLE: GENERAL ENGLISH I**

**COURSE CODE: EN23101**

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> 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
<b>CO2</b>	<b>CO2:</b> To Construct vocabulary and to gain understanding on the tense component, a pivotal constituent for language structuring and vocabulary building.	III Applying
<b>CO3</b>	<b>CO3:</b> To Identify with economical word constructions, paying specific attention in constructing sound writing skills.	I Remembering
<b>CO4</b>	<b>CO4:</b> To Interpret functional grammar, the basic part involved in sentence constructing to improve linguistic skills.	V Evaluating
<b>CO5</b>	<b>CO5:</b> To Develop communication skills to provide a platform for language efficiency for effective language delivery.	II Understanding

**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	S	S		H
C02	H	S	S	S	H	S	H	H	S	H		H
C03	H	H	H	H	H	S	H	S	S	H	H	H
C04	H	H	H	S	S	S	H	H		H		S
C05	S	S	H	H	H	H	H	H		H		H

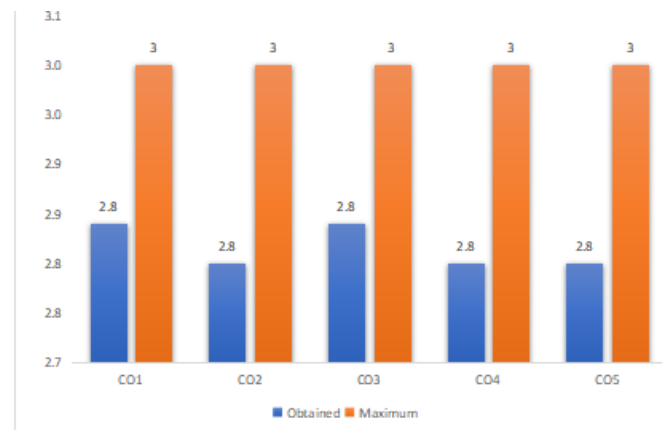
**H: Highly Supportive**

**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			94.0	3.0	100.0	3.0	100.0	3.0	70.0	1.0	2.6	94.0	3.0	3.0	2.8
CO2	100.0	3.0			94.0	3.0			100.0	3.0	70.0	1.0	2.5	94.0	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	94.0	3.0			100.0	3.0	70.0	1.0	2.6	94.0	3.0	3.0	2.8
CO4			100.0	3.0	94.0	3.0			100.0	3.0	70.0	1.0	2.5	94.0	3.0	3.0	2.8
CO5			100.0	3.0	94.0	3.0			100.0	3.0	70.0	1.0	2.5	94.0	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			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	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	H 2.8	H 2.8
AVERAGE OF COS FOR POS	2.813333333	2.826666667	2.82	2.826666667	2.813333333	2.8	2.816	2.81
AVERAGE OF POS	2.813333	2.822222	2.815	2.822222	2.813333	2.8	2.8112	2.8025
AVERAGE	2.812476389							

**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.:**

- **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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**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> Students will be able to differentiate Accepted norms and counter values and be able to	<b>IV Analysing</b>

	<b>identify</b> the various Dimensions of Human Development	
<b>CO2</b>	<b>CO2:</b> Students will be able to <b>demonstrate</b> Love and Experience of God and identify the Basic Issues of Life and Happiness as a life goal	III Applying
<b>CO3</b>	<b>CO3:</b> They will able to <b>understand</b> the importance of concern for others and critique the various problems that deter the growth of the society	II Understanding
<b>CO4</b>	<b>CO4:</b> The students will be able to recognize the traits of a good personality and practice Self exploration	I Remembering
<b>CO5</b>	<b>CO5:</b> Students will be able to interpret the purpose of life and goal setting and demonstrate self-management	II Understanding

**Table 1: CO, PO, PSO MAPPING**

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

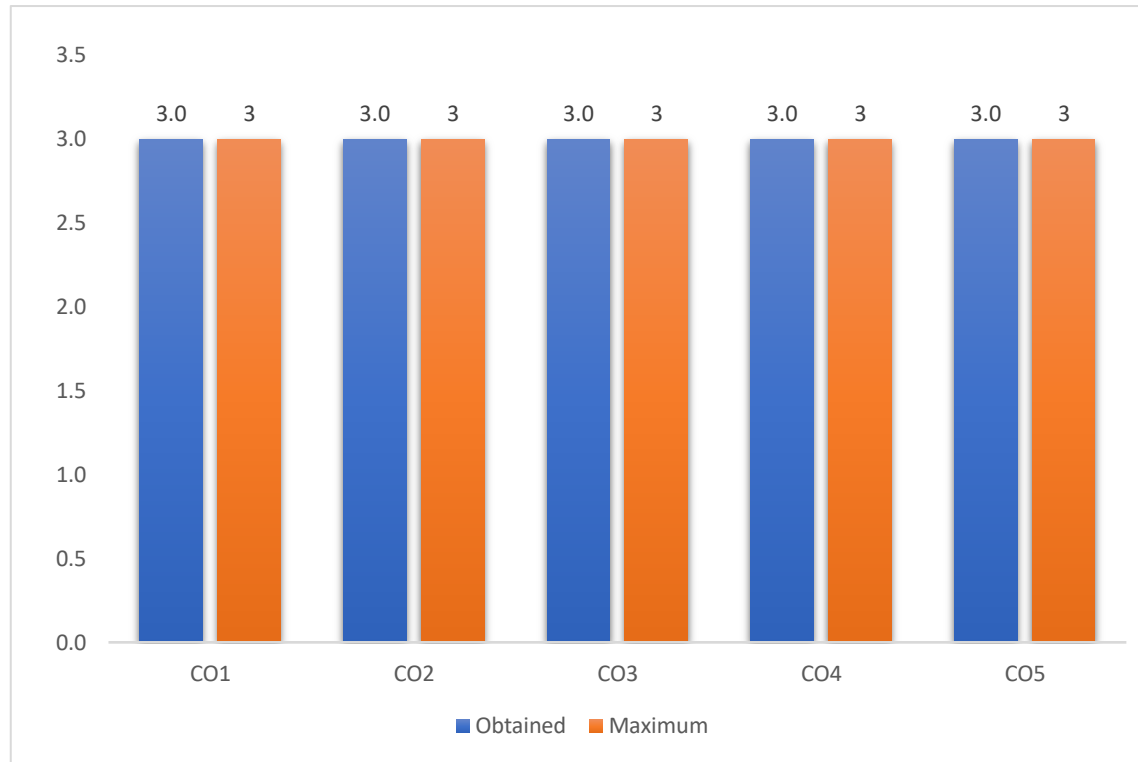
**H: Highly Supportive**

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co	mid exam 1	mid exam 2	group discussion	assignment	viva	Attendance		External Exam	
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	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainme nt level	pas s%	Attainm ent level	pass %	Attainm ent level	co wise inter nal aver age	pas s%	Attainm ent level	co wise exter nal avera ge	co wise total avera ge
C O 1	96. 0	3.0			100 .0	3.0	100 .0	3.0	100 .0	3.0	90.0	3.0	3.0	100 .0	3.0	3.0	3.0
C O 2	96. 0	3.0			100 .0	3.0			100 .0	3.0	90.0	3.0	3.0	100 .0	3.0	3.0	3.0
C O 3	96. 0	3.0	98. 0	3.0	100 .0	3.0			100 .0	3.0	90.0	3.0	3.0	100 .0	3.0	3.0	3.0
C O 4			98. 0	3.0	100 .0	3.0			100 .0	3.0	90.0	3.0	3.0	100 .0	3.0	3.0	3.0
C O 5			98. 0	3.0	100 .0	3.0			100 .0	3.0	90.0	3.0	3.0	100 .0	3.0	3.0	3.0

AVER AGE	AVER AGE
3	3

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OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
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		H
AVERAGE OF COS FOR POS	3	3	3	3	3	3	3	
AVERAGE OF POS	3	3	3	3	3	3	3	
AVERAGE	3							

**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.)**

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	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> Understand basic computer terminology and number systems.	II Understanding
<b>CO2</b>	<b>CO2:</b> Learn about operating systems, and its types.	VI Creating

<b>CO3</b>	<b>CO3:</b> Learn about the applications of Information technology	VI Creating
<b>CO4</b>	<b>CO4:</b> Importance of system development and the phases of SDLC	I Remembering
<b>CO5</b>	<b>CO5:</b> Use of modern means of communications, types of networks and topologies	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			S	S		S		H
C02	H		H	H			H	S		H		H
C03	H		H	H	H		H	S		H		H
C04	H		H	H	S		H	S		H		S
C05	H		H	H	S		S	H		H		H

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**



C O 1	100 .0	3.0			100 .0	3.0	100 .0	3.0	100 .0	3.0	72.0	1.0	2.6	100 .0	3.0	3.0	2.8
C O 2	100 .0	3.0			100 .0	3.0			100 .0	3.0	72.0	1.0	2.5	100 .0	3.0	3.0	2.8
C O 3	100 .0	3.0	96. 0	3.0	100 .0	3.0			100 .0	3.0	72.0	1.0	2.6	100 .0	3.0	3.0	2.8
C O 4			96. 0	3.0	100 .0	3.0			100 .0	3.0	72.0	1.0	2.5	100 .0	3.0	3.0	2.8
C O 5			96. 0	3.0	100 .0	3.0			100 .0	3.0	72.0	1.0	2.5	100 .0	3.0	3.0	2.8

AVER AGE	AVER AGE
3	2.816

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CO1	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		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		2.816		2.816	2.81	2.84				2.813333333		2.8	
AVERAGE OF POS		2.8112		2.8112	2.81	2.84				2.813333		2.8	
AVERAGE	2.814288889												

**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

<b>COURSE TITLE: DIFFERENTIAL EQUATIONS AND NUMERICAL ANALYSIS</b>
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**COURSE CODE: DS19102**

**CREDITS: 4**

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

**Programme Outcomes – (B. Sc.)**

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**approach and derive insights from it.**

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> 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
<b>CO2</b>	<b>CO2:</b> Analyze and Solve basic application problems described by first order differential equations. such as orthogonal trajectories	IV Analyzing
<b>CO3</b>	<b>CO3:</b> Solve second order Homogeneous Equations with Constant Coefficients. Obtain exact and Numerical solutions using differential equations technology.	V Evaluating
<b>CO4</b>	<b>CO4:</b> Analyse and evaluate the accuracy of common numerical methods.	IV Analyzing
<b>CO5</b>	<b>CO5:</b> Select appropriate numerical methods to apply to various types of problems in engineering and science in consideration of the mathematical operations.	V Evaluating

**Table 1: CO, PO, PSO MAPPING**

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

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**Table 2: COURSE OUTCOME ATTAINMENT**

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Pass percent between 75% - 85%= 2

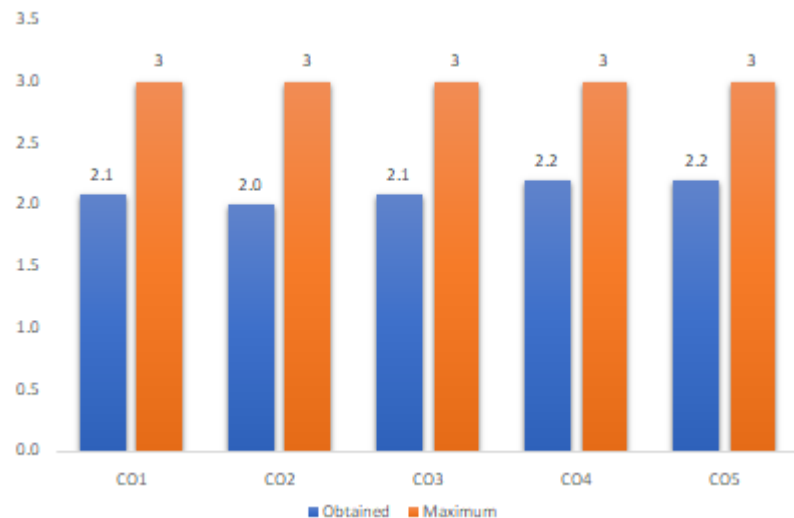
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co	mid exam 1	mid exam 2	group discussion	assignment	viva	Attendance		External Exam	
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	pass %	Attainment level	pass %	Attainment level	pass %	Attainment level	pass %	Attainment level	pass %	Attainment level	pass %	Attainment level	co wise internal average	pass %	Attainment level	co wise external average	co wise total average
CO 1	70.0	1.0			100.0	3.0	100.0	3.0	100.0	3.0	70.0	1.0	2.2	80.0	2.0	2.0	2.1
CO 2	70.0	1.0			100.0	3.0			100.0	3.0	70.0	1.0	2.0	80.0	2.0	2.0	2.0
CO 3	70.0	1.0	92.0	3.0	100.0	3.0			100.0	3.0	70.0	1.0	2.2	80.0	2.0	2.0	2.1
CO 4			92.0	3.0	100.0	3.0			100.0	3.0	70.0	1.0	2.5	80.0	2.0	2.0	2.2
CO 5			92.0	3.0	100.0	3.0			100.0	3.0	70.0	1.0	2.5	80.0	2.0	2.0	2.2

AVERA GE	AVERA GE
2	2.112



**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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CO1	H 2.08		H 2.08		H 2.08	H 2.08		
CO2			H 2	H 2		H 2	H 2	
CO3	H 2.08		H 2.08	H 2.08	H 2.08	H 2.08	H 2.08	
CO4	H 2.2	H 2.2	H 2.2	H 2.2			H 2.2	
CO5		H 2.2	H 2.2	H 2.2				H 2.2
AVERAGE OF COS FOR POS	2.12	2.2	2.112	2.12	2.08	2.053333333	2.093333333	2.2
AVERAGE OF POS	2.133333	2.2	2.1184	2.12	2.08	2.044444	2.093333	2.2
AVERAGE	2.123688889							

## 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.)**

**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.

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

**Table 1: CO, PO, PSO MAPPING**

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
----------	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------

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

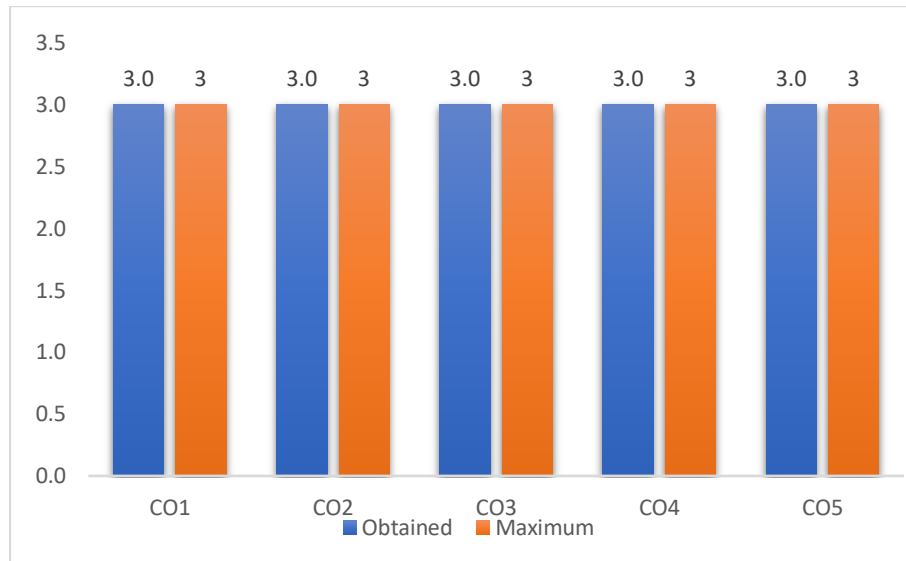
**H: Highly Supportive**

**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		External Exam	
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	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
CO 1	98.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	94.0	3.0	3.0	100.0	3.0	3.0	3.0
CO 2	98.0	3.0			100.0	3.0			100.0	3.0	94.0	3.0	3.0	100.0	3.0	3.0	3.0
CO 3	98.0	3.0	94.0	3.0	100.0	3.0			100.0	3.0	94.0	3.0	3.0	100.0	3.0	3.0	3.0
CO 4			94.0	3.0	100.0	3.0			100.0	3.0	94.0	3.0	3.0	100.0	3.0	3.0	3.0
CO 5			94.0	3.0	100.0	3.0			100.0	3.0	94.0	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			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		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: 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.

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

**Table 1: CO, PO, PSO MAPPING**

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
----------	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------

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

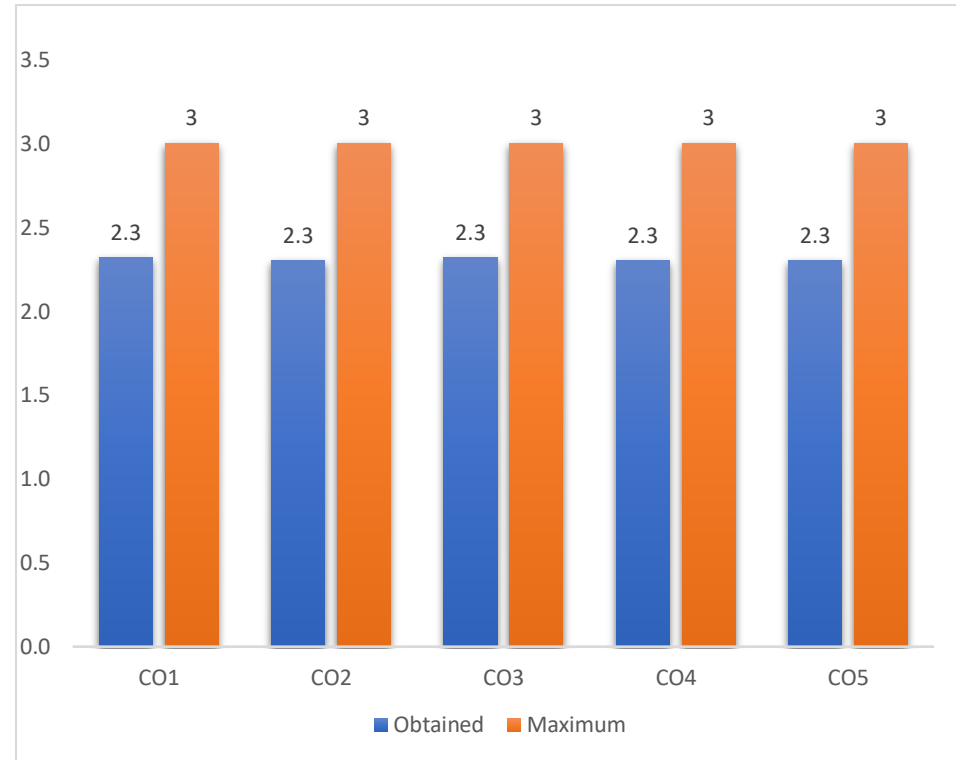
**H: Highly Supportive**

**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	External Exam
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	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainme nt level	pas s%	Attainm ent level	pass %	Attainm ent level	co wise inter nal aver age	pas s%	Attainm ent level	co wise exter nal avera ge	co wise total avera ge
<b>C O 1</b>	96. 0	3.0			100 .0	3.0	100 .0	3.0	100 .0	3.0	76.0	2.0	2.8	82. 0	2.0	2.0	2.3
<b>C O 2</b>	96. 0	3.0			100 .0	3.0			100 .0	3.0	76.0	2.0	2.8	82. 0	2.0	2.0	2.3
<b>C O 3</b>	96. 0	3.0	100 .0	3.0	100 .0	3.0			100 .0	3.0	76.0	2.0	2.8	82. 0	2.0	2.0	2.3
<b>C O 4</b>			100 .0	3.0	100 .0	3.0			100 .0	3.0	76.0	2.0	2.8	82. 0	2.0	2.0	2.3
<b>C O 5</b>			100 .0	3.0	100 .0	3.0			100 .0	3.0	76.0	2.0	2.8	82. 0	2.0	2.0	2.3

AVER AGE	AVER AGE
2	2.308

**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 2.32	H 2.32	H 2.32		H 2.32	H 2.32	H 2.32	
CO2		H 2.3		H 2.3		H 2.3	H 2.3	H 2.3
CO3	H 2.32		H 2.32		H 2.32	H 2.32		H 2.32
CO4		H 2.3		H 2.3		H 2.3	H 2.3	
CO5	H 2.3	H 2.3	H 2.3	H 2.3				H 2.3
AVERAGE OF COS FOR POS	2.313333333	2.305	2.313333333	2.3	2.32	2.31	2.306666667	2.306666667
AVERAGE OF POS	2.311111	2.30125	2.311111	2.3	2.32	2.3075	2.302222	2.306667
AVERAGE	2.307482639							

**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

**COURSE TITLE: ENVIRONMENTAL STUDIES AND GENDER SENSITIZATION**

**COURSE CODE: ES23301**

**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.
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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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
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<b>CO1</b>	<b>CO1: Understand</b> the importance of environmental education, conservation of natural resources & understand the importance of ecosystems and biodiversity	II Understanding
<b>CO2</b>	<b>CO2: Understand</b> the pollution problems and apply the environmental science knowledge on solid waste management, disaster management	II Understanding
<b>CO3</b>	<b>CO3: Apply</b> the environmental science knowledge to improve the resources Evaluate and understand the sustainable environmental conditions and control methods	III Applying
<b>CO4</b>	<b>CO4: Identify</b> 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
<b>CO5</b>	<b>CO5: Understand</b> 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**

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

**H: Highly Supportive**

**S: Supportive**

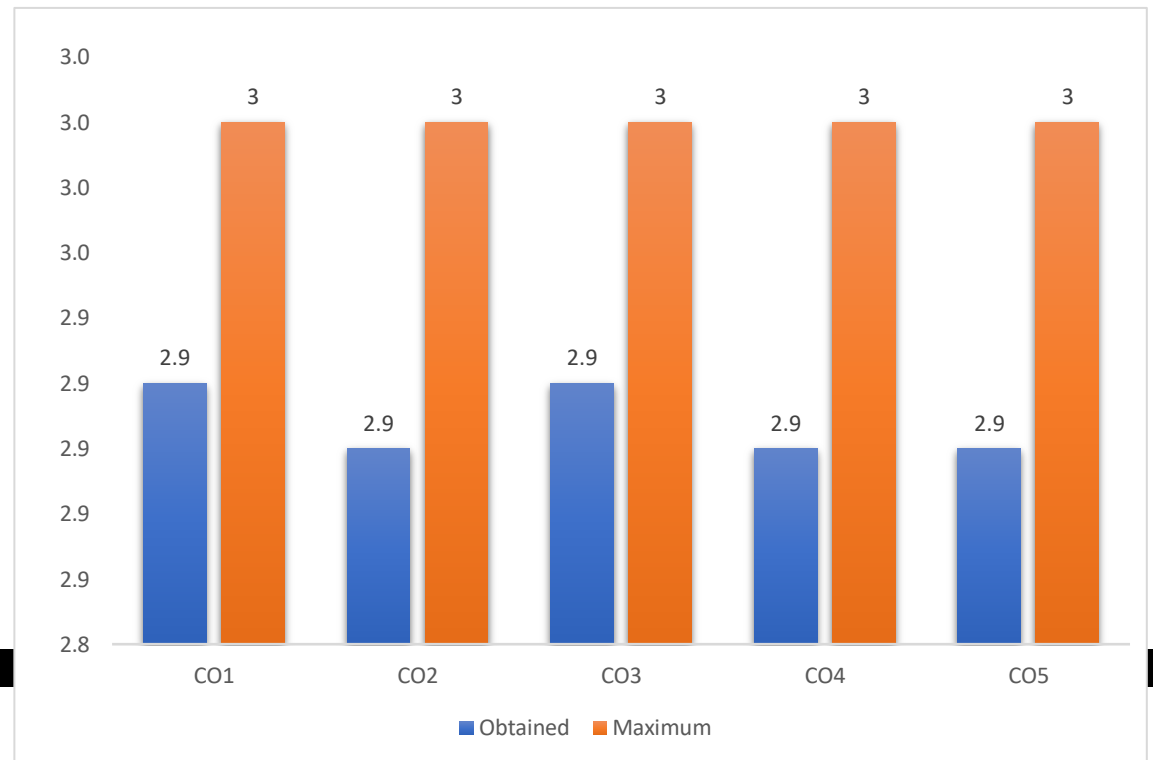
**Table 2: COURSE OUTCOME ATTAINMENT**

**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
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					discussion												
	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pass %	Attainm ent level	co wise inter nal aver age	pas s%	Attainm ent level	co wise exter nal aver age	co wise total avera ge
<b>C O 1</b>	97.9	3.0			100.0	3.0	100.0	3.0	100.0	3.0	79.2	2.0	2.8	87.5	3.0	3.0	2.9
<b>C O 2</b>	97.9	3.0			100.0	3.0			100.0	3.0	79.2	2.0	2.8	87.5	3.0	3.0	2.9
<b>C O 3</b>	97.9	3.0	100.0	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	87.5	3.0	3.0	2.9
<b>C O 4</b>			100.0	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	87.5	3.0	3.0	2.9
<b>C O 5</b>			100.0	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	87.5	3.0	3.0	2.9

<b>AVER AGE</b>	<b>AVER AGE</b>
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				
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	
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		2.908	2.91	2.91		2.906666667	2.9
AVERAGE OF POS	2.9056		2.9056	2.9075	2.91		2.906667	2.9
AVERAGE	2.905894444							

**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.
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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.

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

**Table 1: CO, PO, PSO MAPPING**

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

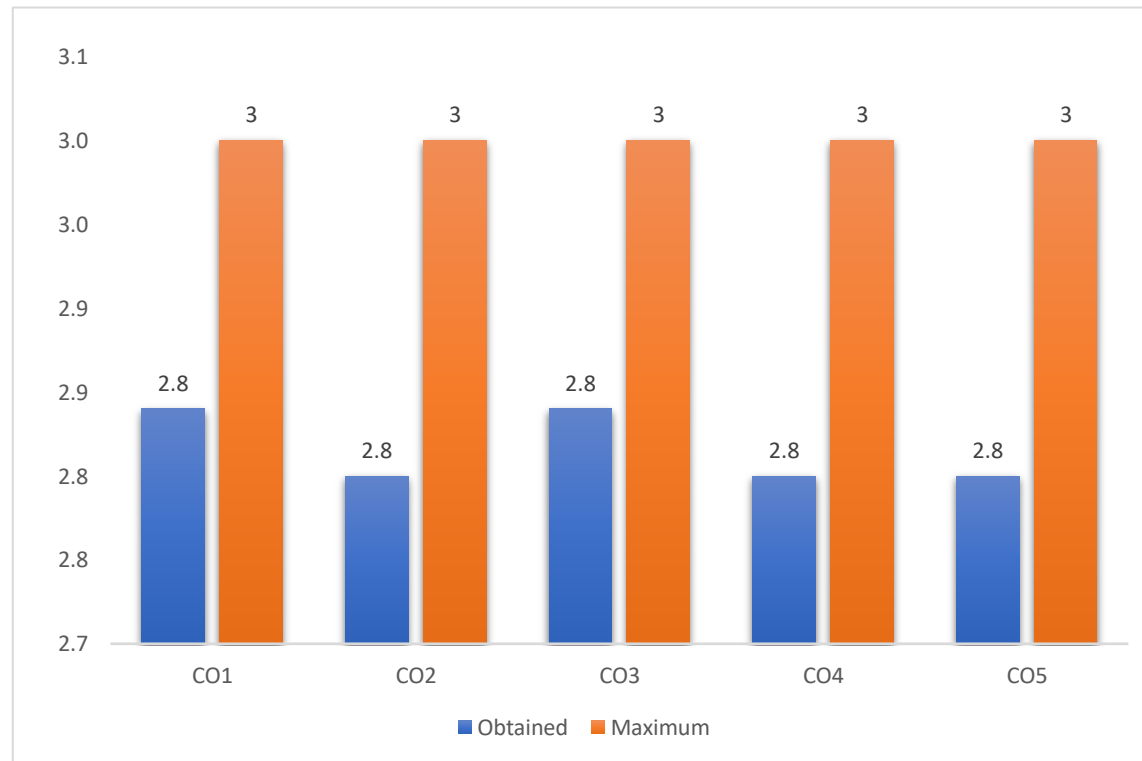
**H: Highly Supportive**

**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
	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainme nt level	pas s%	Attainm ent level	pass %	Attainm ent level		pas s%	Attainm ent level	co wise external average	
<b>C O 1</b>	94.0	3.0			96.0	3.0	96.0	3.0	96.0	3.0	72.0	1.0	2.6	88.0	3.0	3.0	2.8
<b>C O 2</b>	94.0	3.0			96.0	3.0			96.0	3.0	72.0	1.0	2.5	88.0	3.0	3.0	2.8
<b>C O 3</b>	94.0	3.0	94.0	3.0	96.0	3.0			96.0	3.0	72.0	1.0	2.6	88.0	3.0	3.0	2.8
<b>C O 4</b>			94.0	3.0	96.0	3.0			96.0	3.0	72.0	1.0	2.5	88.0	3.0	3.0	2.8
<b>C O 5</b>			94.0	3.0	96.0	3.0			96.0	3.0	72.0	1.0	2.5	88.0	3.0	3.0	2.8

<b>AVER AGE</b>	<b>AVER AGE</b>
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							
CO2	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	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			H	2.8	H	2.8		
AVERAGE OF COS FOR POS		2.816		2.826666667		2.816		2.81		2.826666667		2.82		2.813333333		2.8
AVERAGE OF POS		2.8112		2.822222		2.8112		2.81		2.822222		2.82		2.813333		2.8
AVERAGE		2.813772222														

**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.

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

**Table 1: CO, PO, PSO MAPPING**

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

H: Highly Supportive  
S: Supportive

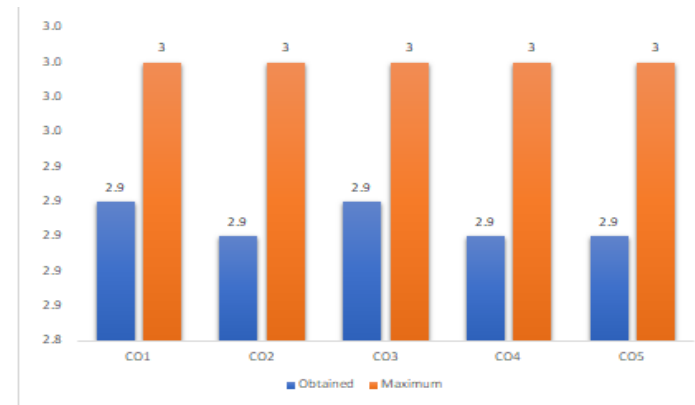
**H: Highly Supportive**

**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	97.9	3.0			100.0	3.0	100.0	3.0	100.0	3.0	79.2	2.0	2.8	97.9	3.0	3.0	2.9
CO2	97.9	3.0			100.0	3.0			100.0	3.0	79.2	2.0	2.8	97.9	3.0	3.0	2.9
CO3	97.9	3.0	97.9	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	97.9	3.0	3.0	2.9
CO4			97.9	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	97.9	3.0	3.0	2.9
CO5			97.9	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	97.9	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		
CO2	H 2.9	H 2.9	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	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				H 2.9
AVERAGE OF COS FOR POS	2.908	2.905	2.908	2.905	2.91	2.91	2.90666667	2.91
AVERAGE OF POS	2.9056	2.90125	2.9056	2.905	2.91	2.9075	2.906667	2.91
<b>AVERAGE</b>	<b>2.906452083</b>							

**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

**COURSE TITLE: STATISTICAL METHODS**

**COURSE CODE:BS23038**

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> Interpret the correlation between two variables.	II Understanding
<b>CO2</b>	<b>CO2:</b> 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
<b>CO3</b>	<b>CO3:</b> Show the association between the attributes.	III Applying
<b>CO4</b>	<b>CO4:</b> Generalize the properties of estimators.	II Understanding
<b>CO5</b>	<b>CO5:</b> Differentiate Maximum likely hood estimation and method of moments	IV Analyzing

**Table 1: CO, PO, PSO MAPPING**

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
<b>C01</b>	<b>H</b>	<b>H</b>	<b>H</b>	<b>S</b>	<b>H</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>H</b>	<b>S</b>	<b>S</b>	<b>H</b>

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

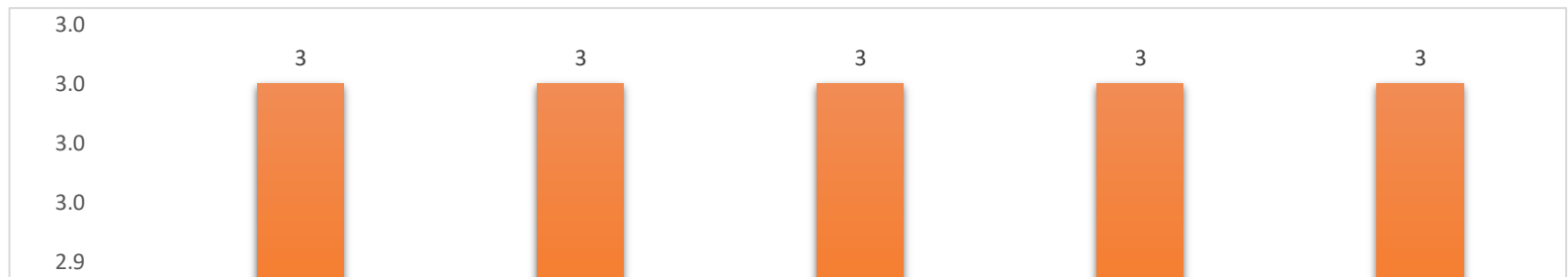
**H: Highly Supportive**

**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			
	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level		pas s%	Attain ment level	co wise external average	co wise total average
C O	92.0	3.0			96.0	3.0	96.0	3.0	96.0	3.0	76.0	2.0	2.8	86.0	3.0	3.0	2.9

1																	
CO2	92.0	3.0			96.0	3.0			96.0	3.0	76.0	2.0	2.8	86.0	3.0	3.0	2.9
CO3	92.0	3.0	92.0	3.0	96.0	3.0			96.0	3.0	76.0	2.0	2.8	86.0	3.0	3.0	2.9
CO4			92.0	3.0	96.0	3.0			96.0	3.0	76.0	2.0	2.8	86.0	3.0	3.0	2.9
CO5			92.0	3.0	96.0	3.0			96.0	3.0	76.0	2.0	2.8	86.0	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			
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	H 2.92	H 2.92	
CO4	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	2.908	2.913333333	2.908	2.905	2.913333333	2.91	2.906666667	2.9
AVERAGE OF POS	2.9056	2.911111	2.9056	2.905	2.911111	2.91	2.906667	2.9
AVERAGE	2.906886111							

**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

**COURSE TITLE: DATABASE MANAGEMENT SYSTEMS**

**COURSE CODE: DS23301**

**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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using first principles of mathematics, natural sciences, and engineering sciences.

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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.

**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.

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

	database.	
<b>CO5</b>	<b>CO5:</b> To understand the concept of Transactions, recovery system and concurrency control.	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			S	S		S	H	
C02		S		H		H	H	H		H		H
C03	H		H		H	H	S	S	S		S	
C04			S	H	S		H	S		H	S	S
C05	H	H	H	H	S		S	H	S	H		H

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**

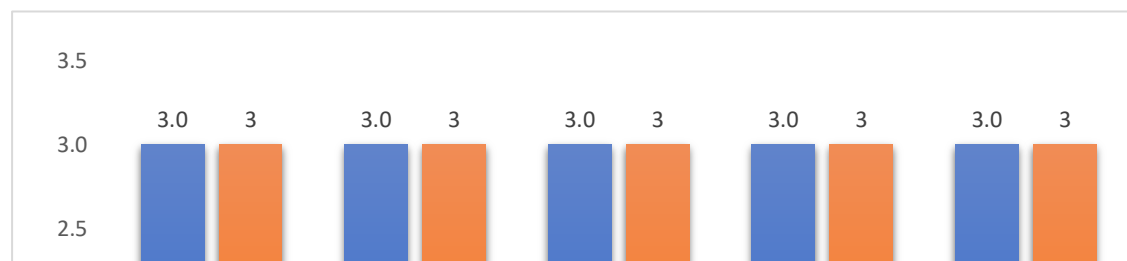
**ATTAINMENT SCALE:**

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Pass percent between 75% - 85%= 2

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Pass percent of less than 65%= 0



co	mid exam 1	mid exam 2	group discussion	assignment	viva	Attendance		External Exam	
----	------------	------------	---------------------	------------	------	------------	--	---------------	--

	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainm ent level	pas s%	Attainm ent level	co wise inter nal aver age	pas s%	Attain ment level	co wise exter nal avera ge	co wise total avera ge
<b>CO1</b>	97. 9	3.0			100 .0	3.0	100 .0	3.0	100 .0	3.0	95. 8	3.0	3.0	91. 7	3.0	3.0	3.0
<b>CO2</b>	97. 9	3.0			100 .0	3.0			100 .0	3.0	95. 8	3.0	3.0	91. 7	3.0	3.0	3.0
<b>CO3</b>	97. 9	3.0	100 .0	3.0	100 .0	3.0			100 .0	3.0	95. 8	3.0	3.0	91. 7	3.0	3.0	3.0
<b>CO4</b>			100 .0	3.0	100 .0	3.0			100 .0	3.0	95. 8	3.0	3.0	91. 7	3.0	3.0	3.0
<b>CO5</b>			100 .0	3.0	100 .0	3.0			100 .0	3.0	95. 8	3.0	3.0	91. 7	3.0	3.0	3.0

AVER AGE	AVER AGE
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:**

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**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					
CO2				H 3		H 3	H 3	H 3
CO3	H 3		H 3		H 3	H 3		
CO4				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: 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.
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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.

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> Identify the various techniques of operations research and to translate a real–world problems, given in words, into a mathematical formulation.	IV Analyzing
<b>CO2</b>	<b>CO2:</b> Construct the simplex table and to plan the optimum results.	III Applying
<b>CO3</b>	<b>CO3:</b> Use the program for optimizing the cost involved in transportation problems.	III Applying
<b>CO4</b>	<b>CO4:</b> Develop and solve transformation models and assignment models.	III Applying

<b>CO5</b>	<b>CO5:</b> Design the sequence of jobs and to make up the total process time.	IV Analyzing
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**Table 1: CO, PO, PSO MAPPING**

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

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**

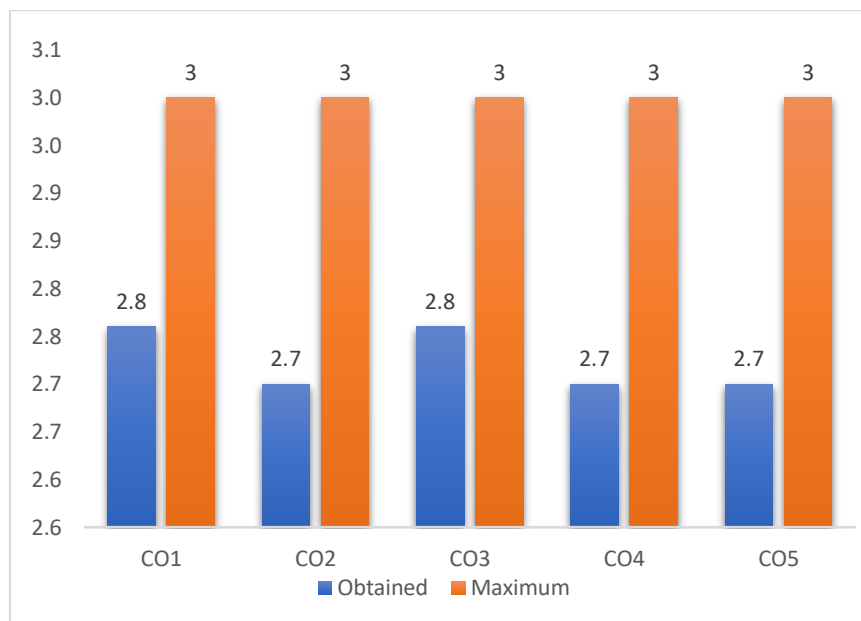
**ATTAINMENT SCALE:**

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 external average	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 1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	56.0	0.0	2.4	92.0	3.0	3.0	2.8

CO 2	100. 0	3.0			100. 0	3.0			100. 0	3.0	56.0	0.0	2.3	92.0	3.0	3.0	2.7
CO 3	100. 0	3.0	100. 0	3.0	100. 0	3.0			100. 0	3.0	56.0	0.0	2.4	92.0	3.0	3.0	2.8
CO 4			100. 0	3.0	100. 0	3.0			100. 0	3.0	56.0	0.0	2.3	92.0	3.0	3.0	2.7
CO 5			100. 0	3.0	100. 0	3.0			100. 0	3.0	56.0	0.0	2.3	92.0	3.0	3.0	2.7

AVERA GE	AVERA GE
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	
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	H 2.7	H 2.7		H 2.7		H 2.7

AVERAGE OF COS FOR POS	2.73	2.73	2.73	2.724	2.73	2.72	2.7	2.7
AVERAGE OF POS	2.715	2.7225	2.715	2.7168	2.73	2.706667	2.7	2.7
AVERAGE	2.713245833							

**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. 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.

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

**Table 1: CO, PO, PSO MAPPING**

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
<b>C01</b>	<b>H</b>		<b>H</b>	<b>S</b>			<b>S</b>	<b>S</b>		<b>S</b>		<b>H</b>
<b>C02</b>	<b>H</b>		<b>S</b>	<b>H</b>			<b>H</b>	<b>S</b>		<b>H</b>		<b>H</b>
<b>C03</b>	<b>H</b>		<b>H</b>	<b>H</b>	<b>H</b>		<b>H</b>	<b>S</b>		<b>H</b>		<b>H</b>

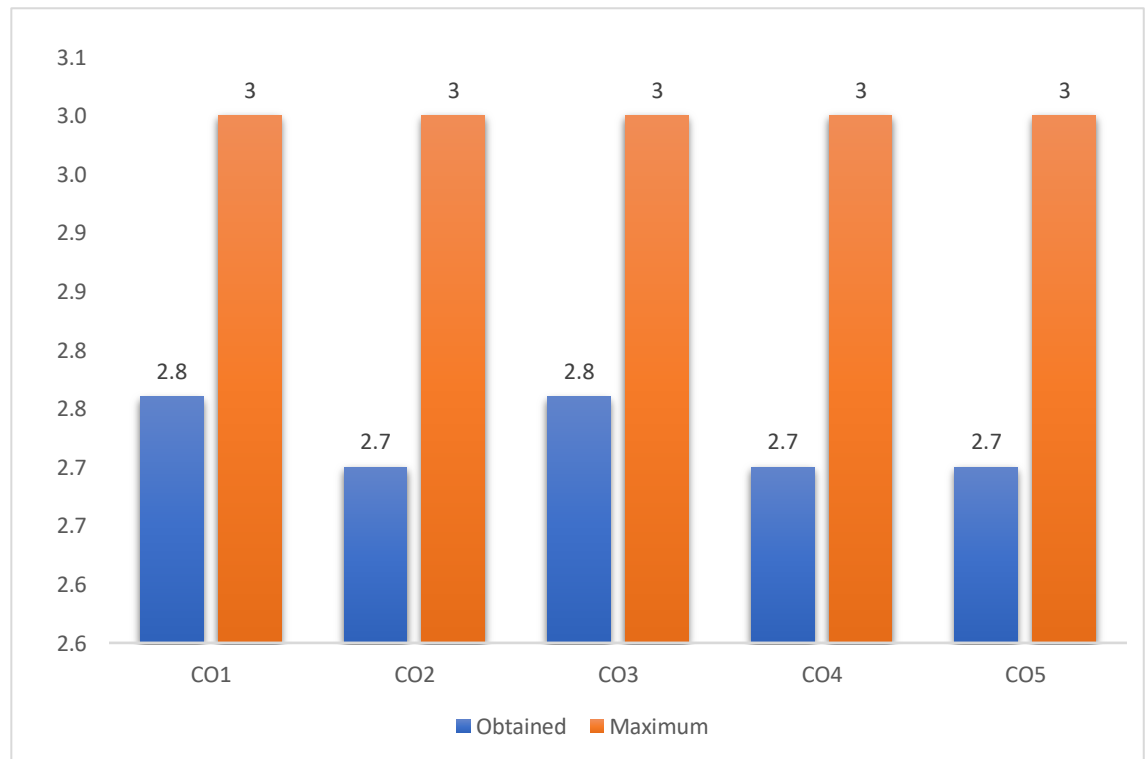
C04	H		H	H	S		H	S		H		S
C05	H		H	H	S		S	H		H		H

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			
	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pass %	Attainm ent level		pas s%	Attainm ent level	co wise external average	co wise total average
C O 1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	62.0	0.0	2.4	96.0	3.0	3.0	2.8
C O 2	100.0	3.0			100.0	3.0			100.0	3.0	62.0	0.0	2.3	96.0	3.0	3.0	2.7
C O 3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	62.0	0.0	2.4	96.0	3.0	3.0	2.8
C O 4			100.0	3.0	100.0	3.0			100.0	3.0	62.0	0.0	2.3	96.0	3.0	3.0	2.7
C O 5			100.0	3.0	100.0	3.0			100.0	3.0	62.0	0.0	2.3	96.0	3.0	3.0	2.7

AVER AGE	AVER AGE
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					
CO2	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	
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	2.724		2.73	2.715	2.76		2.72	2.7
AVERAGE OF POS	2.7168		2.7225	2.715	2.76		2.72	2.7
AVERAGE	2.722383333							

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> Explain engineering through various process models.	V Evaluating
<b>CO2</b>	<b>CO2:</b> Identify analyze Requirements, Object Oriented and various modeling's.	IV Analyzing
<b>CO3</b>	<b>CO3:</b> Categorize design and architecture	IV Analyzing
<b>CO4</b>	<b>CO4:</b> Classify Components, golden rules and design evaluation	IV Analyzing
<b>CO5</b>	<b>CO5:</b> To understand testing techniques to evaluate quality metrics	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			S	S		S		H
C02	H		H	H			H	S		H		H
C03	H		H	H	H		H	S		H		H
C04	H		H	H	S		H	S		H		S
C05	H		H	H	S		S	H		H		H

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**

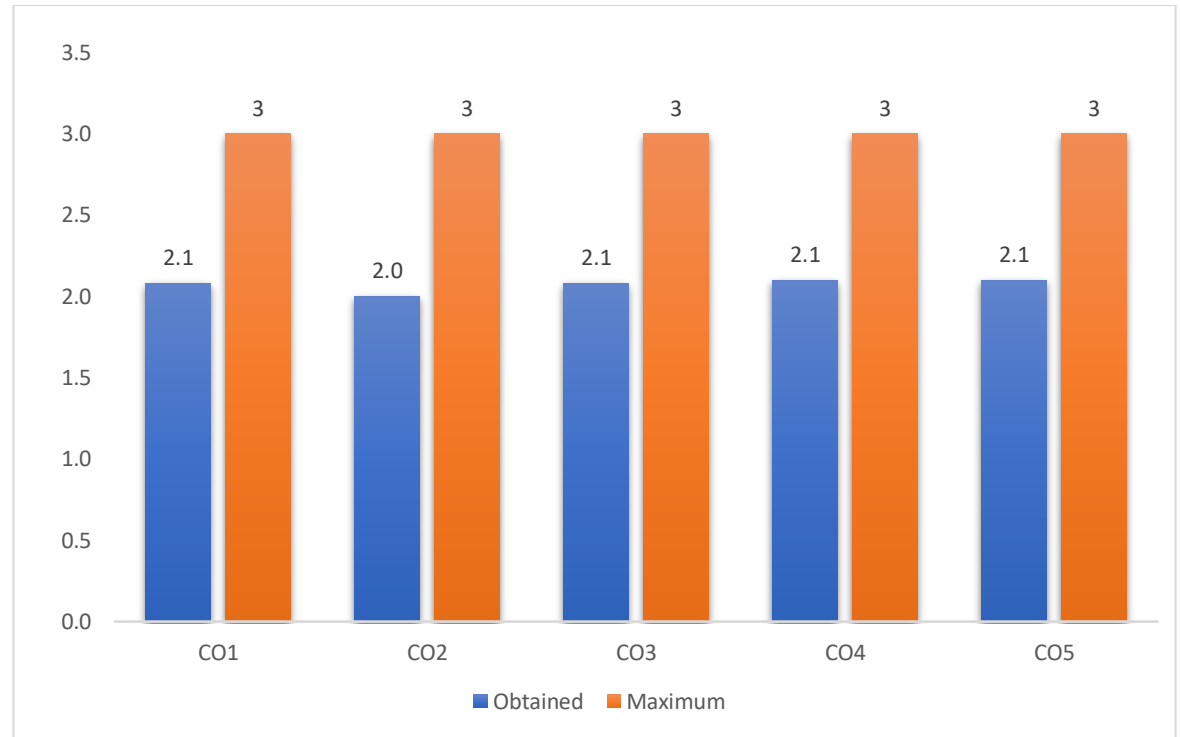
**ATTAINMENT SCALE:**

**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
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	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
CO 1	81.0	2.0			100.0	3.0	85.7	3.0	100.0	3.0	57.1	0.0	2.2	81.0	2.0	2.0	2.1
CO 2	81.0	2.0			100.0	3.0			100.0	3.0	57.1	0.0	2.0	81.0	2.0	2.0	2.0
CO 3	81.0	2.0	95.2	3.0	100.0	3.0			100.0	3.0	57.1	0.0	2.2	81.0	2.0	2.0	2.1
CO 4			95.2	3.0	100.0	3.0			100.0	3.0	57.1	0.0	2.3	81.0	2.0	2.0	2.1
CO 5			95.2	3.0	100.0	3.0			100.0	3.0	57.1	0.0	2.3	81.0	2.0	2.0	2.1

AVERA GE	AVERA GE
2	2.072

**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
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CO1	H	2.08		H	2.08						
CO2	H	2		H	2	H	2		H	2	
CO3	H	2.08		H	2.08	H	2.08	H	2.08		
CO4	H	2.1		H	2.1	H	2.1		H	2.1	
CO5	H	2.1		H	2.1	H	2.1			H	2.1
AVERAGE OF COS FOR POS		2.072		2.072	2.07	2.08			2.06	2.1	
AVERAGE OF POS		2.0704		2.0704	2.07	2.08			2.06	2.1	
AVERAGE	2.075133333										

### 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.

**Table 1: CO, PO, PSO MAPPING**

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



C O 1	100 .0	3.0			100 .0	3.0	100 .0	3.0	82. 8	2.0	62.1	0.0	2.2	93. 1	3.0	3.0	2.7
C O 2	100 .0	3.0			100 .0	3.0			82. 8	2.0	62.1	0.0	2.0	93. 1	3.0	3.0	2.6
C O 3	100 .0	3.0	100 .0	3.0	100 .0	3.0			82. 8	2.0	62.1	0.0	2.2	93. 1	3.0	3.0	2.7
C O 4			100 .0	3.0	100 .0	3.0			82. 8	2.0	62.1	0.0	2.0	93. 1	3.0	3.0	2.6
C O 5			100 .0	3.0	100 .0	3.0			82. 8	2.0	62.1	0.0	2.0	93. 1	3.0	3.0	2.6

AVER AGE	AVER AGE
3	2.632

**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 2.68	H 2.68	H 2.68	H 2.68		H 2.68		
CO2		H 2.6		H 2.6	H 2.6		H 2.6	
CO3		H 2.68		H 2.68	H 2.68			
CO4				H 2.6		H 2.6	H 2.6	
CO5	H 2.6	H 2.6	H 2.6	H 2.6		H 2.6		H 2.6
AVERAGE OF COS FOR POS	2.64	2.64	2.64	2.632	2.64	2.626666667	2.6	2.6
AVERAGE OF POS	2.62	2.63	2.62	2.6224	2.64	2.608889	2.6	2.6
AVERAGE	2.617661111							

## **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.

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

**Table 1: CO, PO, PSO MAPPING**

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

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**

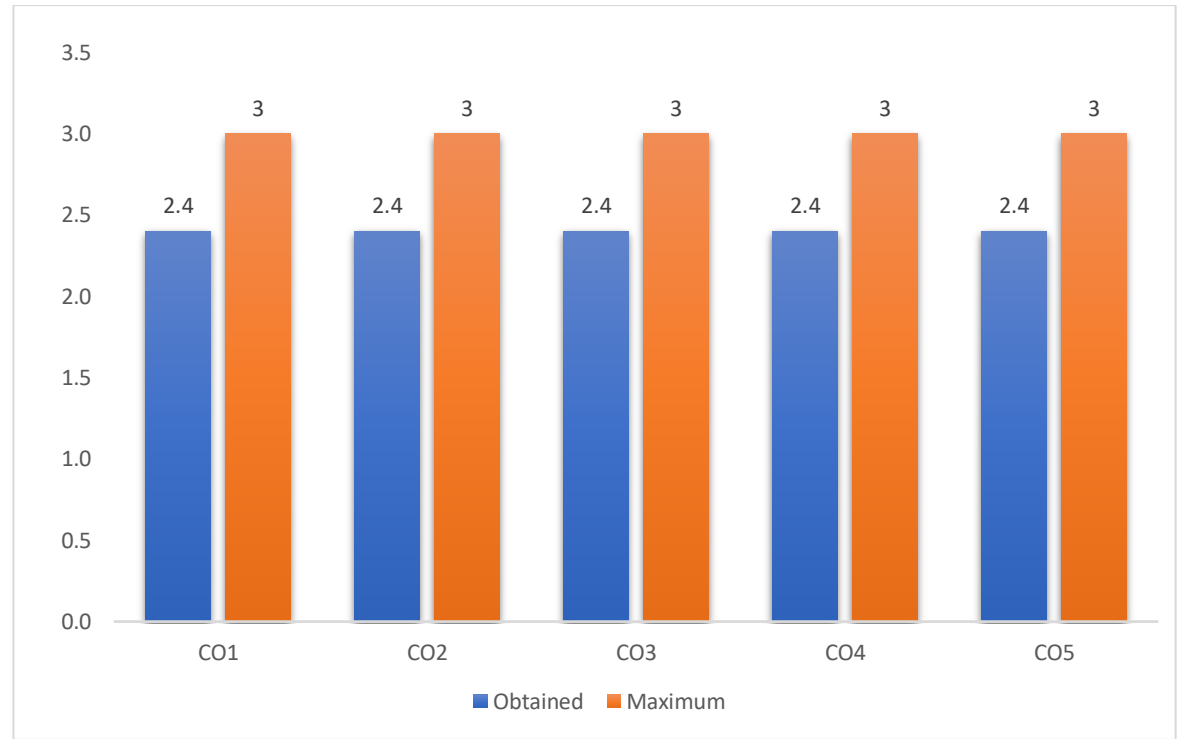
**ATTAINMENT SCALE:**

**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 external average	co wise total average
	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainme nt level	pas s%	Attainme nt level		pas s%	Attainm ent level		
C O1	98.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	96.0	3.0	3.0	76.0	2.0	2.0	2.4
C O2	98.0	3.0			100.0	3.0			100.0	3.0	96.0	3.0	3.0	76.0	2.0	2.0	2.4
C O3	98.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	96.0	3.0	3.0	76.0	2.0	2.0	2.4
C O4			100.0	3.0	100.0	3.0			100.0	3.0	96.0	3.0	3.0	76.0	2.0	2.0	2.4
C O5			100.0	3.0	100.0	3.0			100.0	3.0	96.0	3.0	3.0	76.0	2.0	2.0	2.4

AVER AGE	AVER AGE
2	2.4

**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 2.4	H 2.4	H 2.4		H 2.4	H 2.4	H 2.4	
CO2		H 2.4		H 2.4		H 2.4	H 2.4	H 2.4
CO3	H 2.4		H 2.4		H 2.4	H 2.4		H 2.4
CO4		H 2.4		H 2.4		H 2.4	H 2.4	
CO5	H 2.4	H 2.4	H 2.4	H 2.4				H 2.4
AVERAGE OF COS FOR POS	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
AVERAGE OF POS	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
AVERAGE	2.4							

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1:</b> Apply basic principles of AI in solutions that require problem solving, inference, perception,	<b>IV Applying</b>

	knowledge representation, and learning.	
<b>CO2</b>	<b>CO2:</b> Understand predicate logic and transform the real life information in different representation.	II Understanding
<b>CO3</b>	<b>CO3:</b> Understand formal methods of knowledge representation.	II Understanding
<b>CO4</b>	<b>CO4:</b> Analyze the underlying mathematical relationships and build expert system.	IV Analyzing
<b>CO5</b>	<b>CO5:</b> Demonstrate Knowledge representation techniques.	V Evaluating

**Table 1: CO, PO, PSO MAPPING**

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

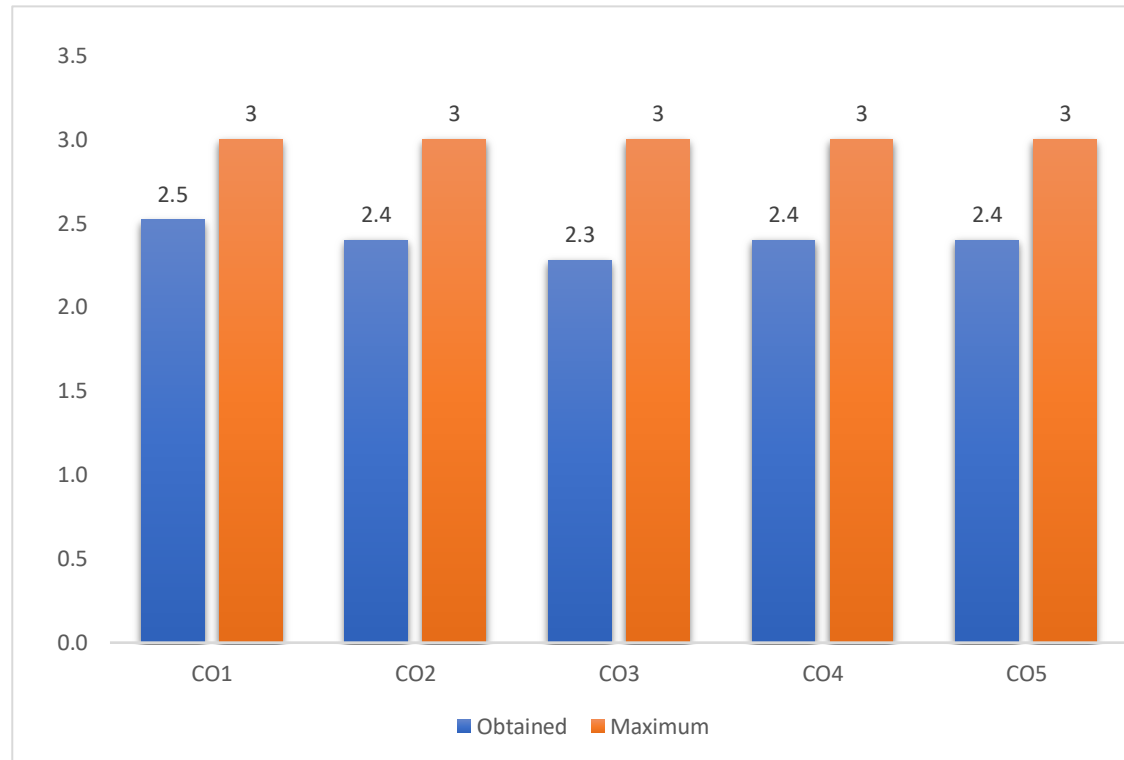
**H: Highly Supportive**

**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	assignment	viva	Attendance	External Exam
----	------------	------------	-------	------------	------	------------	---------------

					discussion												
	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pas s%	Attainm ent level	pass %	Attainm ent level	co wise inter nal aver age	pas s%	Attainm ent level	co wise exter nal aver age	co wise total avera ge
C O 1	0.0	0.0			100 .0	3.0	100 .0	3.0	100 .0	3.0	0.0	0.0	1.8	100 .0	3.0	3.0	2.5
C O 2	0.0	0.0			100 .0	3.0			100 .0	3.0	0.0	0.0	1.5	100 .0	3.0	3.0	2.4
C O 3	0.0	0.0	0.0	0.0	100 .0	3.0			100 .0	3.0	0.0	0.0	1.2	100 .0	3.0	3.0	2.3
C O 4			0.0	0.0	100 .0	3.0			100 .0	3.0	0.0	0.0	1.5	100 .0	3.0	3.0	2.4
C O 5			0.0	0.0	100 .0	3.0			100 .0	3.0	0.0	0.0	1.5	100 .0	3.0	3.0	2.4

AVER AGE	AVER AGE
3	2.4

**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		
CO2			H 2.4	H 2.4		H 2.4	H 2.4	
CO3	H 2.28		H 2.28	H 2.28	H 2.28	H 2.28	H 2.28	
CO4	H 2.4	H 2.4	H 2.4	H 2.4			H 2.4	
CO5		H 2.4	H 2.4	H 2.4				H 2.4
AVERAGE OF COS FOR POS	2.4	2.4	2.4	2.37	2.4	2.4	2.36	2.4
AVERAGE OF POS	2.36	2.4	2.376	2.37	2.34	2.36	2.36	2.4
AVERAGE	2.37075							

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1: Describe different components of time series data and compare various methods in estimating trend</b>	IV Analyzing
<b>CO2</b>	<b>CO2: Demonstrate different growth curves and compute seasonal variations using various methods.</b>	IV Applying
<b>CO3</b>	<b>CO3: Describe multivariate data analytical tools and model best fit multiple linear regression for multivariate data.</b>	II Understanding
<b>CO4</b>	<b>CO4: outline different discriminant analysis used for multivariate data analysis.</b>	IV Analyzing
<b>CO5</b>	<b>CO5: use principal component analysis and factor analysis for dimensional reduction in multivariate data analysis.</b>	IV Applying

**Table 1: CO, PO, PSO MAPPING**

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

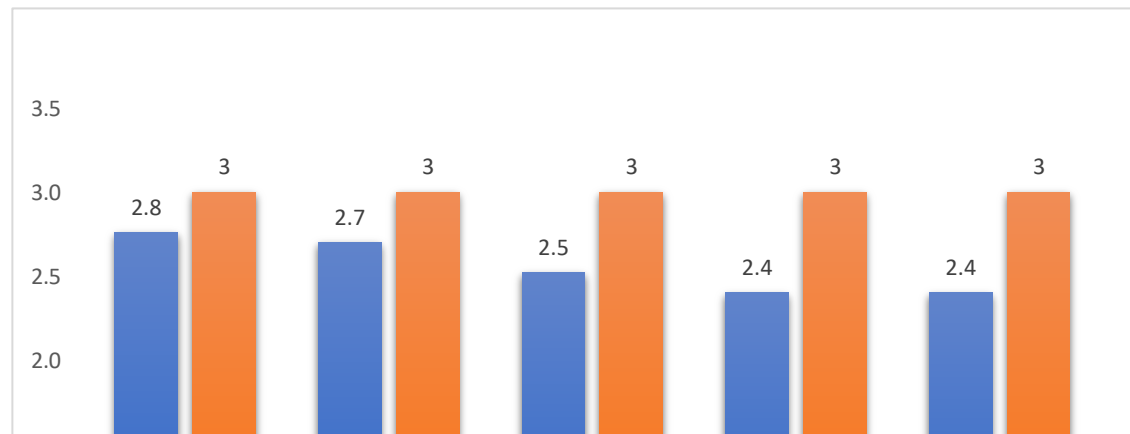
**H: Highly Supportive**

**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





													average			average	ge
C O 1	88.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	52.0	0.0	2.4	90.0	3.0	3.0	2.8
C O 2	88.0	3.0			100.0	3.0			100.0	3.0	52.0	0.0	2.3	90.0	3.0	3.0	2.7
C O 3	88.0	3.0	64.0	0.0	100.0	3.0			100.0	3.0	52.0	0.0	1.8	90.0	3.0	3.0	2.5
C O 4			64.0	0.0	100.0	3.0			100.0	3.0	52.0	0.0	1.5	90.0	3.0	3.0	2.4
C O 5			64.0	0.0	100.0	3.0			100.0	3.0	52.0	0.0	1.5	90.0	3.0	3.0	2.4

AVER AGE	AVER AGE
3	2.556

**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	H 2.76	
CO2		H 2.7		H 2.7		H 2.7	H 2.7	H 2.7
CO3	H 2.52		H 2.52		H 2.52	H 2.52		H 2.52

CO4		H 2.4		H 2.4		H 2.4	H 2.4	
CO5	H 2.4	H 2.4	H 2.4	H 2.4				H 2.4
AVERAGE OF COS FOR POS	2.56	2.565	2.56	2.5	2.64	2.595	2.62	2.54
AVERAGE OF POS	2.493333	2.51625	2.493333	2.5	2.58	2.55375	2.573333	2.54
AVERAGE	2.53125							





**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

**COURSE TITLE: GENERAL ENGLISH II**

**COURSE CODE: EN23201**

**CREDITS: 3**

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

### **Programme Outcomes – (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.
- **PO8. Life-long learning:** Recognize 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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	To <b>Identify</b> a sound understanding on the formation of words and to demonstrate the functional grammatical component in the sentence. (IV analyze)	I Remembering
<b>CO2</b>	To <b>Paraphrase</b> 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
<b>CO3</b>	To <b>Create</b> an understanding on Indian Literature, alongside to develop and chisel their communication skills. (VI create)	VI Creating
<b>CO4</b>	To <b>Recognize</b> the moral element which underlies in the short story; an exposure to informal language.( I knowledge)	VI Creating
<b>CO5</b>	To <b>Develop</b> 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	H	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	H

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**

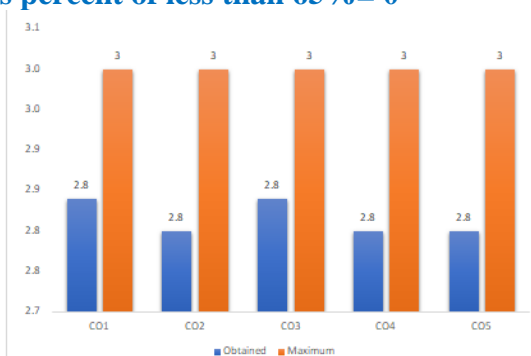
**ATTAINMENT SCALE:**

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	102.0	3.0			102.0	3.0	102.0	3.0	102.0	3.0	73.5	1.0	2.6	102.0	3.0	3.0	2.8
CO2	102.0	3.0			102.0	3.0			102.0	3.0	73.5	1.0	2.5	102.0	3.0	3.0	2.8
CO3	102.0	3.0	100.0	3.0	102.0	3.0			102.0	3.0	73.5	1.0	2.6	102.0	3.0	3.0	2.8
CO4			100.0	3.0	102.0	3.0			102.0	3.0	73.5	1.0	2.5	102.0	3.0	3.0	2.8
CO5			100.0	3.0	102.0	3.0			102.0	3.0	73.5	1.0	2.5	102.0	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			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	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		H 2.8
AVERAGE OF COS FOR POS	2.813333333	2.84	2.826666667	2.813333333	2.813333333	2.8	2.813333333	2.813333333
AVERAGE OF POS	2.813333	2.84	2.822222	2.813333	2.813333	2.8	2.813333	2.813333
AVERAGE	2.816111111							

Activate V

**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

**COURSE TITLE: INDIAN HERITAGE AND CULTURE**

**COURSE CODE: IC23201**

**CREDITS: 2**

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

### Programme Outcomes – (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
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- **PO7: Communication:** Communicate effectively on complex science & technology activities
- **PO8. Life-long learning:** Recognize the need and ability to engage in independent and life long 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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	The student can <b>understand</b> 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
<b>CO2</b>	Students will <b>analyze</b> how Persian culture entered into India and how it influenced the Fine Arts of Indian society like Classical Music, Dance and Architecture.	IV Analyzing
<b>CO3</b>	Student can able to <b>assess</b> 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
<b>CO4</b>	Students will <b>evaluate</b> various challenges face by the youth and the evil affects of terrorism on society	V Evaluating
<b>CO5</b>	The topics in the unit <b>create</b> 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	H	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	H

**H: Highly Supportive**

**S: Supportive**

**Table 2: COURSE OUTCOME ATTAINMENT**

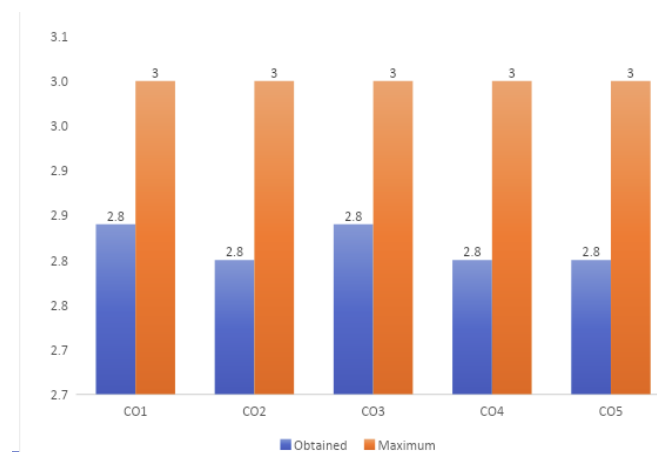
**ATTAINMENT SCALE:**

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		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	66.0	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	66.0	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	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	
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				H 2.8
AVERAGE OF COS FOR POS	2.816	2.82	2.816	2.81	2.84	2.8	2.813333333	2.82
AVERAGE OF POS	2.8112	2.81	2.8112	2.81	2.84	2.8	2.813333	2.82
<b>AVERAGE</b>	2.814466667							

**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.)**

- **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.

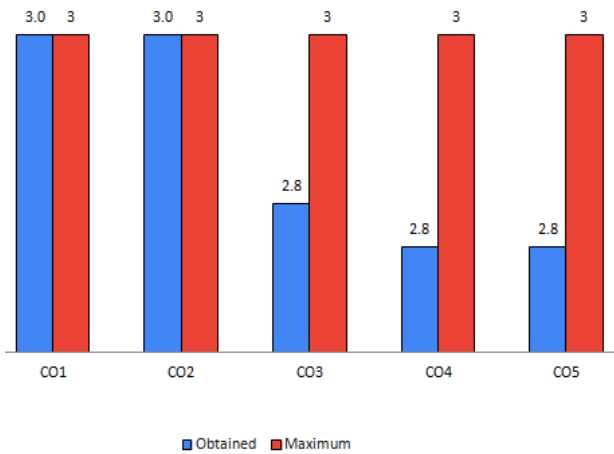
	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>Demonstrate</b> important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element	II Understanding
<b>CO2</b>	<b>Analyze</b> different types of subgroups such as normal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



**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		Attainment		viva		Attendance		co wise internal	External Exam		co wise total	
	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment		pass%	Attainment		
CO1	90.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	90.0	3.0	3.0	100.0	3.0	3.0	3.0
CO2	90.0	3.0			100.0	3.0			100.0	3.0	90.0	3.0	3.0	100.0	3.0	3.0	3.0
CO3	90.0	3.0	70.0	1.0	100.0	3.0			100.0	3.0	90.0	3.0	2.6	100.0	3.0	3.0	2.8
CO4			70.0	1.0	100.0	3.0			100.0	3.0	90.0	3.0	2.5	100.0	3.0	3.0	2.8
CO5			70.0	1.0	100.0	3.0			100.0	3.0	90.0	3.0	2.5	100.0	3.0	3.0	2.8
															AVERAGE	AVERAGE	
															3	2.888	

**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					
CO2	H 3		H 3			H 3		
CO3				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				H 2.8
AVERAGE OF COS FOR POS	2.866666667	2.9	2.9	2.82		2.9	2.8	2.8
AVERAGE OF POS	2.866667	2.85	2.875	2.82		2.9	2.8	2.8
AVERAGE	2.84452381							

**COURSE OUTCOME MAPPING**

**MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES**

**COURSE TITLE: OPERATING SYSTEMS**

**COURSE CODE: DS19204**

**CREDITS: 4**

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

### **Programme Outcomes – (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.**

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>Identify</b> the main components of an OS & their functions	IV Analyzing
<b>CO2</b>	<b>Analyze</b> various issues in Inter Process Communication (IPC) and the role of OS in IPC	IV Analyzing
<b>CO3</b>	<b>Explain</b> Process synchronization, Deadlocks-deadlock characterization, methods for handling deadlocks.	V Evaluating
<b>CO4</b>	<b>Compare</b> the concepts and implementation Memory management policies and virtual memory	IV Analyzing
<b>CO5</b>	<b>Understand</b> 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	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	H

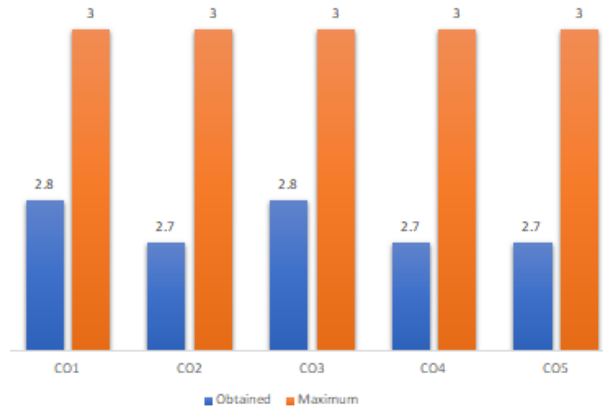
**H: Highly Supportive**

**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		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	56.0	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	56.0	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	56.0	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	56.0	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	56.0	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					
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
CO4	H 2.7		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	2.724	2.73	2.724	2.715	2.76	2.7	2.72	2.73
AVERAGE OF POS	2.7168	2.715	2.7168	2.715	2.76	2.7	2.72	2.73
AVERAGE	2.7217							



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
<b>AVERAGE</b>	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.)

- **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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1: Use</b> discrete and continuous probability distributions, including requirements, mean and variance, and making decisions	VI Creating
<b>CO2</b>	<b>CO2: Identify</b> the characteristics of different discrete distributions.	IV Analyzing
<b>CO3</b>	<b>CO3: Apply</b> the normal probability distribution including standard normal curve calculations of appropriate areas.	II Understanding
<b>CO4</b>	<b>CO4: Choose</b> exponential, beta and Gamma distributions to solve statistical problems.	III Applying
<b>CO5</b>	<b>CO5: Develop</b> 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	H	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	H

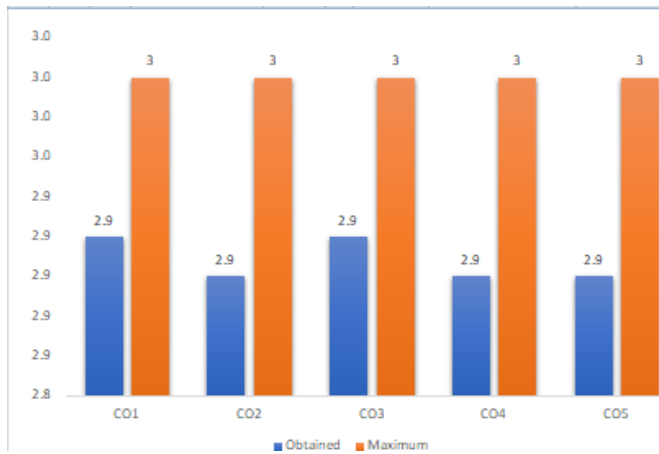
**H: Highly Supportive**

**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		co wise internal average	External Exam		co wise external average	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	92.0	3.0			100.0	3.0	98.0	3.0	100.0	3.0	76.0	2.0	2.8	98.0	3.0	3.0	2.9
CO2	92.0	3.0			100.0	3.0			100.0	3.0	76.0	2.0	2.8	98.0	3.0	3.0	2.9
CO3	92.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	76.0	2.0	2.8	98.0	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	98.0	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	98.0	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					
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	H 2.92
CO4	H 2.9		H 2.9	S 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	2.908	2.91	2.908	2.905	2.92	2.9	2.90666667	2.91
AVERAGE OF POS	2.9056	2.905	2.9056	2.905	2.92	2.9	2.906667	2.91
AVERAGE	2.907233333							

**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.)

- **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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>Choose</b> appropriate data structures to represent data items in real world problems	II Understanding
<b>CO2</b>	<b>Illustrate</b> non-linear data structures like linked list	IV Analyzing
<b>CO3</b>	<b>Organize</b> the data using sorting in various linear data structures and determine time complexity	VI Creating
<b>CO4</b>	<b>Construct</b> data with nonlinear data structure using trees.	II Understanding
<b>CO5</b>	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	H	H	H	S	S		S	S	H	S	S	H
C02	H	S	H	H	S	S	H	S	S	H	S	H
C03	H	H	S	S	H	H	S	H	H	H	S	H
C04	H	S	H	H	S	H	H	S	S	S	H	S
C05	H	H	H	H	S	S	S	H	S	H	H	H

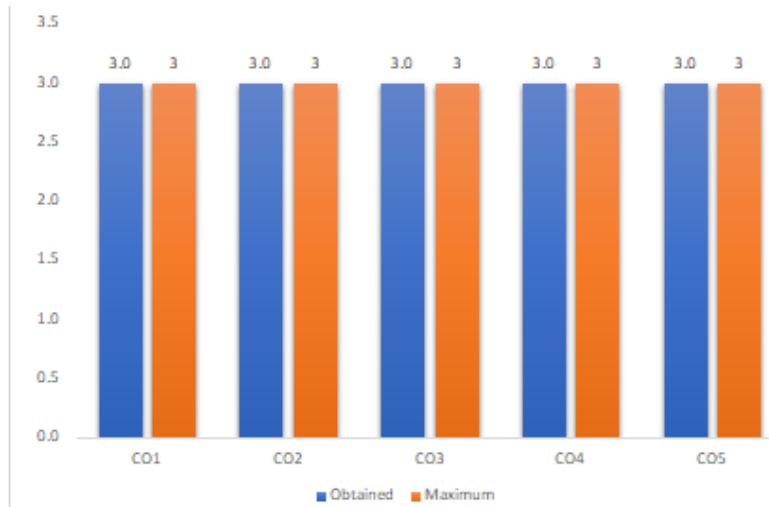
**H: Highly Supportive**

**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	co wise external average	
CO1	100.0	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	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
CO3	100.0	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
CO4			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
CO5			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

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	
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: Accounting and Financial Management**

**COURSE CODE: DS23401**

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO 1</b>	<b>CO1:</b> To <b>Describe</b> the need and importance of accounting and infer the various principles of accounting	I Remembering
<b>CO 2</b>	<b>CO2:</b> To <b>Explain</b> about branches of accounting	II Understanding
<b>CO 3</b>	<b>CO3:</b> To <b>Analyze</b> the financial position of an organization	IV Analyzing
<b>CO 4</b>	<b>CO4:</b> To <b>Interpret</b> the sources of finance.	V Evaluating
<b>CO 5</b>	<b>CO5:</b> To <b>Create</b> budgets for key factors of organization.	VI Creating

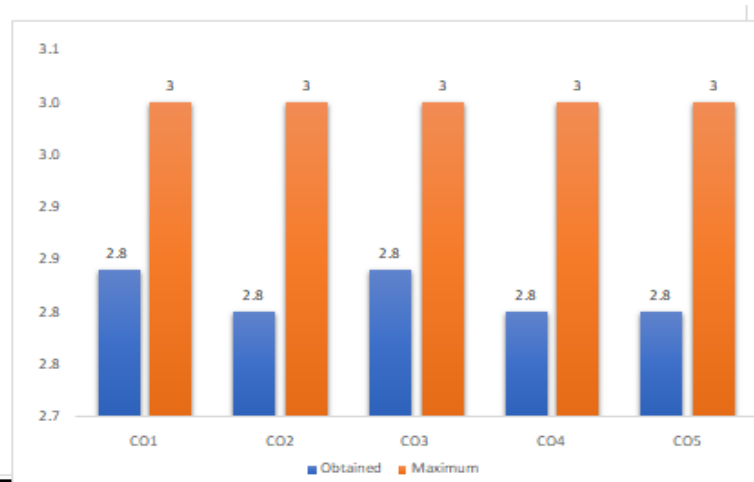
**Table 1: CO, PO, PSO MAPPING**

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	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			
	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
C01	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	72.9	1.0	2.6	100.0	3.0	3.0	2.8
C02	100.0	3.0			100.0	3.0			100.0	3.0	72.9	1.0	2.5	100.0	3.0	3.0	2.8
C03	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	72.9	1.0	2.6	100.0	3.0	3.0	2.8
C04			100.0	3.0	100.0	3.0			100.0	3.0	72.9	1.0	2.5	100.0	3.0	3.0	2.8
C05			100.0	3.0	100.0	3.0			100.0	3.0	72.9	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	H 2.84	H 2.84					
CO2	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				H 2.8
AVERAGE OF COS FOR POS	2.816	2.82	2.816	2.81	2.84	2.8	2.813333333	2.82
AVERAGE OF POS	2.8112	2.81	2.8112	2.81	2.84	2.8	2.813333	2.82
AVERAGE	2.814466667							

Activate Win...

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO 1</b>	<b>CO1: Understand</b> basic concept of R.	II Understanding
<b>CO 2</b>	<b>CO2: Demonstrate</b> programming concepts and data structures in R.	II Understanding
<b>CO 3</b>	<b>CO3: Analyze</b> a large problem by sub dividing it into smaller components using functions	IV Analyzing
<b>CO 4</b>	<b>CO4: Choose</b> an appropriate graphic for analysis and analyze data using summary statistics.	III APPLYING
<b>CO 5</b>	<b>CO5: Choose</b> the type of regression based on data set.	III APPLYING

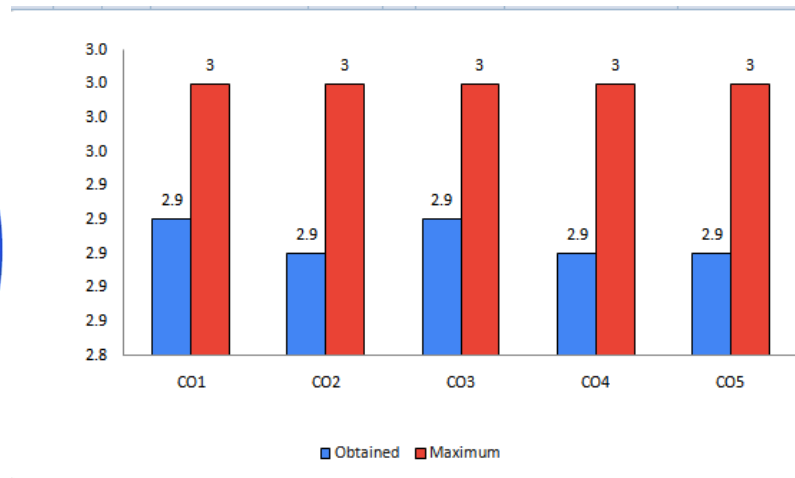
**Table 1: CO, PO, PSO MAPPING**

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	S	H	H	S	S		S	S	H	S	H	H
C02	H		H			H	H	S		H		S
C03		S	H	H	H		S		H	H	S	H
C04	H		H	S	S	H	H	S	S	S		S
C05	H	H	H	H	S	S	S	H		H	H	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		
CO 1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	79.2	2.0	2.8	100.0	3.0	3.0	2.9
CO 2	100.0	3.0			100.0	3.0			100.0	3.0	79.2	2.0	2.8	100.0	3.0	3.0	2.9
CO 3	100.0	3.0	97.9	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	100.0	3.0	3.0	2.9
CO 4			97.9	3.0	100.0	3.0			100.0	3.0	79.2	2.0	2.8	100.0	3.0	3.0	2.9
CO 5			97.9	3.0	100.0	3.0			100.0	3.0	79.2	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	H 2.9	
CO3			H 2.92	H 2.92	H 2.92			
CO4	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	2.9	2.91	2.908	2.91	2.92	2.9	2.9	2.9
AVERAGE OF POS	2.9	2.905	2.9056	2.91	2.92	2.9	2.9	2.9
AVERAGE	2.905075							

**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
CO 1	<b>CO1:</b> To <b>understand</b> the concepts of Data Warehousing and its importance	II Understanding
CO 2	<b>CO2:</b> <b>Analyze</b> different Data Mining methods using algorithms	IV Analyzing
CO 3	<b>CO3:</b> <b>Explain</b> the classification of data	II Understanding
CO 4	<b>CO4:</b> <b>Express</b> clustering methods using algorithms.	V Evaluating
CO 5	<b>CO5:</b> <b>Identify</b> importance of Text Mining and related algorithms	III Applying

**Table 1: CO, PO, PSO MAPPING**

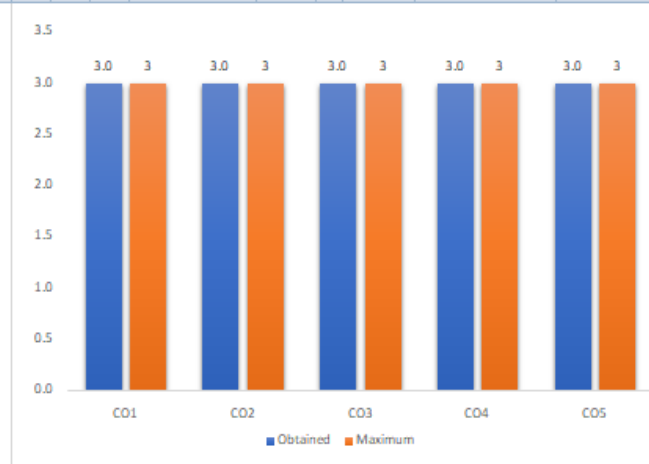
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	S	H	S	S		S	S	H	S	H	H
C02	S		S	H		H	H	S		H		S
C03	H	H	H	S	H		S	S	S	S	S	H
C04	S		H	H	H	S	H	H	S	H		H
C05	H	H	S	H	H	H	S	H		S	H	S

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	95.8	3.0			100.0	3.0	100.0	3.0	100.0	3.0	85.4	3.0	3.0	100.0	3.0	3.0	3.0
CO2	95.8	3.0			100.0	3.0			100.0	3.0	85.4	3.0	3.0	100.0	3.0	3.0	3.0
CO3	95.8	3.0	95.8	3.0	100.0	3.0			100.0	3.0	85.4	3.0	3.0	100.0	3.0	3.0	3.0
CO4			95.8	3.0	100.0	3.0			100.0	3.0	85.4	3.0	3.0	100.0	3.0	3.0	3.0
CO5			95.8	3.0	100.0	3.0			100.0	3.0	85.4	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					
CO2				H 3		H 3	H 3	
CO3	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		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: COMPUTER NETWORKS**

**COURSE CODE: BS20409**

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO 1</b>	<b>CO1: Understand</b> and identify basic computer network topologies and protocols and explain Data Communication System components	II Understanding
<b>CO 2</b>	<b>CO2: Describe</b> the functions of each layer in OSI model and its protocols	I Remembering
<b>CO 3</b>	<b>CO3: Classify</b> different error detecting techniques	II Understanding
<b>CO 4</b>	<b>CO4: Build</b> skills of sub-netting and routing mechanisms	III Applying
<b>CO 5</b>	<b>CO5: Classify</b> 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	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	H

H: Highly Supportive  
 S: Supportive

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**Table 2: COURSE OUTCOME ATTAINMENT**

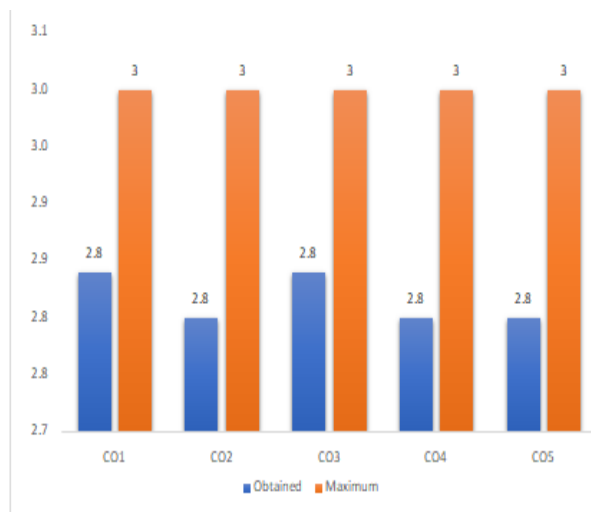
**ATTAINMENT SCALE:**

**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	70.8	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	70.8	1.0	2.5	100.0	3.0	3.0	2.8
CO3	100.0	3.0	97.9	3.0	100.0	3.0			100.0	3.0	70.8	1.0	2.6	100.0	3.0	3.0	2.8
CO4			97.9	3.0	100.0	3.0			100.0	3.0	70.8	1.0	2.5	100.0	3.0	3.0	2.8
CO5			97.9	3.0	100.0	3.0			100.0	3.0	70.8	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	
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				H 2.8
AVERAGE OF COS FOR POS	2.816	2.82	2.816	2.81	2.84	2.8	2.813333333	2.82
AVERAGE OF POS	2.8112	2.81	2.8112	2.81	2.84	2.8	2.813333	2.82
AVERAGE	2.814466667							

**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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO 1</b>	<b>CO1: Develop</b> the distributional results needed for statistical inference.	III Applying
<b>CO 2</b>	<b>CO2: Analyze</b> hypotheses tests of means, proportions and variances using both one-and two-sample data sets	IV Analysing
<b>CO 3</b>	<b>CO3: Explain</b> Chi-Squared test for independence of attributes and goodness of fit.	II Understanding
<b>CO 4</b>	<b>CO4: Differentiate</b> between the tests statistics to be used for dependent and independent samples	IV Analysing
<b>CO 5</b>	<b>CO5: Design</b> the test statistic to be used when the nature of the distribution is unknown	V Creating

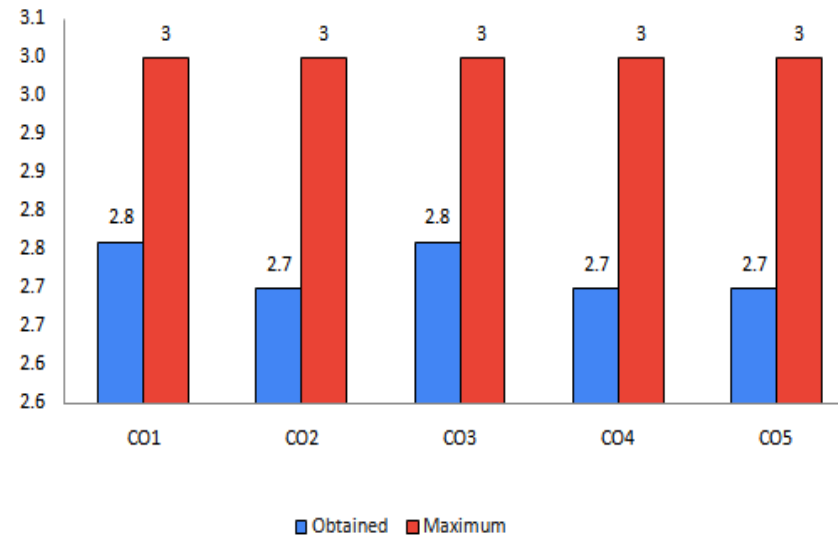
**Table 1: CO, PO, PSO MAPPING**

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	S	H	H	S	S	S	S	S	H	S	H	H
C02	H		H		S	H	H	S		H		S
C03		S	H	H	H	H	S		H	S	S	H
C04	S		H	S	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	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	External Exam			
	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment level		pass%	Attainment	co wise external	co wise total
C01	97.9	3.0			100.0	3.0	100.0	3.0	100.0	3.0	62.5	0.0	2.4	100.0	3.0	3.0	2.8
C02	97.9	3.0			100.0	3.0			100.0	3.0	62.5	0.0	2.3	100.0	3.0	3.0	2.7
C03	97.9	3.0	97.9	3.0	100.0	3.0			100.0	3.0	62.5	0.0	2.4	100.0	3.0	3.0	2.8
C04			97.9	3.0	100.0	3.0			100.0	3.0	62.5	0.0	2.3	100.0	3.0	3.0	2.7
C05			97.9	3.0	100.0	3.0			100.0	3.0	62.5	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					
CO2	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		
CO4			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	2.7	2.73	2.724	2.73	2.76	2.72	2.7	2.7
AVERAGE OF POS	2.7	2.715	2.7168	2.73	2.76	2.72	2.7	2.7
AVERAGE	2.717725							

**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.:

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**PROGRAMME SPECIFIC OUTCOMES (DEPARTMENTAL):**

**Students will be able to:**

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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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO 1</b>	<b>CO1:</b> Write java programs and <b>differentiate</b> between object-oriented programming and procedure-oriented programming.	IV Analyzing
<b>CO 2</b>	<b>CO2: Apply</b> object-oriented programming features for solving a given problem.	III Applying
<b>CO 3</b>	<b>CO3: Incorporate</b> exception handling mechan	II Understanding
<b>CO 4</b>	<b>CO4: Implement</b> Use of java standard API library to handle file operations.	II Understanding
<b>CO 5</b>	<b>CO5: Develop</b> 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	H	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	H		S
C05	H	H	H	H	S	S	S	H		H	H	H

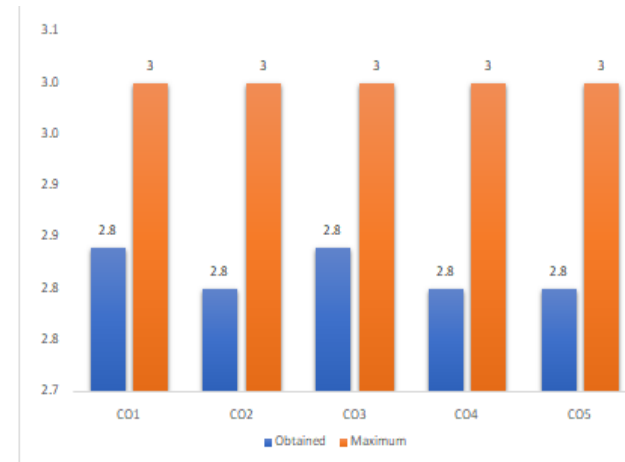
H: Highly Supportive

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	93.8	3.0			100.0	3.0	100.0	3.0	100.0	3.0	68.8	1.0	2.6	100.0	3.0	3.0	2.8
CO2	93.8	3.0			100.0	3.0			100.0	3.0	68.8	1.0	2.5	100.0	3.0	3.0	2.8
CO3	93.8	3.0	95.8	3.0	100.0	3.0			100.0	3.0	68.8	1.0	2.6	100.0	3.0	3.0	2.8
CO4			95.8	3.0	100.0	3.0			100.0	3.0	68.8	1.0	2.5	100.0	3.0	3.0	2.8
CO5			95.8	3.0	100.0	3.0			100.0	3.0	68.8	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:**

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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	
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				H 2.8
AVERAGE OF COS FOR POS	2.816	2.82	2.816	2.81	2.84	2.8	2.813333333	2.82
AVERAGE OF POS	2.8112	2.81	2.8112	2.81	2.84	2.8	2.813333	2.82
AVERAGE	2.814466667							

**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.

- **PO1. Scientific Knowledge:** Apply the knowledge of Science, Mathematics, Engineering & Technology fundamentals to solve the complex problems.
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**PSO1:** Apply computer science languages and algorithms, as well as mathematical and statistical models for developing solutions to the real world problems.

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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.

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

**Table 1: CO, PO, PSO MAPPING**

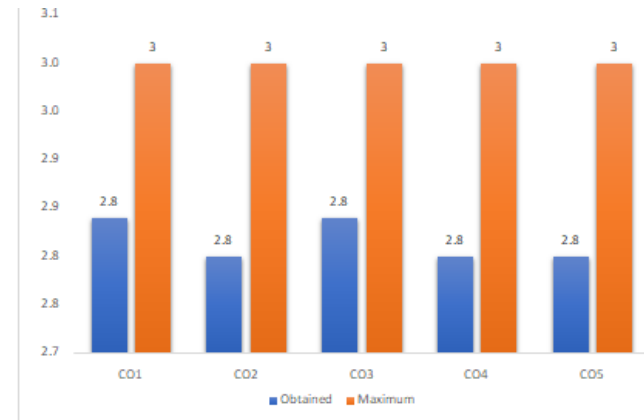
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	S		S	S	H	S	S	H
C02	H	S	H	H		S	H	S	H	H	H	H
C03	H	S	S	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	S		S
C05	H	H	H	H	S	S	S	H	S	H	H	H

H: Highly Supportive  
 S: Supportive

**Table 2: COURSE OUTCOME ATTAINMENT**

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- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
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- 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	71.4	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	71.4	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	71.4	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	71.4	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	71.4	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)**

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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	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				H 2.8
AVERAGE OF COS FOR POS	2.816	2.82	2.81	2.81	2.84	2.8	2.813333333	2.82
AVERAGE OF POS	2.8112	2.81	2.8025	2.81	2.84	2.8	2.813333	2.82
<b>AVERAGE</b>	2.813379167							

**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.)**

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	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1: Understand</b> distributed systems for cloud computing	II Understanding
<b>CO2</b>	<b>CO2: Identify</b> cloud servers, types and components	IV Analyzing
<b>CO3</b>	<b>CO3: Analyse</b> cloud architectural information in the present generation of market	IV Analyzing
<b>CO4</b>	<b>CO4: Compare</b> types of clients in the cloud and virtualization	II Understanding
<b>CO5</b>	<b>CO5: Examine</b> 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	H	H	S	S		S	S	H	S	H	H
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C03	H	S	H	S	H		S	H	H	H	S	H
C04	S	S	H	H	S	H	H	S	S	S		S
C05	H	H	H	H	S	S	S	H	H	H	H	H

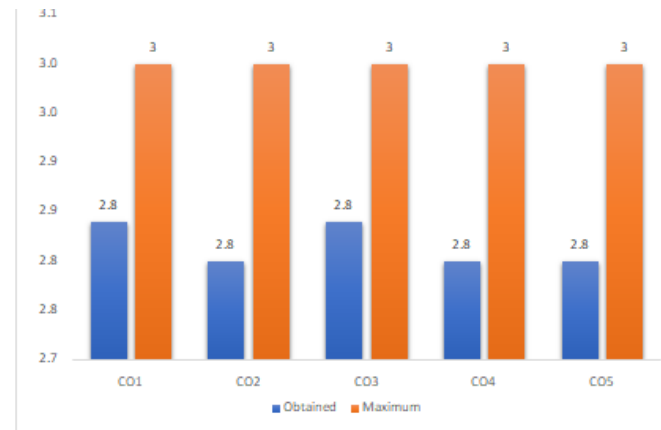
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	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level		pass%	Attainment level	co wise external average	
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CO2	100.0	3.0			100.0	3.0			100.0	3.0	65.5	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	65.5	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	65.5	1.0	2.5	100.0	3.0	3.0	2.8
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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				H 2.8
AVERAGE OF COS FOR POS	2.82	2.813333333	2.816	2.8	2.84	2.8	2.8	2.82
AVERAGE OF POS	2.815	2.804444	2.8112	2.8	2.84	2.8	2.8	2.82
<b>AVERAGE</b>	<b>2.811330556</b>							

**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.)**

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- **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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO1</b>	<b>CO1: Understand</b> market research methods.	II Understanding
<b>CO2</b>	<b>CO2: Analyze</b> consumer behaviour and marketing strategy.	IV Analyzing
<b>CO3</b>	<b>CO3: Identify</b> market basket analysis.	III Applying
<b>CO4</b>	<b>CO4: Examine</b> survival analysis.	IV Analyzing
<b>CO5</b>	<b>CO5: Classify</b> customer segmentation.	II Understanding

**Table 1: CO, PO, PSO MAPPING**

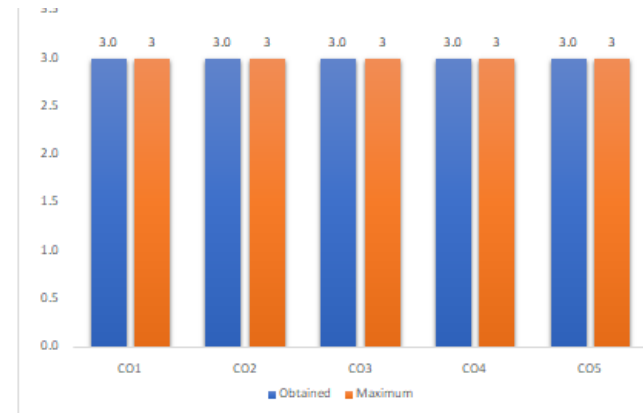
outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02	PS03	PS04
C01	H	H	H	S	S		S	S	H	S	S	H
C02	H	S	H	H		S	H	S	H	H	H	H
C03	H	S	S	H	H		H	H	H	H	S	H
C04	H		H	H	S	H	H	S	S	S		S
C05	H	H	H	H	S	S	S	H	S	H	H	H

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	100.0	3.0	3.0	100.0	3.0	3.0	3.0
CO2	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
CO3	100.0	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
CO4			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
CO5			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

AVERAGE	AVERAGE
3	3

Activate Windows  
Go to Settings to activate

**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	
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: BIG DATA ANALYTICS**

**COURSE CODE: DS21603**

**CREDITS: 4**

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

### **Programme Outcomes – (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.
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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.

	<b>COURSE OUTCOMES</b>	<b>BLOOM'S TAXONOMY LEVEL</b>
<b>CO 1</b>	<b>CO1: Explain</b> the motivation for big data systems and identify the main sources of Big Data in the real world.	V Evaluating
<b>CO 2</b>	<b>CO2: Develop</b> technical skills in predicative and prescriptive modeling to support business decision-making.	VI Creating
<b>CO 3</b>	<b>CO3: Implement</b> several Data Intensive tasks using the Map Reduce Paradigm.	III Applying
<b>CO 4</b>	<b>CO4: Understand</b> Hadoop ecosystem such as YARN and HIVE-QL for structured databases.	II Understanding
<b>CO 5</b>	<b>CO5: Demonstrate</b> 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	H	H	S	S		S	S	H	S	H	H
C02	H		H	H		H	H	S		H		H
C03	H	S	H	S	H		S	H	H	H	S	H
C04	S		H	H	S	H	H	S	S	S		S
C05	H	H	H	H	S	S	S	H		H	H	H

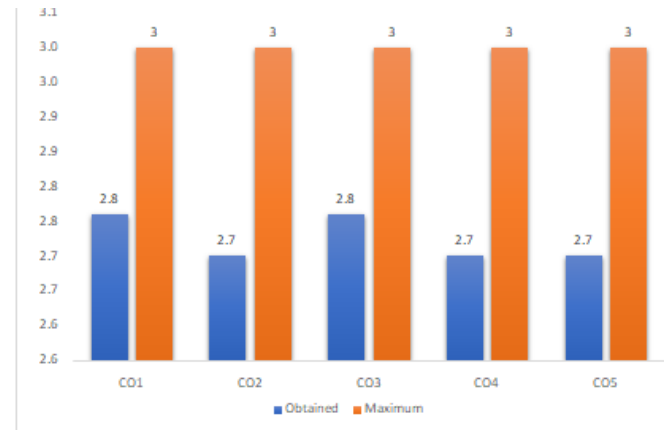
H: Highly Supportive  
S: Supportive

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**Table 2: COURSE OUTCOME ATTAINMENT**

**ATTAINMENT SCALE:**

- Pass percent of 85% and above= 3
- Pass percent between 75% - 85%= 2
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- 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			100.0	3.0	100.0	3.0	100.0	3.0	40.0	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	40.0	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	40.0	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	40.0	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	40.0	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)**

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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		H 2.7	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	H 2.7	
CO5	H 2.7	H 2.7	H 2.7	H 2.7				H 2.7
AVERAGE OF COS FOR POS	2.73	2.73	2.724	2.7	2.76	2.7	2.7	2.73
AVERAGE OF POS	2.7225	2.715	2.7168	2.7	2.76	2.7	2.7	2.73
AVERAGE	2.7180375							

