THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

- **Feedback from Graduating Students**
- **Feedback from Alumni**
- **Feedback from Employer**
- **Feedback from Faculty**
- **Analysis of feedbacks received and action taken report**

ANNEXURE-1

SAMPLE FILLED GRADUATING STUDENT SURVEY FORMS

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Graduating Students

The program of BE Computer Engineering has been designed with certain program outcomes (the knowledge, skills and attitudes that students develop during the course of study). The students of graduating class are requested to answer the questionnaire given in this form to assess how well they judge they have attained the Program Outcomes and Program Students Outcomes set for the program. Please answer the questionnaire on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	I will be able to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					✓
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					✓
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.					✓
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					✓
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal					✓

	and cultural issues and the consequent responsibilities relevant to the professional engineering practice.					
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					✓
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					✓
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					✓
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					✓
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					✓
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques					✓
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Signature

Student Name: Nipun Verma

Year of graduation: 2023

Date: 7th April 2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Graduating Students

The program of BE Computer Engineering has been designed with certain program outcomes (the knowledge, skills and attitudes that students develop during the course of study). The students of graduating class are requested to answer the questionnaire given in this form to assess how well they judge they have attained the Program Outcomes and Program Students Outcomes set for the program. Please answer the questionnaire on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	I will be able to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					5
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					5
PO3	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.					5
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					5
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					5
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal					5

	and cultural issues and the consequent responsibilities relevant to the professional engineering practice.					
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					5
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					5
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					5
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					5
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					5
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					5
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques					5
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					5

Shivanshu

Signature

Student Name: Shivanshu Mishra

Year of graduation: 2023

Date: April 28th, 2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA

COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Graduating Students

The program of BE Computer Engineering has been designed with certain program outcomes (the knowledge, skills and attitudes that students develop during the course of study). The students of graduating class are requested to answer the questionnaire given in this form to assess how well they judge they have attained the Program Outcomes and Program Students Outcomes set for the program. Please answer the questionnaire on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	I will be able to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					✓
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					✓
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.				✓	
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.				✓	
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.				✓	
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal				✓	

	and cultural issues and the consequent responsibilities relevant to the professional engineering practice.					
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.				✓	
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					✓
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					✓
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					✓
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.				✓	
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					✓
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques					✓
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Signature

Student Name: Ananya Goel

Year of graduation: 2023

SAMPLE FILLED EMPLOYER SURVEY FORMS

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Employer

Dear Sir/Mam,

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.
We solicit your feedback on attainment of the Program Outcomes and Program Students Outcomes (the knowledge, skills and attitudes that students develop during the course of study at TIET) of the BE Computer Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	The student has an ability to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					√
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					√
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.					√
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					√
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					√
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and					√

	the consequent responsibilities relevant to the professional engineering practice.					
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					√
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					√
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					√
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					√
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					√
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					√
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques				√	
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					√

Navneet G.
Signature

Name: Navneet Goswami

Name of the Company: Futures First Info Services Pvt. Ltd.

Date: April 19, 2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Employer

Dear Sir/Mam,

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.
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	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	The student has an ability to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					✓
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					✓
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.					✓
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					✓
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and					✓

	the consequent responsibilities relevant to the professional engineering practice.					
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					✓
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					✓
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					✓
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					✓
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					✓
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques				✓	
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Signature

Name: Zubair

Name of the Company: TruckX

Date: 28 April 2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Employer

Dear Sir/Mam,

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.
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	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	The student has an ability to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.				✓	
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					✓
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.				✓	
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					✓
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and					✓

	the consequent responsibilities relevant to the professional engineering practice.					
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.				✓	
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					✓
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.				✓	
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					✓
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					✓
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques			✓		
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Piyush Agarwal

Signature

Name: Piyush Agarwal

Name of the Company: Paytm

Date: 14/04/2023

SAMPLE FILLED ALUMNI SURVEY FORMS

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Alumni

Dear Alumni

It is wonderful to reconnect with you after a few years. We hope you have been doing exceedingly well in your career. We are sure that your stay with TIET has enabled you to imbibe the process of life-long learning and to take up challenging careers. We are sure you were sufficiently equipped not only to take on the real world but also make it a better place to live in through responsible and innovative use of technology. We need your support to keep the TIET flag flying high.

We solicit your feedback on attainment of the Program Outcomes and Program Students Outcomes (the knowledge, skills and attitude that you developed during the course of study at TIET and subsequent work experience) of the BE Computer Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	I will be able to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					✓
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.				✓	
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.					✓
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					✓
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓

PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.				✓	
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.				✓	
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					✓
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					✓
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.				✓	
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.				✓	
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques					✓
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Signature Saurav

Student Name: Saurav

Year of graduation: 2018

Name of the current organization: INDMoney

Date: 16-Dec-2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Alumni

Dear Alumni

It is wonderful to reconnect with you after a few years. We hope you have been doing exceedingly well in your career. We are sure that your stay with TIET has enabled you to imbibe the process of life-long learning and to take up challenging careers. We are sure you were sufficiently equipped not only to take on the real world but also make it a better place to live in through responsible and innovative use of technology. We need your support to keep the TIET flag flying high.

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	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	I will be able to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					✓
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.				✓	
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.				✓	
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.				✓	
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓

PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.					✓
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			✓		
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.				✓	
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.				✓	
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					✓
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.				✓	
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques				✓	
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Signature

Student Name: Gaurav Kamboj

Year of graduation: 2018

Name of the current organization: SAP India Pvt. Ltd.

Date: May 05, 2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Alumni

Dear Alumni

It is wonderful to reconnect with you after a few years. We hope you have been doing exceedingly well in your career. We are sure that your stay with TIET has enabled you to imbibe the process of life-long learning and to take up challenging careers. We are sure you were sufficiently equipped not only to take on the real world but also make it a better place to live in through responsible and innovative use of technology. We need your support to keep the TIET flag flying high.

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	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	I will be able to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					✓
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					✓
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.					✓
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.				✓	
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓

PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.			✓		
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			✓		
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.				✓	
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.				✓	
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					✓
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.				✓	
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques				✓	
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.			✓		

Signature:

Student Name: Atul

Year of graduation: 2018

Name of the current organization: Tech Mahindra

Date: 19/05/2023

SAMPLE FILLED FACULTY SURVEY FORMS

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Faculty

Dear Sir/Mam

We solicit your feedback on attainment of the Program Outcomes and Program Students Outcomes (the knowledge, skills and attitudes that students develop during the course of study at TIET) of the BE Computer Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	The student has an ability to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.				✓	
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					✓
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations.					✓
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.				✓	
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					✓
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and					

	the consequent responsibilities relevant to the professional engineering practice.				✓	
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			✓		
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			✓		
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					✓
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.				✓	
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					✓
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.				✓	
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques				✓	
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					✓

Signature 

Name of the faculty: Dr. Geeta Kasana

Designation: Assistant Professor

Date: 26th April, 2023

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Survey form to assess the level of attainment of POs and PSOs – Faculty

Dear Sir/Mam

We solicit your feedback on attainment of the Program Outcomes and Program Students Outcomes (the knowledge, skills and attitudes that students develop during the course of study at TIET) of the BE Computer Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

	Survey questionnaire	**Level of attainment (answer on a scale of 1 to 5)**				
		1	**2**	**3**	**4**	**5**
	The student has an ability to:					
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					5
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.				4	
PO3	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.					5
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					5
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					5
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.				4	

PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.				4	
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.				4	
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					5
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					5
PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					5
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.					5
PSO1	Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques					5
PSO2	Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.					5

Signature

Name of the faculty: Palika Chopra

Designation: Assistant Professor

Date: 19 April 2023

Process of Program outcome attainment:

The Program Outcomes (PO) or the Program Specific Outcomes (PSO) are achieved through curriculum that offers a number of mandatory courses. Each course in the curriculum has defined course outcomes that are mapped to the program outcomes and a set of performance criteria that are used to provide quantitative measurement of how well course outcomes are achieved. The process of PO or PSO attainment level is shown by the following flowchart:

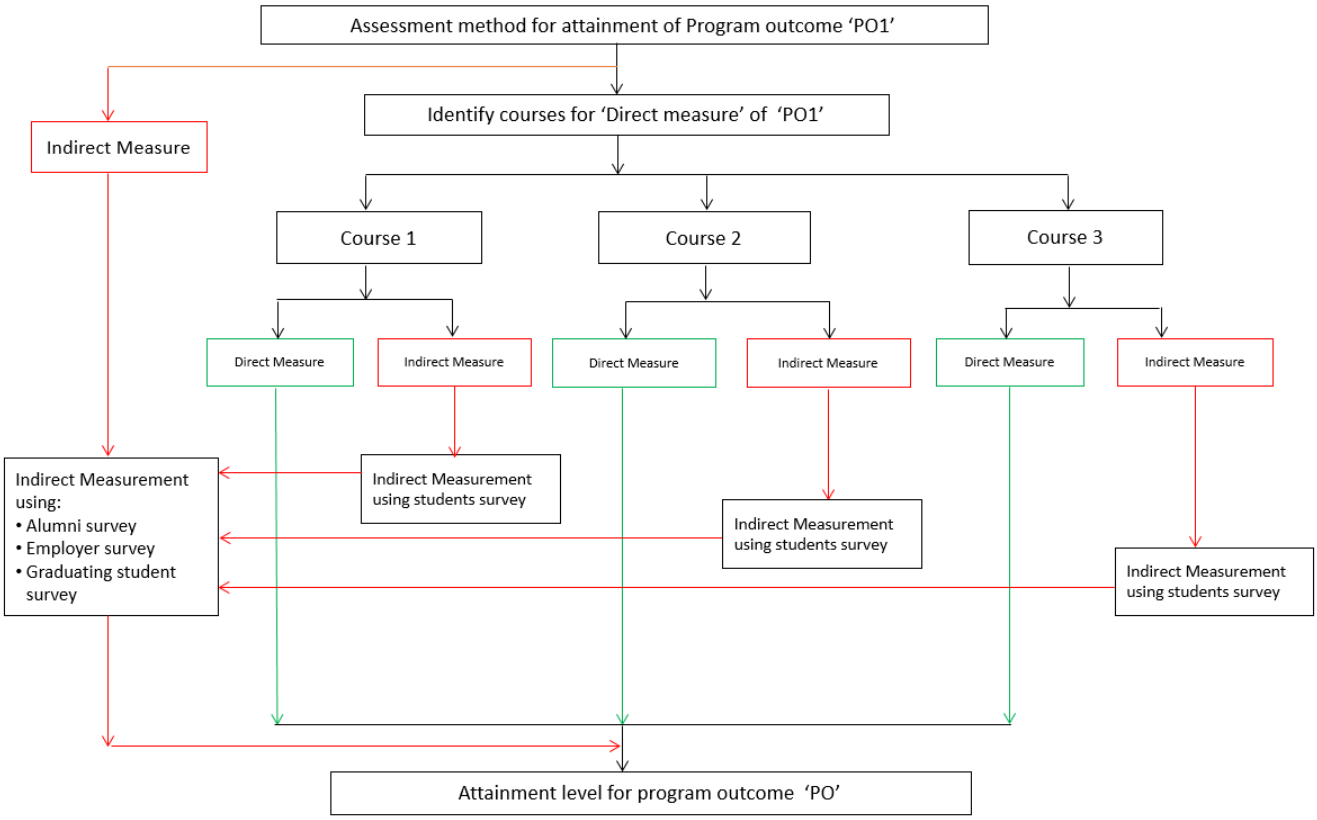


Figure 1 Flowchart showing the process of PO/PSO attainment level

As shown in the flowchart given above, each of the PO or the PSO are assessed using a direct and an indirect method.

This assessment is carried out using the following measurable and quantitative parameters and survey/questionnaire techniques/tools.

A. Assessment Tools used for measurement of Program Outcome attainment:

In the Outcome Based Education (OBE), the course outcome attainment scores measured using direct and indirect assessment tools is eventually used for measuring the attainment of Program Outcomes and Program specific outcomes. Thus, PO and PSO assessment process uses both direct and indirect measures to measure the attainment of each outcome. The examples of such measures are given below:

1. Direct Assessment tools:

After evaluating the attainment of course outcomes using direct assessment tools as mentioned below average direct CO score for each course is computed. Direct assessment score for attainment of PO and PSO is computed by mapping the direct CO scores for all courses with corresponding PO's as defined in the Program articulation matrix. Following direct assessment tools are employed for measuring PO /PSO attainment:

- Mid Semester Examinations [Once during 8^{th} or 9^{th} week of a semester]
- End semester Examination [once during 15^{th} week of the semester]
- Tutorial Assignments [Varies depending on the tutorial engagement]
- Quizzes [Mostly once during semester, Varies and is decided by course coordinator]
- Projects [Mostly once during semester, Varies and is decided by course coordinator]

2. Indirect Assessment tools:

This includes feedbacks from all the stakeholders such as course exit survey, Graduating student survey, alumni feedback, Employer feedback etc.

Indirect Assessment Tools		
S. No.	**Indirect Assessment Tool**	**Method Description**
1	Course Survey [Twice before MST and EST]	Course Survey is completed for every course in each semester to get a formal feedback from students for the courses offered in a semester and provide objective information to the faculty for self-appraisal, self-improvement & development. The course survey is focussed on attainment of course outcomes. Formal student feedback is obtained online and it is mandatory for all students to participate in such surveys. The course survey results are compiled by the individual course instructors for his feedback.
2	Graduating student's survey [Once per year for the graduating batch]	A questionnaire survey is used to measure the level of achievement of expected program outcomes/program specific outcomes. It is mandatory for all graduating students to participate in this questionnaire. Each participant is asked to rate his/her perception of achievement of the program outcomes/program specific outcome on a scale of 1 to 5 where 1 signifies a poor outcome and 5 signifies a high level of achievement of objectives. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to3. The assessment results are documented and discussed in the meeting of department

		faculty to make action points for initiating corrective and preventive actions. A sample filled copy of graduating students' survey form is provided in Annexure-I
3	Alumni survey [Once in three years]	It is believed that the perception of students changes from the time of graduation to some point in their respective careers as they get more mature and have learnt tricks of the trade on the job. At this point of time, they are in a better position to provide more valuable and objective feedback on the learning in their undergraduate program and also how much of the program outcomes (on some scale) have actually been possible. To obtain this information, a survey is conducted for practicing alumni who graduated during the last 2 to 5 years. This survey like the graduating student survey is targeted at the program outcomes & program specific outcomes achieved during the last 2 to 5 years. Again, the respondents are asked to rate each PO and PSO on a scale of 1 to 5. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to3. The findings of the survey are processed and used for effecting improvements in the program to achieve the program educational objectives and program outcomes.
4	Employer survey [Once in three years]	All the students of program to be accredited are required to spend a full six month's semester in the industry completing an industrial project under the joint supervision of industry supervisors and TIET faculty. All the faculty members are required to visit one or two organizations two times during their six month's semester in the industry for evaluation of students placed for their work term in these organizations. This provides an opportunity to take feedback of our graduated students working in these organizations. During the course of interaction with the employer of our students, the employers provide information on their performance against POs &PSOs through survey form. This form, like the other forms, has questions related to the POs & PSOs. The rating is again given on a scale of 1 to 5 with 5 representing the best performance. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to3.A sample copy of filled employer survey form is provided in Annexure-I

B. Processes used for measurement of Program Outcome attainment:

CO Attainment scores for each subject obtained by direct assessment tools is mapped to correlated PO or PSO using the course articulation matrix. Similarly, CO attainment scores achieved through indirect assessment tools are also mapped with the correlated PO or PSO.

$$\text{PO/PSO Attainment (Direct Assessment)} = \left[\frac{\text{PO\_CO Mapping}}{3} \times CO\ Attainment\ (Direct\ Assessment\right]$$

$$\text{PO/PSO Attainment (Indirect Assessment)} = \left[\frac{\text{PO\_CO Mapping}}{3} \times CO\ Attainment\ (Indirect\ Assessment\right]$$

Attainment for a program outcome is finally computed by taking weighted average of contributions of participating courses towards that particular PO or PSO.

Finally, program outcomes for entire course is assessed by taking weighted sum of direct and indirect assessment as

Overall PO/PSO = 80% weightage of direct PO Score + 20% weightage of Indirect PO Score

Table 1 below shows the frequency of data collection of each form.

Table 1: Assessment tools, frequency of data collection and weightage

Assessment Tool	When data is collected	Frequency of Data Analysis	Weightage
Course Portfolio	During the semester	Once in a year	**5**
Course Survey	End of the semester	Once in a year	**4**
Graduating Student's Survey	End of the program	Once in a year	**3**
Alumni Survey	After 2-5 year of graduation	Once in 3 years	
Employer Survey		Once in 3 years	

On the basis of results of assessment tools, the assessment of level of attainment of each PO or PSO outcome is carried out. The assessment loop for each program outcomes is shown in Figure 2.

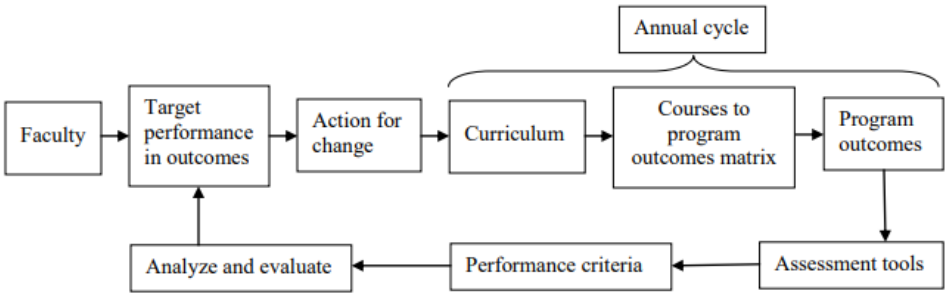


Figure 2 Assessment loop for PO/PSO

Actions taken based on the results of evaluation of each of the COs, POs & PSOs

Based on the CO, PO, and PSO attainment levels, subjects were identified whose CO attainment level was low but weightage towards calculation of a PO/PSO level was high. For such subjects, the concerned faculty prepared an Action Taken Report (ATR), providing details of reasons for the low attainment level and the actions to improve upon the same (please see Table 2).

Table 2: POs & PSOs Attainment Levels and Actions for improvement

<table>
<tr><td colspan="4">PO1- Engineering Knowledge- Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</td></tr>
<tr><td>POs</td><td>Target Level</td><td>Attainment Level</td><td>Observations</td></tr>
<tr><td>PO-1</td><td>2.4</td><td>2.78</td><td>➢ The target level was achieved.
➢ A total of 27 subjects were considered for calculating the attainment level of PO1.
➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning
➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low.
➢ The subjects which required improvements are UCS301, UCS303, UES012, UMA011, UCS411, UCS413, UCS503, UCS505, UCS701 and UMA035.</td></tr>
<tr><td colspan="4">Action taken report for the courses which need further improvement are:

UCS301 (Data Structures)
The semester was conducted online due to the global pandemic (Covid-19), and connectivity issues resulted in students missing certain online lectures and facing challenges in maintaining focus on subsequent topics. They understood the concepts but could not implement it properly as face-to-face lab sessions were not conducted.</td></tr>
</table>

Actions taken for improvement:

1. To address the limited hands-on practice caused by the absence of face-to-face lab sessions, additional lab assignments focusing on both linear and non-linear data structures will be introduced. These assignments aim to provide students with more opportunities for practical application, reinforcing their theoretical understanding of the concepts.
2. Recognizing the importance of practical implementation in mastering data structures, additional lectures and lab sessions will be conducted. These sessions will specifically focus on assisting students in implementing basic data structures, both linear and non-linear.

UCS303 (Operating Systems)

The semester was run online due to the global pandemic (Covid-19) and connectivity issues led students to miss some online lectures and lose concentration on further topics. Further, due to the online mode, giving one-to-one attention to all students was difficult for lab classes.

The course aims to provide an understanding of the concepts of the operating system through practical application and more precise explanations.

Actions taken for improvement:

1. Topic-wise discussion sessions will be arranged, and students will be encouraged to attend these sessions to seek clarification on concepts, assignments, and other course-related queries.
2. Real-world examples will be provided for a better understanding of how the theoretical concepts are applied in practical scenarios.
3. The E-content of the topics which required detailed explanation will be prepared and uploaded on the learning management system (LMS).

UES012 (Engineering Materials)

Due to the global pandemic (Covid-19), the semester was conducted online, and connectivity concerns caused students to miss certain online lectures and struggle to stay concentrate on subsequent themes. They comprehended the principles but were unable to put them into practise because face-to-face lab sessions were not held.

Actions taken for improvement

1. Students will be encouraged to undergo mini projects based on galvanic series and electrochemical cells to get more practical exposure of the course content.
2. Think-Pair-Share approach will be used in laboratory sessions to enhance the problem-solving capability.
3. Additional lab assignments on basic chemistry-related reactions will be provided.

UMA011 (Numerical Analysis)

Solving numerical problems requires consistent practice to reinforce learning. If students do not spend enough time in practicing tutorial exercises, they may struggle to understand and apply the concepts effectively. The subject's topics are interdependent, and skipping a class may lead to a waning of interest in the subject.

Actions taken for improvement

1. The faculty members involved in the subject are requested to devote initial lectures of the next academic year for covering basics of mathematics.

2. The faculty will also be advised to motivate the students to dedicate time and effort for improving their understanding of the subject matter.
3. The faculty members involved in the subject are instructed to take continuous feedback from the students so that overall attainment can be improved in next academic year.

UCS411 (Artificial Intelligence)

A significant portion of the course was covered in the online mode due to COVID pandemic. Since this subject requires an understanding of basic programming, mathematics and data structure concepts, students who did not have conceptual clarity faced problems in having a thorough grasp of this subject.

Since the aim is to provide a comprehensive knowledge of this subject to all the students, following corrective measures have been proposed:

Actions taken for improvement

1. The faculty will be requested to give extra attention to the students for covering basics of programming, mathematics and data structure. In addition to this, students shall be encouraged to ask questions and seek clarification from faculty members.
2. Additional problem-solving exercises will be given to all the students on the topic of classification models and propositional logic.
3. Students will be encouraged to have interactive discussions and group activities to foster collaboration and exchange of ideas among peers.

UCS413 (Network Programming)

A significant portion of prerequisite knowledge was covered in the online mode due to COVID pandemic. Further, due to the online mode, giving one-to-one attention to all students was difficult in lectures and labs.

The course was aimed to provide a comprehensive understanding of Network Programming and following actions will be taken in the next academic year for the improvement of course outcome attainment.

1. The faculty will be requested to engage a few extra lectures on building their basic fundamentals.
2. PPTs will be updated to put more visuals during lecturing for better understanding of the problems.
3. Additional practice problems will be given to students to practice the learned concepts.

UCS503 (Software Engineering)

Although students showed a lot of interest in this subject but students were lagging in understanding the scope of application of process models in different domains and CASE tools used during the software development process.

To provide a comprehensive understanding of the above-mentioned topics, where students had few doubts, the following actions plan has been prepared:

Actions taken for improvement:

1. Students will be given demonstrations of projects, making them understand the criteria for the selection of the software development life cycle model.
2. The software process models will be explained with the help of real-time case studies.
3. Students will be explained through the examples of CASE tools used during all the phases of software development. Demonstration and Hands-On Sessions of Selenium, Trello, and GitHub will be conducted.

UCS505 (Computer Graphics)

It was realized that students had difficulty grasping the concepts of numerical related problems, especially in transformations and projections. The normal curriculum of formal teaching and learning practices was reinstated from this semester after COVID pandemic. Therefore, generally the students had been away from this kind of examination**.** The lack of coherent resonance among teacher and students was responsible for this kind of attainment of course outcome.

Actions taken for improvement:

1. In the initial classes, the pace of the lectures will be slowed down to provide a better understanding of specific complex topics.
2. It has been decided that additional tutoring hours will be made available to students who require extra assistance.

UCS701 (Theory of Computation)

Due to COVID-19 Pandemic, the initial few weeks of the EVEN Semester of the session 21-22 were conducted in online mode, followed by the offline lectures. However, Students were given the option to attend the classes either in online or offline mode. For online students, video/slides/lecture notes were available on LMS. Weekly doubt sessions were conducted for online students.

Designing of Automata (FSA, PDA, TM etc.), regular expression, designing of grammar (RG, CFG, CS) requires consistent practice to reinforce learning. If students do not spend enough time practicing tutorial exercises, they may struggle to apply the concepts effectively.

The subject's topics are interdependent, and skipping a class may lead to a waning of interest in the subject.

Actions taken for improvement:

1. Individual assessment will be done in tutorials to identify specific areas of difficulty and personalized guidance was provided through
    - one-on-one support,
    - reinforcing concepts through examples,
    - regular assessments and feedback,
    - peer learning opportunities.
2. Practical applications of the subject will be discussed in between classes to present the importance of the subject so that the students can attend the class regularly.
3. Supplementary tutorial sheets will be provided to practice more problems.
4. Doubt Sessions for difficult topics will be scheduled for a better understanding of topics.
5. The faculty members involved in the subject are instructed to take continuous feedback from the students so that overall attainment can be improved in next academic year.

UMA035 (Optimization Techniques)

One key factor contributing to lower performance in the Optimization Techniques course is a foundational gap in basic mathematical concepts. This gap poses a challenge for students when tackling more advanced subjects within the course. Previously, tutorials played a crucial role, offering opportunities for students to solve numerical problems and enhance their performance. Unfortunately, the absence of such practice sessions now may be a contributing factor to the diminished achievements in the course.

The numerical problems in the curriculum, while not overly complex, demand extensive calculations. Despite students feeling confident in their understanding of these problems, the lack of regular practice has resulted in subpar performance. Many students are prone to making calculation errors, leading to divergent results and ultimately lower scores.

Actions taken for improvement

1. Additional practice problems will be given to students to practice the learned concepts.
2. Faculty will be counselled to motivate students to allocate dedicated time and energy towards improving their comprehension of the subject matter.
3. Students will be prompted to actively participate in their learning journey by posing queries and seeking guidance from faculty members, fostering an environment conducive to interactive and dynamic learning.

PO2 – Problem Analysis- Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

POs	Target Level	Attainment Level	Observations
PO-2	**2.4**	**2.79**	➢ The target level was achieved. ➢ A total of 26 subjects were considered for calculating the attainment level of PO1. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UMA011, UCS411, UCS503, UCS505, UCS701, UMA035 and UTA025.

Action taken report for the courses which need further improvement (UCS301, UCS303, UMA011, UCS411, UCS503, UCS505, UCS701, UMA035) has been provided in PO1.

Action taken report for the course which need further improvement:

UTA025 (Innovation and Entrepreneurship)

The following topics were covered in the course: Entrepreneurial Opportunities, Entrepreneurial Process and Decision Making, Crafting business models and Lean Start-ups, Organizing Business and Entrepreneurial Finance. For course outcome attainment the following actions were planned to be taken in the next academic year:

1. Model sample reports and BMC posters will be shared with students to make them aware about their weak points.
2. To demonstrate the business model canvas again to emphasize the importance of visual impact and its content.
3. Students will be encouraged and motivated to actively participate in group discussions, fostering an environment conducive to pitching and developing innovative business ideas.
4. Future lecture delivery methods are slated for improvement, with plans to introduce hands-on group exercises during tutorial sessions and promote more discussions to enhance engagement and understanding.

PO3 – Design/Development of Solutions- Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
POs	**Target Level**	**Attainment Level**	**Observations**
PO-3	**2.4**	**2.75**	➢ The target level was achieved. ➢ A total of 24 subjects were considered for calculating the attainment level of PO3. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UES012, UCS411, UCS503, UCS505, UCS701 and UTA025.
Action taken report for the courses which need further improvement (UCS301, UCS303, UES012, UCS411, UCS503, UCS505, UCS701) has been provided in PO1 and UTA025 has been provided in PO2.			

PO4 - Conduct Investigations of Complex Problems- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions			
POs	**Target Level**	**Attainment Level**	**Observations**
PO-4	**2.4**	**2.81**	➢ The target level was achieved. ➢ A total of twenty-one subjects were considered for calculating the attainment level of PO4. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UMA011, UCS411, UCS413, UCS503, and UCS 701.

Action taken report for the courses which need further improvement (UCS301, UCS303, UMA011, UCS411, UCS413, UCS503, and UCS 701) has been provided in PO1.

PO5- Modern Tool Usage- Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

POs	Target Level	Attainment Level	Observations
PO-5	**2.4**	**2.86**	➢ The target level was achieved. ➢ A total of twenty-three subjects were considered for calculating the attainment level of PO5. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UCS411, UCS503, UCS505, UMA035 and UTA025.

Action taken report for the courses which need further improvement (UCS301, UCS303, UCS411, UCS503, UCS505, UMA035) has been provided in PO1 and UTA025 has been provided in PO2.

PO6- The Engineer and Society - Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

POs	Target Level	Attainment Level	Observations
PO-6	**2.4**	**2.88**	➢ The target level was achieved. ➢ A total of twelve subjects were considered for calculating the attainment level of PO6. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS303, UCS411, UCS503 and UTA025.

Action taken report for the courses which need further improvement (UCS303, UCS411, UCS503) has been provided in PO1 and UTA025 has been provided in PO2.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

POs	Target Level	Attainment Level	Observations
PO-7	**2.4**	**2.83**	➢ The target level was achieved. ➢ A total of sixteen subjects were considered for calculating the attainment level of PO7. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS303, UCS 301, UCS 503, UCS 505 and UTA 025.

Action taken report for the courses which need further improvement (UCS301, UCS 303, UCS 503, UCS 505) has been provided in PO1 and UTA025 has been provided in PO2.

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

POs	Target Level	Attainment Level	Observations
PO-8	**2.4**	**2.82**	➢ The target level was achieved. ➢ A total of eight subjects were considered for calculating the attainment level of PO8. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a

			few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS 413, UCS 503 and UCS505.
Action taken report for the courses which need further improvement (UCS 413, UCS 503 and UCS505) has been provided in PO1.			

PO9- Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
POs	**Target Level**	**Attainment Level**	**Observations**
PO-9	**2.4**	**2.83**	➢ The target level was achieved. ➢ A total of eighteen subjects were considered for calculating the attainment level of PO9. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS 413, UCS 503, UCS 505, UCS 701 and UTA 025.
Action taken report for the courses which need further improvement (UCS301, UCS 413, UCS 503, UCS 505, UCS 701) has been provided in PO1 and UTA025 has been provided in PO2.			

PO10 – Communication- Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
POs	**Target Level**	**Attainment Level**	**Observations**

PO-10	**2.4**	**2.87**	➢ The target level was achieved. ➢ A total of 11 subjects were considered for calculating the attainment level of PO10. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS503, UCS505, and UTA025.
Action taken report for the courses which need further improvement (UCS 503 and UCS 505) has been provided in PO1 and UTA025 has been provided in PO2.			

PO11 – Project Management and Finance- Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.			
POs	**Target Level**	**Attainment Level**	**Observations**
PO-11	**2.4**	**2.85**	➢ The target level was achieved. ➢ A total of 19 subjects were considered for calculating the attainment level of PO11. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS503, UCS413, UCS505, and UTA025.
Action taken report for the courses which need further improvement (UCS301, UCS503, UCS413 and UCS505) has been provided in PO1 and UTA025 has been provided in PO2.			

PO12 – Life-Long Learning- Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.			
POs	**Target Level**	**Attainment Level**	**Observations**

PO-12	**2.4**	**2.82**	➢ The target level was achieved. ➢ A total of 20 subjects were considered for calculating the attainment level of PO12. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UCS413, UCS503, UCS505, UCS701, UTA025.
Action taken report for the courses which need further improvement (UCS301, UCS303, UCS413, UCS503, UCS505 and UCS701) has been provided in PO1 and UTA025 has been provided in PO2.			

PSO1- Apply the fundamentals of mathematics, science and engineering to identify, formulate, design and investigate engineering problems using efficient and effective computational techniques.			
PSOs	**Target Level**	**Attainment Level**	**Observations**
PSO-1	**2.4**	**2.75**	➢ The target level was achieved. ➢ A total of 25 subjects were considered for calculating the attainment level of PSO1. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning. ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UES012, UMA011, UCS411, UCS413, UCS503, UCS505, UCS701, UMA035 and UTA025.
Action taken report for the courses which need further improvement (UCS301, UCS303, UES012, UMA011, UCS411, UCS413, UCS503, UCS505, UCS701, UMA035) has been provided in PO1 and UTA025 has been provided in PO2.			

PSO2- Apply the appropriate engineering techniques using modern hardware and software tools in computer science and engineering to engage in lifelong learning, being ethical to successfully adapt in multi-disciplinary environment.

PSOs	Target Level	Attainment Level	Observations
PSO-2	**2.4**	**2.85**	➢ The target level was achieved. ➢ A total of 23 subjects were considered for calculating the attainment level of PSO2. ➢ Regular monitoring and feedback are crucial in tracking the effectiveness of learning. ➢ There was scope for further improvement as contribution of a few subjects towards attainment of this program objective was observed to be low. ➢ The subjects which required improvements are UCS301, UCS303, UCS411, UCS413, UCS503, UCS505, UCS701 and UTA025.
Action taken report for the courses which need further improvement (UCS301, UCS303, UCS411, UCS413, UCS503, UCS505, UCS701) has been provided in PO1 and UTA025 has been provided in PO2.			

Program Outcomes once mapped to the learning outcomes of a particular course gives us an insight of the level of achievement of students in that particular PO. Given this broaden picture of new understanding, we get an opportunity to improvise through initiatives and also implement certain changes that can be lead us to have better performances. For example, in an outcome measurement related to ability to identify and formulate problems for engineering system was assessed through courses that basically require an understanding of engineering problems and its formulation which may lead to problem solving. Therefore, in order to further strengthen student learning, we implemented a paradigm shift in teaching from **Teacher Centric to Student Centric Learning Approach**. This concept was introduced to the faculty through **Centre for Academic Practices and Student Learning (CAPSL)** training workshop which started in year 2016. All faculty from the department have been completed the basic course of New Direction Program and benefitted through this workshop. Faculty was trained to adopt academic practices such as outcome-based learning, creative thinking, introducing assessment methods involving students, and many more. With these approaches, students were more open to creatively formulate problem.

On the other hand, where student is assessed for his/her ability to solve complex engineering problems, role of problem solving through tutorials becomes very important. While student centric approach did help in 2018-2019 but a marginal fall was visible in 2019-2020. One of the main reasons for this can be attributed to a shift to an **Online Mode of Teaching because of COVID pandemic**. Many of the courses covered in this category were from even semester such as Data Structures (UCS301), Operating Systems (UCS303), i.e January-June, 2020. Faculty was still in a learning mode to teach online and conduct tutorials. Lecture/Tutorial sessions

needed to be channelized in less time. As a result, **Thapar Learning Management System (TIET-LMS)** was developed and effective July 2020, all academic activities are conducted through it, and reviewing tutorials has also now become seamless. It is anticipated that with the coming up of TIET-LMS, we foresee a positive improvement in this regard in the future.

One of the recent and major changes that we have incorporated in our Curriculum is inclusion of Eleven Elective Focus Baskets (EFB). These baskets are offered to B.E. Computer Engineering students after the end of Second Year. Since 2019, it is mandatory for every student to select one basket among the 10 Elective focus baskets. Every EFB has 4 subjects; E-1 is covered in Semester V, E-II and E-III are covered in Semester VI and E-VI is covered in Semester VII. The students are provided a certificate along with B.E. Computer Engineering Degree.

The course syllabi, for these newly included courses, has been carefully designed giving due consideration to suggestions and rectifications proposed by the experts call industry both, during Board of Studies meetings held in the year 2020.

Table3: List of Elective Focus Baskets offered by CSED to COE Students

Sr. No.	Name of the Basket	Collaborating Industry
1.	Data Science	Coursera
2.	Information and Cyber Security	ThriveDx, Israel
3.	Cyber Forensics and Ethical Hacking	EC-Council, USA
4.	Robotics & Edge Artificial Intelligence (AI)	NVIDIA
5.	Conversational Artificial Intelligence (AI)	NVIDIA
6.	Full Stack	Xebia
7.	DevOps and Continuous Delivery	Xebia
8.	Financial Derivative	Future First
9.	High Performance Computing	NA
10.	Computer Animation and Gaming	NA
11.	Mathematics and Computing	NA

Over the past three years, particularly, we are laying **more stress on writing and presentation skills**. Casual, unprofessional writing is no more accepted in project report, capstone, or laboratory reports etc. This is keeping in view the need to communicate effectively with range of audiences through writing, with peers and with people in professional organizations. Now Students have to undertake several proof reading

before the final report is accepted for evaluation purposes. Several templates of project writing have been prepared by the faculty and are circulated to students much before the submission time. Students are encouraged to read research papers and asked to bring in a small write up, which becomes useful in undertaking a Capstone Project (UCS794). Students who go for project semester are exclusively judged for their writing and communications skills by their Industrial Mentor, which in itself is a motivation for students to work harder even when outside the campus. The **Centre for Training & Development (CTD) on campus** has been established to build upon the communication skills through lecture series, workshops and several other activities. We do see several benefits emanating from this Centre and we expect that a positive change will be reflected in the PO score over the next few years. From 2018-19, the Institute has decided to enhance manifold the student experience of theoretical study through practical application and implementation via the Experiential Learning Centre (ELC) activities. These activities do not contribute to the total credits earned, rather, are an initiative to inculcate team spirit and make students learn to design, fabricate and commission a real world problem while working in a team. Experiential learning creates a deeper understanding of course content, promotes critical thinking and problem-solving, and allows students to actively participate, reflect, and apply new knowledge and skills. The goal of computer science Experiential Learning (EL) activities is to provide students with the opportunity to apply their knowledge to real-world situations and develop practical and technical expertise. These activities involve simulations, virtual environment setup, designing, hardware assembling, and other interactive tools. After completing the activity, the certificates are issued to the students.

Every UG student must complete all the five ELC activities conducted during the first five semesters (Sem I-Sem V) with a 'Completed satisfactorily' assessment for the award of his/her degree.

The semester wise details of CSED EL activities are as follows-

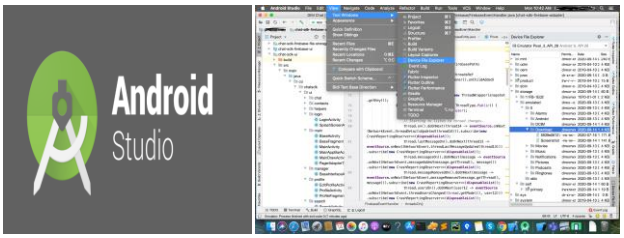
EL Coordinators: Dr. Sharad Saxena and Dr. Raman Kumar Goyal

Semester 1: Mobile APP Development

A mobile app development experiential learning activity is a hands-on project in which students create a mobile application. This activity provides students with hands-on experience in creating a mobile app, including design, development, and testing. It also gives them an understanding of the complete app development process and the challenges in creating a successful mobile app.

The basic outline of the activity is:

- ✓ *Conceptualization*: Students brainstorm and define the problem considering factors such as target audience, user experience, and feasibility.
- ✓ *Design*: Students create wireframes and mockups of their app using Flutter (ioS) or Android Studio, considering the app's user interface, navigation, and overall aesthetic.
- ✓ *Development*: Students write code to build the mobile app using programming languages such as Java, Swift, or Kotlin, depending on the platform (Android or iOS) they are targeting.
- ✓ *Testing*: Students test the app, and fix the bugs if any, to ensure that it functions as per the expectations. They are encouraged to gather user feedback and improve the app's functioning based on the feedback received.

Faculty Facilitator	
Dr. Raman Kumar Goyal (Team Lead) Dr. Vaibhav Aggarwal Dr. Surjit Singh Dr. Tanya Garg Dr. Sumana Maiti	

Semester 2: Robotic Arm "The Soul of Industrial Automation"

A robotic arm, controlled by using Arduino programming, is an experiential learning activity in industrial automation and robotics. Arduino is an open-source electronics platform that allows students to control the robotic arm through simple and accessible coding easily. This activity provides students with hands-on experience in programming and building a robotic arm with an understanding of industrial automation and robotics technology.

The basic outline of the activity is:

- ✓ *Design*: Students design the robotic arm, considering its size and weight, the number of joints, and the type of actuators needed to control the movement.
- ✓ *Building*: Students build the robotic arm using plastic, metal, and electronic materials and assemble it according to the design specifications.

- ✓ *Programming*: Students write code using the Arduino programming language to control the movement of the robotic arm, and the code is uploaded to the Arduino board, which controls the actuators and motors.
- ✓ *Testing*: Students test the robotic arm and make necessary modifications if required, to accomplish the desired movements and behaviors.

Faculty Facilitator

Dr. Sachin Kansal (Team Lead)

Dr. Anil Singh

Dr. Nitigya Sambyal

Dr. Manish Kumar

Dr. Jaskirat Singh




Semester 3: Gaming and Animation

A gaming and animation experiential learning activity is a hands-on project in which students create a game or an animated project. Such activities provide the opportunity for students to gain experience in areas such as game design, animation techniques, and programming. Such hands-on activities help students understand the challenges of creating successful interactive projects.

The basic outline of the activity is:

- ✓ *Conceptualization*: Students brainstorm and define the concept for their game or animation, considering various factors, including target audience, gameplay mechanics, and story.
- ✓ *Design*: Students create sketches and prototypes of their game or animation through pencil and paper or digital design software. They imagine the overall look and feel of the project and the user experience.
- ✓ *Development*: Students write code to bring their game or animation to life, using programming languages and game engines such as Unity or Unreal Engine.
- ✓ *Testing*: The designed game or the animation is tested, and bugs, if any, are fixed to ensure that it performs on the expected lines. Students are advised to gather user feedback and make project improvements based on the feedback received.

Faculty Facilitator

Dr. Shailendra Tiwari (Team Lead) Dr. Shivendra Shivani Dr. Shashank S Singh Dr. Amit Trivedi Dr. Jaswinder Pal Singh	 

Semester 4: Handwriting Recognition System

A handwriting recognition system experiential learning activity is a hands-on project in which students create a system that can recognize handwritten text and generate a summary of the recognized text. This activity allows students to gain experience in computer vision, natural language processing (NLP), and machine learning.

The basic outline of the activity is:

- ✓ *Conceptualization*: Students brainstorm and define the problem they want to solve using their handwriting recognition system. They consider factors such as target audience, accuracy requirements, and performance constraints.
- ✓ *Data Collection*: Data is collected, and handwritten text data is pre-processed to train the system.
- ✓ *Model Training*: Students train a machine learning model, such as a Convolution Neural Network (CNN) or a Recurrent Neural Network (RNN), on the preprocessed data to recognize handwritten text.
- ✓ *Testing*: Students test the system, fix bugs, and ensure it performs as expected. They may also gather user feedback and make system improvements based on their feedback.

Faculty Facilitator Dr. Ravinder Kumar (Team Lead) Dr. Ashima Anand Dr. Jatin Bedi Dr. Sanjeev Rao Dr. Ankit Kumar Jaiswal	  

Semester 5: Cyber Security & Internet Security

A Cyber Security and Internet Security experiential learning activity using IoT sensors like alarms, cameras, RFID, proximity sensors, and LCD-display is a hands-on project in which students learn and experience the various challenges in protecting computer systems and networks. It gives them an understanding of the security challenges that arise in the context of IoT and the importance of secure communication and data storage in IoT networks.

The basic outline of the activity is:

- ✓ *Overview*: Students are introduced to the Internet of Things (IoT) concept and the security challenges of connecting sensors like alarms, cameras, and LCD displays to computer networks.
- ✓ *IoT Security*: They learn about IoT security best practices, including device authentication, secure communication protocols, and secure data storage. They also learn about common IoT security threats, such as unsecured devices and attacks on communication channels. Students get hands-on experience in protecting computer systems and networks that use IoT sensors, including implementing security technologies and practices, secure communication protocols, and incident response.
- ✓ *Hands-on Practice*: Students put their knowledge into practice by participating in hands-on exercises and simulations, such as setting up secure communication channels between IoT sensors and other devices, performing penetration testing, and responding to simulated security incidents.
- ✓ *Discussion and Reflection*: Students reflect on their experiences and engage in group discussions to share their insights and learning.

Faculty Facilitator

Dr. Neeraj Kumar (Team Lead)

Dr. Tarunpreet Bhatia

Dr. Rohit Ahuja

Dr. Vaibhav Pandey

Dr. Garima Singh




There are eight research and industrial project liaison labs namely Language Technology and ML Research LAB, Cyber and Information Security Research Lab, Cloud and IoT Research Lab, Smart Cities Research Lab, Artificial Intelligence Lab, Data Science Lab, High Performance Computing Lab, Autonomous Robotics Research Lab, Computer Vision Research Lab, Computational Intelligence Research Lab. Additionally, there are four dedicated labs for PhD students (Doctoral Research Lab (I to IV)) having Dell workstation T-5610 Intel Xeon e5 2650 2.6GHz RAM 8GB, 2GB NVID1A Card GPU computing workstation machines. The Data center of the computer department consist of 12 high end Server machines that provides the centralized services to the students. The supercomputing NVIDA workstation and NVIDIA server caters the high computational requirements of the students.

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