

SRM TRP ENGINEERING COLLEGE

Approved by AICTE, Affiliated to Anna University

SRM Nagar, Irungalur, Tiruchirappalli – 621 105, Tamil Nadu, India



SRM TRP
ENGINEERING COLLEGE
Affiliated to ANNA UNIVERSITY
TIRUCHIRAPPALLI

**DEPARTMENT OF MECHANICAL
ENGINEERING**

ME – THERMAL ENGINEERING

**MAPPING OF COURSE OUTCOME WITH
PROGRAM OUTCOME**

R-2021

Department of Mechanical Engineering

Vision of the Institution

To carve the youth as dynamic, competent, valued, and knowledgeable Technocrats, who shall lead the nation to a better future

Mission of the Institution

- M1: To inculcate the academic excellence in engineering education to create talented professionals
- M2: To promote research in basic sciences and applied engineering among faculty and students to fulfill the societal expectation
- M3: To Enhance the Holistic development of the students through meaningful interaction with industry and academia
- M4: To foster the students on par with sustainable development goals thereby contributing to the process of nation building
- M5: To nurture and retain conducive lifelong learning environment towards professional excellence

Vision of the Department

To produce globally competent, innovative and entrepreneurial mechanical engineers for ever changing industrial and societal needs through academic and research excellence.

Mission of the Department

- M1: To provide excellent academic environment with quality technical expertise to the students in the field of mechanical engineering.
- M2: To inculcate the students with professional and ethical behavior to serve the society with leadership quality.
- M3: To encourage and assist the students to gain practical experience in industries to supplement the theoretical knowledge
- M4: To provide state of the art research facilities and a collaborative environment for stimulating the students and faculty to create, analyze, apply and disseminate knowledge.
- M5: To make the students as an academic expert, scientist and entrepreneurs through continuous learning with multidisciplinary knowledge.

Program Educational Objectives (PEO's)

The graduate of Mechanical engineering will have

- PEO1: Analyze, design and evaluate thermal systems using state of the art engineering tools and techniques
- PEO2: Develop methods of energy conservation for sustainable growth
- PEO3: Communicate effectively and support constructively towards team work
- PEO4: Pursue lifelong learning for professional growth with ethical concern for society and environment

Program Outcomes (PO's)

The students after successful completion of the program will acquire:

- PO1: An ability to independently carry out research/investigation and development work to solve practical problems
- PO2: An ability to write and present a substantial technical report/document
- PO3: Demonstrate a degree of mastery over thermal engineering at a level higher than the Bachelor's program.
- PO4: Design, develop and analyze thermal systems for improved performance
- PO5: Identify viable energy sources and develop effective technologies to harness them analyze, interpret the data and results with valid conclusion.
- PO6: Engage in lifelong learning adhering to professional, ethical, legal, safety, environmental and societal aspects for career excellence.

Course Code / Name:	MA4154 / Advanced Numerical Methods	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
MA4154.1	Solve an algebraic or transcendental equation, linear system of equations and differential equations using an appropriate numerical method.	L3AP
MA4154.2	Solving the initial boundary value problems and boundary value problems using finite difference and finite element methods.	L3AP
MA4154.3	Solving parabolic and hyperbolic partial differential equations by finite difference methods.	L3AP
MA4154.4	Compute solution of elliptic partial differential equations by finite difference methods	L3AP
MA4154.5	Selection of appropriate numerical methods to solve various types of problems in engineering and science in consideration with the minimum number of mathematical operations involved, accuracy requirements and available computational resources..	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
MA4154.1	3	3	3	1	2	1
MA4154.2	3	3	3	1	2	1
MA4154.3	3	3	3	1	2	1
MA4154.4	3	3	3	1	2	1
MA4154.5	3	3	3	1	2	1
MA4154	3.00	3.00	3.00	1.00	2.00	1.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4151 / Advanced Heat Transfer	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4151.1	Analyse problems on heat transfer associated with conduction and convection and radiation through vapours and gases.	L4AN
TE4151.2	Analyse problems on turbulent heat transfer and also solve high speed flow problems.	L4AN
TE4151.3	Analyse problems on phase change heat transfer.	L4AN
TE4151.4	Estimate the performance of compact heat exchangers and also understand the use of correlations to predict heat transfer from specific devices	L4AN
TE4151.5	Understand and analyse the mass transfer associated with heat transfer in engineering systems	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4151.1	2	1	3	0	0	0
TE4151.2	2	2	3	0	0	0
TE4151.3	2	1	3	0	0	0
TE4151.4	2	2	3	0	0	0
TE4151.5	2	2	2	0	0	0
TE4151	2.00	1.60	2.60	0.00	0.00	0.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4152 / Advanced Thermodynamics	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to	BT Level
TE4152.1 Apply the law of thermodynamics to thermal systems.	L3AP
TE4152.2 Analyse the actual thermodynamic cycles	L4AN
TE4152.3 Design and analyse a multi component thermodynamic system	L4AN
TE4152.4 Apply the thermodynamics concepts in automotive systems	L3AP
TE4152.5 Understand and analyse the combustion of different fuels	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4152.1	2	0	3	0	0	0
TE4152.2	2	1	3	0	0	0
TE4152.3	2	0	3	0	0	0
TE4152.4	2	1	3	0	0	0
TE4152.5	2	1	3	0	0	0
TE4152	2.00	1.00	3.00	0.00	0.00	0.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4101/Advanced Fluid Mechanics	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4101.1	To familiarized about the ideal and viscous fluid flow, boundary layer concepts and changes in properties in compressible flow and shock expansion.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4101.1	3	3	3	2	1	3
TE4101	3.00	3.00	3.00	2.00	1.00	3.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	RM4151 / Research Methodology And IPR	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
RM4151.1	Understand and comprehend the basics in research methodology and applying them in research/ project work.	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
RM4151.1	3	1	3	1	1	1
RM4151	3.00	1.00	3.00	1.00	1.00	1.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4002 / Energy Resources	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4002.1	Understand the commercial energy and renewable energy sources	L2UN
TE4002.2	Know the working principle of various energy systems..	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4002.1	3	2	3	2	3	3
TE4002.2	3	2	3	2	3	3
TE4002	3.00	2.00	3.00	2.00	3.00	3.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4003 / Advanced Internal Combustion Engines	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4003.1	To understand the working principle of IC engines, source of pollution formation and its control and recent trends in IC engines.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4003.1	3	3	3	3	3	3
TE4003	3.00	3.00	3.00	3.00	3.00	3.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	AX4091 / English For Research Paper Writing	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
AX4091.1	Understand that how to improve your writing skills and level of readability	L2UN
AX4091.2	Learn about what to write in each section	L2UN
AX4091.3	Understand the skills needed when writing a Title.	L2UN
AX4091.4	Understand the skills needed when writing the Conclusion	L2UN
AX4091.5	Ensure the good quality of paper at very first-time submission	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
AX4091.1	1	3	0	0	0	2
AX4091.2	1	3	0	0	0	2
AX4091.3	1	3	0	0	0	2
AX4091.4	1	3	0	0	0	2
AX4091.5	1	3	0	0	0	2
AX4091	1.00	3.00	0.00	0.00	0.00	2.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4111 / Thermal Engineering Laboratory	Semester:	I
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4111.1	Know the various alternate fuels are available for IC engines	L2UN
TE4111.2	Understand the thermodynamic relations for thermal engineering devices.	L2UN
TE4111.3	Understand the working principle of different renewable energy sources.	L2UN
TE4111.4	Measure the properties of different fuels	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4111.1	3	0	3	3	2	2
TE4111.2	3	0	2	3	2	3
TE4111.3	3	0	2	2	2	2
TE4111.4	2	0	2	2	2	1
TE4111	2.60	0.00	2.40	2.40	2.20	2.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4201 / Instrumentation for Thermal Engineering	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4201.1	Infer the role of uncertainty analysis in measuring instruments.	L3AP
TE4201.2	Select the appropriate temperature sensors based on specific applications.	L3AP
TE4201.3	Identify the suitable sensors for pressure and volume measurements.	L3AP
TE4201.4	Evaluate thermos physical properties of media.	L4AN
TE4201.5	Appraise the advantages of data acquisition systems.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4201.1	1	1	0	1	0	0
TE4201.2	2	0	2	1	2	1
TE4201.3	2	0	2	1	2	1
TE4201.4	2	0	2	2	2	1
TE4201.5	2	0	1	1	2	0
TE4201	1.80	1.00	1.40	1.20	1.60	0.60

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	IC4291 / Computational Fluid Dynamics	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
IC4291.1	Analyse the governing equations and boundary conditions	L4AN
IC4291.2	Analyse various discretization techniques for both steady and unsteady diffusion problems	L4AN
IC4291.3	Analyse the various convection-diffusion problems by Finite-Volume method.	L4AN
IC4291.4	Analyse the flow processes by using different pressure bound algorithms	L4AN
IC4291.5	Select and use the different turbulence models according to the type of flows	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
IC4291.1	2	1	3	0	0	1
IC4291.2	2	1	3	0	0	1
IC4291.3	3	1	3	0	3	1
IC4291.4	3	1	3	0	3	0
IC4291.5	3	1	3	0	3	1
IC4291	2.60	1.00	3.00	0.00	3.00	1.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4202 / Fuels, Combustion and Emission Control	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to	BT Level
TE4202.1 Identify to enable the fuels used for different purposes.	L3AP
TE4202.2 Examine the fuels at different conditions.	L4AN
TE4202.3 Summarize the fuels and its combustion levels.	L2UN
TE4202.4 Select the correct Equipments on combustion techniques.	L3AP
TE4202.5 Illustrate the emission control at a standard rate.	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4202.1	1	0	2	1	0	3
TE4202.2	1	0	2	2	0	1
TE4202.3	1	0	2	1	0	1
TE4202.4	0	0	2	1	0	1
TE4202.5	0	0	2	0	0	0
TE4202	1.00	0.00	1.60	1.00	0.00	1.20

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	IC4151 / Alternate Fuels for IC Engines	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
IC4151.1	Expose potential alternate fuels and their characteristics	L2UN
IC4151.2	Use appropriate synthetic fuels and fuel additives for better combustion characteristics	L3AP
IC4151.3	Utilise alcohol fuels effectively for lower emissions	L3AP
IC4151.4	Elaborate on the utilisation of Bio-Diesel and its types as a suitable fuel in CI engines	L3AP
IC4151.5	Utilise different gaseous fuels and predict their performance and combustion characteristics	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
IC4151.1	1	0	2	0	1	0
IC4151.2	2	2	2	0	2	0
IC4151.3	2	2	2	0	1	0
IC4151.4	2	3	3	0	2	2
IC4151.5	2	3	2	0	2	2
IC4151	1.80	2.50	2.20	0.00	1.60	2.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	EY4091 / Advanced Energy Storage Technologies	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to	BT Level
EY4091.1 Identify the energy storage technologies for suitable applications.	L3AP
EY4091.2 Analyze the energy storage systems using TRNSYS	L4AN
EY4091.3 Summarise the concepts and types of batteries	L2UN
EY4091.4 Examine the principle of operation of Hydrogen and Biogas storage systems.	L3AP
EY4091.5 Explain the working of super capacitor, Flywheel and compressed energy storage systems	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
EY4091.1	2	0	1	2	0	0
EY4091.2	2	0	3	3	0	0
EY4091.3	2	0	1	2	0	0
EY4091.4	2	0	1	2	0	0
EY4091.5	2	0	1	2	0	0
EY4091	2.00	0.00	1.40	2.20	0.00	0.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4091 /Advanced Power Plant Engineering	Semester:	II
Regulation:	R-2021		

Course outcome

	Students will be able to	BT Level
TE4091.1	Evaluate appropriate power generation technologies for mitigating the energy gap	L3AP
TE4091.2	Appraise the steam rate, heat rate and cost for generating electricity from coal based thermal power plants	L3AP
TE4091.3	Analyse and suggest measures for improving the performance of gas turbine and diesel power plants	L4AN
TE4091.4	Assess the applicability and performance of a cogeneration system	L4AN
TE4091.5	Decide a suitable type of hydroelectric/nuclear power plant commensurate with the prevailing conditions	L4AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4091.1	2	0	2	0	0	0
TE4091.2	2	0	2	2	0	1
TE4091.3	2	0	2	2	0	1
TE4091.4	2	0	2	2	2	1
TE4091.5	2	0	2	1	2	0
TE4091	2.00	0.00	2.00	1.75	2.00	1.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	AX4092 / Disaster Management	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
AX4092.1	Ability to summarize basics of disaster.	L2UN
AX4092.2	Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response	L2UN
AX4092.3	Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives	L2UN
AX4092.4	Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations	L2UN
AX4092.5	Ability to develop the strengths and weaknesses of disaster management approaches	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
AX4092.1	1	2	0	0	0	3
AX4092.2	1	2	0	0	0	3
AX4092.3	1	2	0	0	0	3
AX4092.4	1	2	0	0	0	3
AX4092.5	1	2	0	0	0	3
AX4092	1.00	2.00	0.00	0.00	0.00	3.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4211 / Thermal Systems Simulation Laboratory	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4211.1	knowledge in various heat transfer simulation study on different thermal engineering applications by using analysis softwares	L2UN
TE4211.2	Analyze the critical/influential properties of thermal systems	L4AN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4211.1	1	2	2	3	2	1
TE4211.2	1	2	2	3	2	1
TE4211	1.00	2.00	2.00	3.00	2.00	1.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4212 / Technical Seminar - I	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4212.1	Identify and choose appropriate topic of relevance.	L2UN
TE4212.2	Assimilate literature on technical articles of specified topic and develop comprehension.	L2UN
TE4212.3	Prepare technical report.	L3AP
TE4212.4	Design, develop and deliver presentation on specified technical topic	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4212.1	1	0	0	1	2	1
TE4212.2	1	0	0	1	1	0
TE4212.3	1	1	0	1	0	0
TE4212.4	1	1	0	0	0	0
TE4212.5	0	2	0	0	3	3
TE4212	0.80	0.80	0.00	0.60	1.20	0.80

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4301/ Design And Optimization Of Thermal Energy Systems	Semester:	III
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4301.1	On successful Completion of this course the student will be understand modeling and optimization of Thermal systems.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4301.1	3	3	3	1	2	1
TE4301	3.00	3.00	3.00	1.00	2.00	1.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4011 / Steam Generator Technology	Semester:	III
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4011.1	Familiarization with Boiler cycles, components and will have specialized knowledge in steam boiler performance evaluation.	L2UN
TE4011.2	Emission related aspects in terms of CO ₂ NO _x emission, mitigation etc will make them to realize the impact of coal/fuel burning in the society	L2UN
TE4011.3	Familiarization with Boiler cycles, components and in Design.	L2UN
TE4011.4	Illustrate a specialized knowledge in steam boiler performance evaluation.	L2UN
TE4011.5	Emission related aspects in terms of CO ₂ NO _x emission, mitigation etc will make them to realize the impact of Coal / fuel burning in the society	L2UN

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4011.1	1	2	0	0	0	0
TE4011.2	2	0	0	0	0	0
TE4011.3	1	0	0	0	0	0
TE4011.4	0	0	0	1	2	0
TE4011.5	0	0	1	0	2	0
TE4011	2.00	0.4	0.2	0.2	0.8	0.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	OCE434 / Environmental Impact Assessment	Semester:	III
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
OCE434.1	Understand need for environmental clearance, its legal procedure, need of EIA, its types, stakeholders and their roles.	L2UN
OCE434.2	Understand various impact identification methodologies, prediction techniques and model of impacts on various environments.	L2UN
OCE434.3	Understand relationship between social impacts and change in community due to development activities and rehabilitation methods.	L2UN
OCE434.4	Document the EIA findings and prepare environmental management and monitoring plan.	L3AP
OCE434.5	Identify, predict and assess impacts of similar projects based on case studies.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
OCE434.1	0	0	0	0	0	0
OCE434.2	3	2	3	2	2	2
OCE434.3	0	2	3	2	2	2
OCE434.4	0	0	3	0	3	2
OCE434.5	3	0	0	2	0	0
OCE434	3.00	2.00	3.00	2.00	2.00	2.00

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4311 / Technical Seminar - II	Semester:	II
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4311.1	Identify and choose appropriate topic of relevance. Develop the capacity to observe intelligently and propose and defend opinions and ideas with tact and conviction.	L2UN
TE4311.2	Develop skills regarding professional communication and technical report writing.	L2UN
TE4311.3	Learn the methodology of publishing technical papers.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4311.1	1	0	0	1	2	1
TE4311.2	1	0	0	1	1	0
TE4311.3	1	1	0	1	0	0
TE4311.4	1	1	0	0	0	0
TE4311.5	0	2	0	0	3	3
TE4311	0.80	0.80	0.00	0.60	1.20	0.80

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4312/Project Work - I	Semester:	III
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4312.1	The students would apply the knowledge gained from theoretical and practical courses in solving problems, so as to give confidence to the students to be creative, well planned, organized, coordinated in their project work phase – II	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4312.1	3	3	3	3	3	3

1	Slight	2	Moderate	3	Substantial
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Course Code / Name:	TE4411Project Work - II	Semester:	IV
Regulation:	R-2021		

Course outcome

Students will be able to		BT Level
TE4411.1	The students' would apply the knowledge gained from theoretical and practical courses in solving problems, so as to give confidence to the students to be creative, well planned, organized, coordinated project outcome of the aimed work.	L3AP

CO-PO matrices

Course code	PO1	PO2	PO3	PO4	PO5	PO6
TE4411.1	3	3	3	3	3	3

CO-PSO matrices

1	Slight	2	Moderate	3	Substantial
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