



**PERIYAR
MANIAMMAI**
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited
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Criterion 1 – Curricular Aspects

Key Indicator	1.2	Academic Flexibility
Metric	1.2.2	Percentage of Programmes in which Choice Based Credit System (CBCS)/elective course system has been implemented (Data for the latest completed academic year)

DEPARTMENT OF MECHANICAL ENGINEERING STRUCTURE OF THE PROGRAM CLEARLY INDICATING COURSES, CREDITS/ELECTIVES

Programmes

1. B.Tech Mechanical Engineering – Full Time
2. M,Tech Renewable Energy – Full time.
3. M,Tech Renewable Energy – Part Time.

1. B.TECH MECHANICAL ENGINEERING - (FULL TIME)

SEMESTER-WISE STRUCTURE OF CURRICULUM

REGULATION – 2021 Revision I

(Applicable to the students admitted the Academic year 2022-23)

SEMESTER I

S.No.	Course. Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XMA101	BSC	Calculus and Linear Algebra	3	1	0	4	3	1	0	4
2.	XCP102	ESC	Programming for Problem Solving	3	0	0	3	3	0	0	3
3.	XAC103	BSC	Applied Chemistry for Engineers	3	1	0	4	3	1	0	4
4.	XEG104	ESC	Engineering Graphics and Design	1	0	2	3	1	0	4	5
5.	XGS105	HSMC	Speech Communication	0	1	2	3	0	1	4	5
6.	XUM106	MC	Constitution of India	0	0	0	0	3	0	0	3
7.	XCP107	ESC	Programming for Problem Solving Laboratory	0	0	1	1	0	0	2	2
8.	XAC108	BSC	Applied Chemistry Laboratory for Engineers	0	0	1	1	0	0	2	2
			Total				19				28

SEMESTER II

S.No.	Course. Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XMA201	BSC	Calculus, Ordinary Differential Equations and Complex Variables	3	1	0	4	3	1	0	4
2.	XBE202	ESC	Electrical and Electronic Engineering Systems	3	1	0	4	3	1	0	4
3.	XAP203	BSC	Applied Physics for Engineers	3	1	0	4	3	1	0	4
4.	XGS204	HSMC	Technical Communication	2	0	0	2	2	0	0	2
5.	XWP205	ESC	Workshop Practices	1	0	2	3	1	0	4	5
6.	XEM206	ESC	Engineering Mechanics	3	0	0	3	3	0	0	3
7.	XBE207	ESC	Electrical and Electronic Engineering Systems Laboratory	0	0	1	1	0	0	2	2
8.	XAP208	BSC	Applied Physics for Engineers Laboratory	0	0	1	1	0	0	2	2
			Total				22				26

SEMESTER III

S.No.	Course. Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XMA301	BSC	Transforms and Partial Differential Equations	3	0	0	3	3	0	0	3
2.	XME302	PCC	Thermodynamics	3	1	0	4	3	1	0	4
3.	XME303	PCC	Strength of Materials	3	1	0	4	3	1	0	4
4.	XME304	PCC	Materials Engineering	3	0	0	3	3	0	0	3
5.	XME305	PCC	Machine Drawing	1	0	1	2	1	0	2	3
6.	XUM306	HSMC	Entrepreneurship Development	2	0	0	2	2	0	0	2
7.	XUM307	MC (HSMC)	Universal Human Values 2 : Understanding Harmony and gender	3	0	0	3	3	0	0	3
8.	XME308	PCC	Strength of Materials Laboratory	0	0	1	1	0	0	2	2
9.	XME309	PCC	Computer Aided Drafting Laboratory	0	0	1	1	0	0	2	2
10.	XME310	PROJ	In-plant Training - I	-	-	-	1	-	-	-	-
			Total				24				26

SEMESTER IV

S.No .	Course. Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XMA401	BSC	Probability Distribution and Statistical Methods	3	0	0	3	3	0	0	3
2.	XME402	PCC	Applied Thermodynamics	3	1	0	4	3	1	0	4
3.	XME403	PCC	Fluid Mechanics and Fluid Machines	3	1	0	4	3	1	0	4
4.	XME404	PCC	Instrumentation and Control	3	0	0	3	3	0	0	3
5.	XUM405	HSMC	Economics for Engineers	3	0	0	3	3	0	0	3
6.	XUM406	MC	Disaster Management	0	0	0	0	3	0	0	3
7.	XME407	PCC	Thermal Engineering Laboratory	0	0	1	1	0	0	2	2
8.	XME408	PCC	Fluid Mechanics and Fluid Machines Laboratory	0	0	1	1	0	0	2	2
			Total				19				24

SEMESTER V

S.No.	Course. Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XME501	PCC	Heat Transfer	3	1	0	4	3	1	0	4
2.	XME502	PCC	Solid Mechanics	3	1	0	4	3	1	0	4
3.	XME503	PCC	Manufacturing Processes	3	0	0	3	3	0	0	3
4.	XME504	PCC	Kinematics and Theory of Machines	3	1	0	4	3	1	0	4
5.	XME505	PEC	Professional Elective Course – I	3	0	0	3	3	0	0	3
6.		OE	Open Elective Course – I	3	0	0	3	3	0	0	3

7.	XME507	PCC	Heat Transfer and Refrigeration Laboratory	0	0	1	1	0	0	2	2
8.	XME508	PCC	Kinematics and Theory of Machines Laboratory	0	0	1	1	0	0	2	2
9.	XME509	PROJ	In-plant Training – II	-	-	-	1	-	-	-	-
			Total				24				25

SEMESTER VI

S.No.	Course Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XME601	PCC	Manufacturing Technology	4	0	0	4	4	0	0	4
2.	XME602	PCC	Design of Machine Elements	3	1	0	4	3	1	0	4
3.	XME603	PEC	Professional Elective Courses - II	3	0	0	3	3	0	0	3
4.		OE	Open Elective Courses – II	3	0	0	3	3	0	0	3
5.	XGS605	HSMC	Professional Skills	1	0	2	3	1	0	4	5
6.	XUM606	MC	Cyber Security	0	0	0	0	3	0	0	3
7.	XME607	PCC	Machine Tools and Metrology Laboratory	0	0	1	1	0	0	2	2
8.	XME608	PCC	Tool Design and Drawing Laboratory	0	0	1	1	0	0	2	2
			Total				19				26

SEMESTER VII

S.No.	Course Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XME701	PCC	Automation in Manufacturing	3	0	0	3	3	0	0	3
2.	XME702	PCC	Automobile Engineering and E-Vehicles	3	0	0	3	3	0	0	3
3.	XME703	PEC	Professional Elective Courses - III	3	0	0	3	3	0	0	3
4.		OE	Open Elective Courses – III	3	0	0	3	3	0	0	3
5.	XES705	MC	Environmental Studies	0	0	0	0	3	0	0	3
6.	XME706	PCC	CAD/CAM Laboratory	0	0	1	1	0	0	2	2
7.	XME707	PCC	Fluid Power Control and Mechatronics Laboratory	0	0	1	1	0	0	2	2
8.	XME708	PROJ	Project Work (Phase - I)	0	0	2	2	0	0	4	4
9.	XME709	PROJ	In-plant Training – III	-	-	-	2	-	-	-	-
			Total				18				23

SEMESTER VIII

S.No.	Course Code	Category	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	XME801	PEC	Professional Elective courses - IV	3	0	0	3	3	0	0	3
2.		OE	Open Elective Courses – IV	3	0	0	3	3	0	0	3
3.		OE	Open Elective Courses – V	3	0	0	3	3	0	0	3
4.	XME804	PROJ	Project Work (Phase - II)	0	0	9	9	0	0	18	18
			Total				18				27

OPEN ELECTIVE COURSES

(OFFERED BY MECHANICAL ENGINEERING DEPARTMENT)

CODE. No	Course Title	Credits			
		L	T	P	C
XMEOE1	Product Design and Development	3	0	0	3
XMEOE2	Renewable Energy Sources	3	0	0	3
XMEOE3	Microelectromechanical Systems	3	0	0	3
XMEOE4	Energy Studies	3	0	0	3

PROFESSIONAL ELECTIVE COURSES

TRACK – I (Thermal Stream)

Course Code No	Course Title	Credits			
		L	T	P	C
XMEE01	Gas Dynamics and Shock Waves	3	0	0	3
XMEE02	Computational Fluid Dynamics	3	0	0	3
XMEE03	Refrigeration and Air conditioning	3	0	0	3
XMEE04	Renewable Energy Sources	3	0	0	3
XMEE05	Advanced I.C Engines	3	0	0	3
XMEE06	Power Plant Engineering	3	0	0	3
TRACK – II (Design Stream)					
XMEE07	Finite Element Analysis	3	0	0	3
XMEE08	Design of Transmission Systems	3	0	0	3
XMEE09	Mechanical Vibrations	3	0	0	3
XMEE10	Design of Jigs and Fixtures and press tools	3	0	0	3
XMEE11	Computer Aided Design	3	0	0	3
XMEE12	Product Design and Development	3	0	0	3

TRACK – III (Manufacturing Stream)					
XMEE13	Industrial Safety	3	0	0	3
XMEE14	Computer Integrated Manufacturing	3	0	0	3
XMEE15	Composite Materials	3	0	0	3
XMEE16	Reliability Engineering	3	0	0	3
XMEE17	Advanced Welding Technology	3	0	0	3
XMEE18	Process Planning and Cost Estimation	3	0	0	3
TRACK – IV (General Stream)					
XMEE19	Microelectromechanical Systems	3	0	0	3
XMEE20	Industrial Robotics	3	0	0	3
XMEE21	Automotive Electronics	3	0	0	3
XMEE22	Total Quality Management	3	0	0	3
XMEE23	Internet of Things and Smart Manufacturing	3	0	0	3
XMEE24	Mathematical Modeling and Analysis	3	0	0	3
XMEE25	Energy Conservation and Management	3	0	0	3

2. M.TECH RENEWABLE ENERGY (FULL TIME)

CURRICULUM – FULL TIME

REGULATION– 2022

(Applicable to the students admitted from the Academic year 2022-23)

SEMESTER I

Category	Code No.	Course Title	L	T	P	C	H
PCC	YRE101	Solar Energy Systems	3	0	0	3	3
PCC	YRE102	Wind, Ocean and Geothermal Energy Systems	3	0	0	3	3
PCC	YRE103	Process Modelling and Simulation in Energy Systems	3	0	0	3	3
PEC		Professional Elective – I	3	0	0	3	3
PEC		Professional Elective – II	3	0	0	3	3
PCC-L	YRE106	Solar Energy Laboratory	0	0	2	2	4
AICTE Mandatory Course*	YRM107	Research Methodology and IPR	2	0	0	2	2
AICTE - Audit**	YEGOE1	English for Research Paper Writing	2	0	0	0	2
PCC-L	YRE109	Process Modelling and Simulation Laboratory	0	0	2	2	4
	Total		19	0	4	21	27

SEMESTER II

Category	Code No.	Course Title	L	T	P	C	H
PCC	YRE201	Bio Energy Systems	3	0	0	3	3
PCC	YRE202	Computational Fluid Dynamics	3	0	0	3	3
PCC	YRE203	Electrical Energy Technology	3	0	0	3	3
PEC		Professional Elective – III	3	0	0	3	3
PEC		Professional Elective – IV	3	0	0	3	3
PCC-L	YRE206	Computational Fluid Dynamics Laboratory	0	0	2	2	4
PCC-L	YRE207	Bio Energy Laboratory	0	0	2	2	4
AICTE - Audit	YPSOE1	Constitution of India	2	0	0	0	2
	Total		17	0	4	19	25

SEMESTER III

Category	Code No.	Course Title	L	T	P	C	H
PROJ	YRE301	Dissertation Phase – I	0	0	10	10	20
PEC		Professional Elective - V	3	0	0	3	3
OEC		Open Elective Course	3	0	0	3	3
		Total	6	0	10	16	26

SEMESTER IV

Category	Code No.	Course Title	L	T	P	C	H
PROJ	YRE401	Dissertation Phase – II	0	0	16	16	32
		Total	0	0	16	16	32

Total Credits - 72

Legend

PCC – Professional Core Course

PEC- Professional Elective Course

OEC – Open Elective Course

PCC-L – Professional Core Course – Lab

PROJ – Project

* - Mandatory Course

**- Mandatory Course - Audit

Note:

- The credit distribution is followed as per the guidelines given by AICTE/UGC.

Course type	Credits			Hours		
	L	T	P	L	T	P
Lecture course	3	0	0	3	0	3
Practical / Project course	0	0	1	0	0	2

LIST OF PROFESSIONAL CORE ELECTIVES**ELECTIVE GROUP - I:**

Code No.	Course Title	L	T	P	C	H
YRE104A	Fluid Dynamics and Heat Transfer	3	0	0	3	3
YRE104B	Energy Conservation in HVAC	3	0	0	3	3
YRE104C	Fuels and Combustion Technology	3	0	0	3	3

ELECTIVE GROUP - II:

Code No.	Course Title	L	T	P	C	H
YRE105A	Environmental Engineering	3	0	0	3	3
YRE105B	Carbon Sequestration and Trading	3	0	0	3	3
YRE105C	Waste Management and Energy Recovery	3	0	0	3	3

ELECTIVE GROUP - III:

Code No.	Course Title	L	T	P	C	H
YRE204A	Optimum Utilization of Heat and Power	3	0	0	3	3
YRE204B	Statistical Tools for Data Analysis	3	0	0	3	3
YRE204C	Sustainable Development	3	0	0	3	3
YRE204D	Hydro Power Technology	3	0	0	3	3

ELECTIVE GROUP - IV:

Code No.	Course Title	L	T	P	C	H
YRE205A	Instrumentation Technology for Energy Systems	3	0	0	3	3
YRE205B	Hydrogen, Fuel cells and Nuclear Energy	3	0	0	3	3
YRE205C	Energy Modelling, Economics and Project Management	3	0	0	3	3
YRE205D	Energy Efficient Building	3	0	0	3	3

ELECTIVE GROUP - V:

Code No.	Course Title	L	T	P	C	H
YRE302A	Energy Audit and Management	3	0	0	3	3
YRE302B	Unit Operations in Industries	3	0	0	3	3
YRE302C	CAD/CAM and Simulation of Renewable Energy Systems	3	0	0	3	3
YRE302D	Industrial Safety	3	0	0	3	3

LIST OF OPEN ELECTIVE COURSES

Code No.	Course Title	L	T	P	C	H
YREOE1	Industrial Safety	3	0	0	3	3

3. M.TECH RENEWABLE ENERGY (PART TIME)

CURRICULUM AND SYLLABUS M.TECH RENEWABLE ENERGY (PART TIME)

REGULATION 2019

(Applicable to the students admitted from the Academic year 2019-20 to till now)

SEMESTER I

Code No.	Course Title	L	T	P	C	HRS
QRE101	Solar Energy Systems	3	0	0	3	4
QRE102	Wind Energy, Tidal Energy and OTEC	3	0	0	3	4
QRE103***	Elective – I	3	0	0	3	4
QRE104	Solar Energy Lab	0	0	4	2	3
		9	0	4	11	15

SEMESTER II

Code No.	Course Title	L	T	P	C	HRS
QRE201	Bio-Energy Systems	3	0	0	3	4
QRE202*	Research Methodology and IPR	2	0	0	2	3
QRE203***	Elective – II	3	0	0	3	4
QRE204	Bio and Thermal Energy Lab	0	0	4	2	3
		8	0	4	10	14

SEMESTER III

Code No.	Course Title	L	T	P	C	HRS
QRE301	Computational Fluid dynamics	3	0	0	3	4
QREOE****	Open Elective Course – I	3	0	0	3	4
QRE303***	Elective – III	3	0	0	3	4
QRE304	Computational Fluid Dynamics Lab	0	0	4	2	3
		9	0	4	11	15

SEMESTER IV

Code No.	Course Title	L	T	P	C	HRS
QRE401***	Elective – IV	3	0	0	3	4
QRE402***	Elective – V	3	0	0	3	4
QREOE****	Open Elective Course – II	3	0	0	3	4
QRE404	MAT and SCI Lab	0	0	4	2	3
		9	0	4	11	15

SEMESTER V

Code No.	Course Title	L	T	P	C	HRS
QRE501	Project Phase – I	0	0	20	9	20
		0	0	20	9	20

SEMESTER VI

Code No.	Course Title	L	T	P	C	HRS
QRE601	Project Phase – II	0	0	32	16	30
		0	0	32	16	30

OVER ALL CREDITS = 68

* - Mandatory Course

**- Mandatory Course - Audit

***- Elective Course

****- Open Elective Course

LIST OF ELECTIVES (*)****ELECTIVE GROUP - I:**

Code No.	Course Title	L	T	P	C	HRS
QRE103A	Fuels and combustion technology	3	0	0	3	4
QRE103B	Waste Management and Energy Recovery	3	0	0	3	4
QRE103C	Fluid Dynamics and Heat Transfer	3	0	0	3	4

ELECTIVE GROUP - II:

Code No.	Course Title	L	T	P	C	HRS
QRE203A	Hydro Power Technology	3	0	0	3	4
QRE203B	Optimum Utilization of heat and power	3	0	0	3	4
QRE203C	Environmental Engineering	3	0	0	3	4

ELECTIVE GROUP - III:

Code No.	Course Title	L	T	P	C	HRS
QRE303A	Electrical Energy Technology	3	0	0	3	4
QRE303B	Energy Conservation in HVAC	3	0	0	3	4
QRE303C	Sustainable Development	3	0	0	3	4

ELECTIVE GROUP - IV:

Code No.	Course Title	L	T	P	C	HRS
QRE401A	Hydrogen and Nuclear Energy	3	0	0	3	4
QRE401B	Instrumentation Technology for Energy Systems	3	0	0	3	4

QRE401C	Energy Modeling, Economics and Project Management	3	0	0	3	4
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ELECTIVE GROUP - V:

Code No.	Course Title	L	T	P	C	HRS
QRE402A	Statistical tools for a Data analysis	3	0	0	3	4
QRE402B	Unit Operations in Industries	3	0	0	3	4
QRE402C	CAD/CAM and Simulation of Renewable Energy systems	3	0	0	3	4

LIST OF OPEN ELECTIVE COURSES (**)**

Open Elective Group - I

Code No.	Course Title	L	T	P	C	HRS
QREOE1A	Energy Audit and Management	3	0	0	3	4
QREOE1B	Carbon Sequestration And Trading	3	0	0	3	4

Open Elective Group - II

Code No.	Course Title	L	T	P	C	HRS
QREOE2A	Process Modeling and Simulation in energy systems	3	0	0	3	4
QREOE2B	Energy Efficient building	3	0	0	3	4

MINUTES OF BOARD OF STUDIES

Minutes of the Board of Studies for B.Tech and M.Tech held on 20.07.2022

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Annex - 11, 12, 13, 14



**PERIYAR
MANIAMMAI**
INSTITUTE OF SCIENCE & TECHNOLOGY
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BOARD OF STUDIES MEETING

MINUTES OF MEETING

Date : 20.07.2022

Time : 10.00 am – 1.30 pm

Mode : Online / GOOGLE MEET

Google Meet Link: <https://meet.google.com/kpt-rjzf-vgy>

The Board of Studies meeting was held in virtual mode on 20.07.2022 with the following agenda and minutes of the discussion is given below.

Meeting Agenda:

1. Implementation of actions taken against feedback received on curricular aspects from Stake holders for M.Tech. Renewable Energy Regulation 2022.
2. Presentation of PEOs and POs and discussion on programme articulation matrix (PO coverage by all COs) for M.Tech. Renewable Energy Regulation 2022.
3. Presentation of Curriculum and Syllabi for M.Tech. Renewable Energy Regulation 2022.
4. Presentation of syllabus for a new Open Elective course – Energy Studies – offered under B.Tech. Mechanical Engineering Regulation 2021 for other department students.
5. Presentation of Curriculum and Syllabi for the following two specializations with B.Tech. Mechanical Engineering Regulation 2021
 - (a) B.Tech. (Hons.) Mechanical Engineering with Specialization in Robotics and Industrial Automation
 - (b) B.Tech. (Hons.) Mechanical Engineering with Specialization in Energy Engineering

Members Present:

S.No.	Name of the Member	Designation	Representation	Signature
1.	Mr. A. Pugazhenth	Assistant Professor & HOD / Mechanical Engineering.	Chairperson	
2.	Dr. M. Udayakumar	Professor HAG, Department of Mechanical Engineering, National Institute of Technology, Trichy.	External Member (Academic)	
3.	Dr. T. Sriharsha	Deputy Manager, Nanotechnology Research and Development, Bharat Heavy Electricals Limited, Trichy.	External Member (Industry)	

4.	Dr. D. Jeyasimman	Associate Professor / Mechanical Engineering	Member	Jeyasimman 20/09/22
5.	Mr. N. Shivakumar	Assistant Professor / Mechanical Engineering	Member	N. Shivakumar 20/09/22
6.	Mr. S. P. Manikandan	Assistant Professor / Mechanical Engineering	Member	S. P. Manikandan 20/09/22
7.	Mr. P. Srinivasan	Assistant Professor / Mechanical Engineering	Member	P. Srinivasan 20/09/22
8.	Mr. R. Thiagarajan	Assistant Professor / Mechanical Engineering	Member	R. Thiagarajan 20/09/22
9.	Mr. R. Udhayasankar	Assistant Professor / Mechanical Engineering	Member	R. Udhayasankar 20/09/22
10.	Mr. V. Pandiaraj	Assistant Professor / Mechanical Engineering	Member	V. Pandiaraj 20/09/22
11.	Mr. J. Senbagaraj (Reg.No -- 121012301020)	II Year / M.Tech. Renewable Energy (Regulation: 2021-23)	Student Member	J. Senbagaraj 20/09/22
12.	Mr. K. Pranesh (Reg.No -- 1190120151417)	IV Year / B.Tech. Mechanical Engineering (Regulation: 2019-23)	Student Member	K. Pranesh
13.	Mr. R. VR. Hariharan (Reg.No -- 1190120151406)	IV Year / B.Tech. Mechanical Engineering (Regulation: 2019-23)	Student Member	R. VR. Hariharan
14.	Mr. T. Ivon Derek (Reg.No -- 121012065557)	III Year / B.Tech. Mechanical Engineering (Regulation: 2020-24)	Student Member	T. Ivon Derek

A. FEEDBACK ON CURRICULAR ASPECTS

The feedback collected and analyzed during 2019-20 and 2020-21 from the following stake holders were presented

1. Teachers
2. Employers
3. Alumni students
4. Students

In addition, feedbacks obtained from Academic Expert, Industry Expert, Teachers, Alumni and students who participated in Department Advisory Committee Meeting (DAC) were also presented. The action taken for the feedbacks are given as "Remarks" column in the Table II.

B. PRESENTATION OF PEOs and POs

Four PEOs and seven POs for M.Tech. Renewable Energy Programme were presented to the members. The members have approved and recommended following.

Programme Educational Objectives (PEOs)

After three years of graduation, the graduates from M.Tech. Renewable Energy will be able to

1. Demonstrate their knowledge, skills and proficiency in usage of modern tools in analysis and design of renewable energy systems.
2. Involve in innovation, optimization, design and development of present and future renewable energy systems according to international standards as an individual or as a group.
3. Carry out research, pursue higher education and engage in life-long learning in the field of renewable energy.
4. Design and develop renewable energy systems for present and future energy requirements taking into account sustainability and environmental issues.

Programme Outcomes (POs)

A graduate at the end of the programme will be able to

1. *Demonstrate* in depth knowledge in the field of renewable energy with recent information on latest technologies and global trends.
2. *Analyze* complex renewable energy systems and formulate solutions as an individual or group through skills, tools, techniques, methods or literature survey.
3. *Create, select, learn and apply* appropriate techniques, resources, and modern engineering and IT tools to complex renewable energy problems with an understanding of the limitations
4. *Demonstrate* knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economic and financial factors.
5. *Communicate* with the engineering community and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, give and receive clear instructions.
6. *Recognize* the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.
7. *Demonstrate* professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and understand the responsibility to contribute to the community for sustainable development of society.

C. PRESENTATION OF CURRICULUM AND SYLLABUS

All the courses which are framed by the department of Mechanical Engineering are presented individually. The deletion, addition and introduction of new courses related details are tabulated for all courses in the following table.

M.Tech. Renewable Energy

Table IIA: Discussions on courses with actions as remarks

S.No	Semester	Course Code	Course Name	Course content Deletion / Addition / New	Percentage of change	Remarks
1	I	YRE101	Solar Energy Systems	No change	No change	-
2	I	YRE102	Wind, Ocean and Geothermal Energy Systems	Added as new course	100 %	-
3	I	YRE103	Process Modelling and Simulation in Energy Systems	No Change	No Change	-
4	I	YRE104A	Fluid Dynamics and Heat Transfer	No Change	No Change	-
5	I	YRE104B	Energy Conservation in HVAC	No Change	No Change	-
6	I	YRE104C	Fuels and Combustion Technology	No Change	No Change	-
7	I	YRE105A	Environmental Engineering	No Change	No Change	-
8	I	YRE105B	Carbon Sequestration and Trading	No Change	No Change	-
9	I	YRE105C	Waste Management and Energy Recovery	No Change	No Change	-
10	I	YRE106	Solar Energy Laboratory	Added as new course	100 %	-
11	I	YRM107	Research Methodology and IPR	No Change	No Change	-
12	I	YEGOE1	English for Research Paper Writing	No Change	No Change	-
13	I	YRE109	Process Modelling and Simulation Laboratory	Added as new Course.	100 %	-
14	II	YRE201	Bio Energy Systems	No Change	No Change	-
15	II	YRE202	Computational Fluid Dynamics	No Change	No Change	-
16	II	YRE203	Electrical Energy Technology	No Change	No Change	-
17	II	YRE204A	Optimum Utilization of Heat and Power	No Change	No Change	-
18	II	YRE204B	Statistical Tools for Data analysis	No Change	No Change	-
19	II	YRE204C	Sustainable Development	No Change	No Change	-
20	II	YRE204D	Hydro Power Technology	No Change	No Change	-
21	II	YRE205A	Instrumentation Technology for Energy Systems	No Change	No Change	-
22	II	YRE205B	Hydrogen, Fuel cells and Nuclear Energy	No Change	No Change	-
23	II	YRE205C	Energy Modelling, Economics and Project Management	No Change	No Change	-
24	II	YRE205D	Energy Efficient Building	No Change	No Change	-

25	II	YRE206	Computational Fluid Dynamics Laboratory	Added as new Course.	60 %	-
26	II	YRE207	Bio Energy Laboratory	Added as new Course	60 %	-
27	II	YPSOE1	Constitution of India	No Change	No Change	-
28	III	YRE301	Dissertation Phase – I	No Change	No Change	-
29	III		Open Elective – I	-	-	-
30	III	YRE302A	Energy Audit and Management	No Change	No Change	-
31	III	YRE302B	Unit Operations in Industries	No Change	No Change	-
32	III	YRE302C	CAD/CAM and Simulation of Renewable Energy Systems	No Change	No Change	-
33	III	YRE302D	Industrial Safety	Added as new Course	100%	-
34	IV	YRE401	Dissertation Phase – II	No Change	No Change	-

B.Tech. Mechanical Engineering

Table IIB: Discussions on courses with actions as remarks

S.No	Semester	Course Code	Course Name	Course content Deletion/ Addition/New	Percentage of change	Remarks
1	-	XMEOE4	Energy Studies	Added as new Open Elective Course.	100 %	-

B.Tech. (Hons.) Mechanical Engineering with Specialization in Robotics and Industrial Automation

Table IIC: Discussions on courses with actions as remarks

S.No	Semester	Course Code	Course Name	Course content Deletion/Addition/New	Percentage of change	Remarks
1	III	XECHR1	Service Robotics with Drives and Sensors	Added as New Course.	100 %	-
2	IV	XECHR2	Industrial Robotics and Automation	Added as New Course.	100 %	-
3	V	XECHR3	Fundamentals of ROS and Embedded in Robotics	Added as New Course.	100 %	-
4	V	XECHR4	Artificial Intelligence and Computer Vision for Robotics	Added as New Course.	100 %	-
5	VI	XECHR5	Deep Learning for Robotics	Added as New Course.	100 %	-
5	VII	XECHR6	Mini Project	Added as New Course.	100 %	-

B.Tech. (Hons.) Mechanical Engineering Programme with Specialization in Energy Engineering

Table IID: Discussions on courses with actions as remarks

S.No	Semester	Course Code	Course Name	Course content Deletion/Addition/New	Percentage of change	Remarks
1	III	XMEHE1	Alternative Sources of Energy	Added as New Course.	100 %	#
2	IV	XMEHE2	Solar and Wind Energy Systems	Added as New Course.	100 %	-
3	IV	XMEHE3	Renewable Energy Laboratory – I	Added as New Course.	100 %	-
4	V	XMEHE4	Energy Storage Systems and Sustainable Development	Added as New Course.	100 %	-
5	VI	XMEHE5	Energy Audit, Conservation and Management	Added as New Course.	100 %	-
6	VI	XMEHE6	Renewable Energy Laboratory – II	Added as New Course.	100 %	-
7	VII	XMEHE7	Mini Project	Added as New Course.	100 %	-

The external BOS member Dr. M. Udayakumar has recommended to include topics on liquid bio fuels and the same have been included in the course 'Alternative Sources of Energy'

D. LIST OF NEWLY INTRODUCED COURSES

M.Tech. Renewable Energy

1. Wind, Ocean and Geothermal Energy Systems
2. Solar Energy Laboratory
3. Process Modelling and Simulation Laboratory
4. Computational Fluid Dynamics Laboratory
5. Industrial Safety

B.Tech. Mechanical Engineering

1. Energy Studies

E. LIST OF COURSES REMOVED

Table III : Table of courses removed with remarks

M.Tech. Renewable Energy

S.No	Course Code and Title	Remarks
1	Mini Project	This core course has been removed as Practical Project component is added in all Laboratory courses.
2.	MAT and SCI Lab	This core course has been replaced with a new core course – Process Modelling and Simulation Laboratory – retaining relevant experiments.

F. PERCENTAGE CHANGE IN THE SYLLABUS

M.Tech. Renewable Energy

Number of new core courses added = 4 with 9 credits

Number of core courses removed = 2 with 3 credits

% change = $(12/52) \times 100 = 23.08\%$

G. NOTES ON BENCHMARKING WITH AICTE MODEL CURRICULUM

It is found that AICTE has not given any model syllabus for Renewable Energy. The AICTE curriculum related to Post Graduate Programme in Mechanical Engineering (Specialization in Thermal Engineering) was presented in the BoS. The members compared the designed curriculum and discussed the following

- The credits of the two curriculum are found to be same.
- The courses which are mandatory and as Open Electives in the AICTE curriculum are present in the designed curriculum.

H. NOTES ON CREDIT DISTRIBUTION AND COMPARISON WITH AICTE GUIDELINES

Table IV: Credit distribution

M.Tech. Renewable Energy

AICTE Course Types	Number of courses		Total credits		
	PMIST Adoption	AICTE Recommendation	PMIST Adoption	AICTE Recommendation	Deviation
Professional Core Courses (PCC)	6	4	18	12	6
Professional Core Courses Lab (PCC-L)	4	4	8	8	0
Professional Elective Course (PEC)	4	4	12	12	0
Open Elective (OE)	1	1	3	3	0
Proj	2	3	26	28	- 2
AICTE Mandatory Course (AICTE – MC)	1	1	2	2	0
AICTE Audit Course (AICTE – Audit)	2	2	0	0	0
Total	22	21	72	68	4

I. COURSES ON EMPLOYABILITY/ENTREPRENEURSHIP/SKILL DEVELOPMENT

The curriculum for M.Tech. Renewable Energy Programme focus of including **97.06 %** of courses with either/and employability/entrepreneurship/skill development. The courses are given below.

Table V Categorization of courses

M.Tech. Renewable Energy

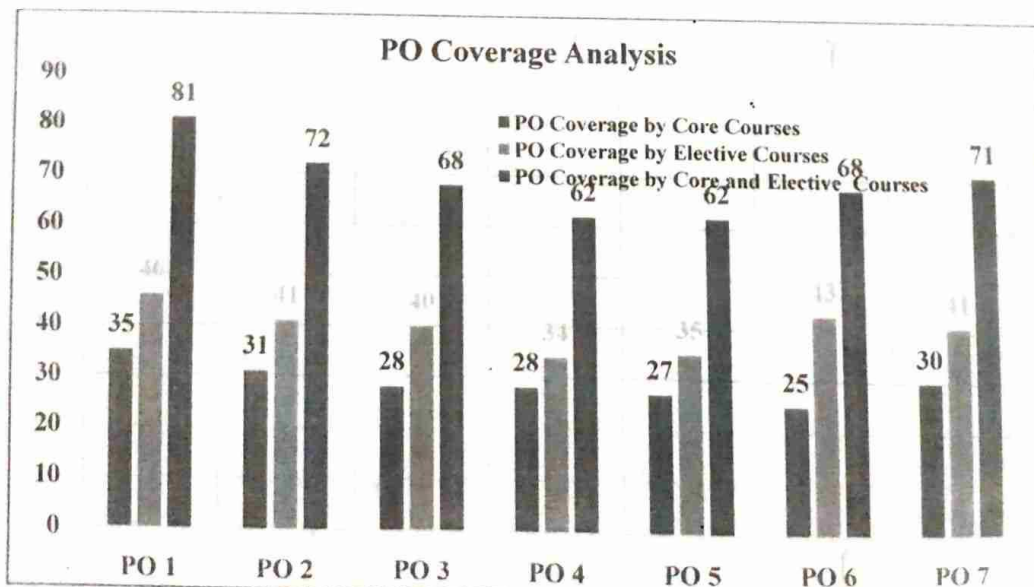
S. No	Course Code	Course Name	Category
1	YRE101	Solar Energy Systems	Employability
2	YRE102	Wind, Ocean and Geothermal Energy Systems	Employability
3	YRE103	Process Modelling and Simulation in Energy Systems	Employability
4	YRE104A	Fluid Dynamics and Heat Transfer	Employability / Entrepreneurship / Skill Development
5	YRE104B	Energy Conservation in HVAC	Employability / Entrepreneurship / Skill Development
6	YRE104C	Fuels and Combustion Technology	Employability / Entrepreneurship / Skill Development
7	YRE105A	Environmental Engineering	Employability / Entrepreneurship / Skill Development
8	YRE105B	Carbon Sequestration and Trading	Employability / Entrepreneurship / Skill Development
9	YRE105C	Waste Management and Energy Recovery	Employability / Entrepreneurship / Skill Development
10	YRE106	Solar Energy Laboratory	Skill Development
11	YRM107	Research Methodology and IPR	Entrepreneurship / Skill Development
12	YEGOE1	English for Research Paper Writing	Entrepreneurship / Skill Development
13	YRE109	Process Modelling and Simulation Laboratory	Skill Development
14	YRE201	Bio Energy Systems	Employability
15	YRE202	Computational Fluid Dynamics	Employability
16	YRE203	Electrical Energy Technology	Employability
17	YRE204A	Optimum Utilization of Heat and Power	Employability / Entrepreneurship / Skill Development
18	YRE204B	Statistical Tools for Data analysis	Employability / Entrepreneurship / Skill Development
19	YRE204C	Sustainable Development	Employability / Entrepreneurship / Skill Development
20	YRE204D	Hydro Power Technology	Employability / Entrepreneurship / Skill Development
21	YRE205A	Instrumentation Technology for Energy Systems	Employability / Entrepreneurship / Skill Development
22	YRE205B	Hydrogen, Fuel cells and Nuclear Energy	Employability / Entrepreneurship / Skill Development
23	YRE205C	Energy Modelling, Economics and Project Management	Employability / Entrepreneurship / Skill Development

24	YRE205D	Energy Efficient Building	Employability / Entrepreneurship / Skill Development
25	YRE206	Computational Fluid Dynamics Laboratory	Skill Development
26	YRE207	Bio Energy Laboratory	Skill Development
27	YPSOE1	Constitution of India	Employability
28	YRE301	Dissertation Phase – II	Employability / Entrepreneurship / Skill Development
29		Open Elective – I	----
30	YRE302A	Energy Audit and Management	Employability / Entrepreneurship / Skill Development
31	YRE302B	Unit Operations in Industries	Employability / Entrepreneurship / Skill Development
32	YRE302C	CAD/CAM and Simulation of Renewable Energy Systems	Employability / Entrepreneurship / Skill Development
33	YRE302D	Industrial Safety	Employability / Entrepreneurship / Skill Development
34	YRE401	Dissertation Phase – II	Employability / Entrepreneurship / Skill Development

J. DISCUSSION ON PROGRAMME ARTICULATION MATRIX (PO COVERAGE BY ALL COs)

M.Tech. Renewable Energy

It is found that the curriculum covers all POs with small deviations. The members agreed that there need not be any changes in the POs.



The BOS members recommended to submit the outcome of this meeting in the forthcoming 40th Academic council meeting for approval.



HOD/Mechanical Engineering
(A. PUGAZHENTHI)



Dean (FET)
(Dr. S. SENTHAMIL KUMAR).



Dean (Academic)
(Dr. A. GEORGE)