



**ANNA UNIVERSITY, CHENNAI**  
**NON-AUTONOMOUS AFFILIATED COLLEGES**  
**REGULATIONS 2021**  
**CHOICE BASED CREDIT SYSTEM**  
**B. E. MECHANICAL ENGINEERING**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- I. Effectuating success in careers by exploring with the design, digital and computational analysis of engineering systems, experimentation and teCsting, smart manufacturing, technical services, and research.
- II. Amalgamating effectively with stakeholders to update and improve their core competencies and abilities to ethically compete in the ever-changing multicultural global enterprise.
- III. To encourage multi-disciplinary research and development to foster advanced technology, and to nurture innovation and entrepreneurship in order to compete successfully in the global economy.
- IV. To globally share and apply technical knowledge to create new opportunities that proactively advances our society through team efforts and to solve various challenging technical, environmental and societal problems.
- V. To create world class mechanical engineers capable of practice engineering ethically with a solid vision to become great leaders in academia, industries and society.

**PROGRAM OUTCOMES (POs)**

**PO**

**GRADUATE ATTRIBUTE**

- 1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2 **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3 **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.
- 4 **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.
- 5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6 **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.

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- 7 **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.
- 8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10 **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.
- 11 **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.
- 12 **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.

### PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of the Mechanical Engineering Degree programme, the Graduates shall exhibit the following:

1. Apply the knowledge gained in Mechanical Engineering for design and development and manufacture of engineering systems.
2. Apply the knowledge acquired to investigate research-oriented problems in mechanical engineering with due consideration for environmental and social impacts.
3. Use the engineering analysis and data management tools for effective management of multidisciplinary projects.

### PEO / PO MAPPING:

PEOs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
I.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
II.	3	2	2	2	2	1	1	1	3		2	1	2	3	3
III.	3	1	2	1	2	2	1		1	2		3	3	2	2
IV.	2	2	2	2	2	2	2	2	2	1		2	2	3	3
V.	3	2	2	2	1	3	2	2	2	1	1	3	3	2	2



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## Mapping of Course Outcome and Programme Outcome

Year	Semester	Course name	PO												PSO			
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
I	I	Professional English- I	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-	
		Matrices and Calculus	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-	
		Engineering Physics	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-	
		Engineering Chemistry	2.8	1.3	1.6	1	-	1.5	1.8	-	-	-	-	1.5	-	-	-	
		Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	-	2	2	3	3	-
		தமிழர் மரபு /Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Problem Solving and Python Programming Laboratory	2	3	3	3	2	-	-	-	-	-	-	2	2	3	3	-
		Physics and Chemistry Laboratory	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-	-
			2.6	1.3	1.6	1	1	1.4	1.8	-	-	-	-	1.3	-	-	-	-
	English Laboratory <sup>s</sup>	3	3	3	3	1	3	3	3	3	3	3	3	3	-	-	-	
	II	Professional English- II	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-	
		Statistics and Numerical Methods	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-	
		Materials Science	3	2	1.6	1.4	1.8	1.2	1	-	-	-	-	1	-	-	-	
		Basic Electrical and Electronics Engineering	2	1.8	1	-	-	-	1	-	-	-	-	2	-	-	1	
		Engineering Graphics	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-	
		தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1	
		Basic Electrical and Electronics Engineering Laboratory	3	3	2	1	1	-	-	1.5	2	-	-	-	-	-	1	
Communication Laboratory/ Foreign Language <sup>s</sup>		2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-		
II	III	Transforms and Partial Differential Equations	3	3	2	2	1	-	-	-	1	-	-	1	3	3	1	
		Engineering Mechanics	3	2	3	1	2	-	-	-	-	-	-	2	3	1	2	
		Engineering Thermodynamics	3	3	2	-	-	1	-	-	1	-	1	2	3	2	3	
		Fluid Mechanics and Machinery	3	2	3	2	2	2	2	1	-	-	-	2	2	2	2	
		Engineering Materials and Metallurgy	3	1	3	2	2	2	2	1	-	-	-	2	2	1	2	
		Manufacturing Processes	3	-	2	-	2	2	2	1	1	-	-	1	3	1	2	
		Professional Development	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	IV	Theory of Machines	3	2	2	-	2	-	-	1	-	-	-	1	3	-	1	
		Thermal Engineering	3	2	1	1	-	-	-	-	-	-	-	1	2	1	1	
		Hydraulics and Pneumatics	2	1	1	1	-	-	-	-	-	-	-	1	2	1	1	
		Manufacturing Technology	3	3	3	1	1	1	3	-	-	3	-	-	3	2	2	
		Strength of Materials	3	3	3	3	2	3	1	3	2	3	1	3	2	1	1	
		Environmental Sciences and Sustainability	1	1	1	-	-	3	-	-	2	1	2	2	2	1	-	
		V	Design of Machine Elements	2	2	3	-	-	-	-	1	1	-	-	2	3	2	2
			Metrology and Measurements	3	2	2	2	-	-	-	-	1	-	-	3	2	1	

  
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	VI	Heat and Mass Transfer	3	3	3	2	-	-	-	-	1	-	-	1	3	2	1	
IV	VII	Mechatronics and IoT	3	2	2	2	2	-	1	-	1	-	-	2	1	2	3	
		Computer Integrated Manufacturing	3	2	2	1	2	-	-	-	1	-	-	1	2	1	3	
		Human Values and Ethics	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Industrial Management	-	-	1	1	-	3	2	3	2	3	2	3	1	1	1	

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**CURRICULUM AND SYLLABI FOR I TO VIII SEMESTERS**  
**SEMESTER I**

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
<b>THEORY</b>								
2.	HS3152	Professional English - I	HSMC	3	0	0	3	3
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
7.	GE3152	தமிழர் மரபு/Heritage of Tamils	HSMC	1	0	0	1	1
<b>PRACTICAL</b>								
7	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
9	GE3172	English Laboratory §	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>16</b>	<b>1</b>	<b>10</b>	<b>27</b>	<b>22</b>

§ Skill Based Course

**SEMESTER II**

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	HS3252	Professional English - II	HSMC	2	0	0	2	2
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3251	Materials Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	GE3252	தமிழ்நாம் ததொழில் நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1	1
7.		NCC Credit Course Level 1#	-	2	0	0	2	2
<b>PRACTICAL</b>								
8.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
9.	BE3271	Basic Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
10.	GE3272	Communication Laboratory / Foreign Language §	EEC	0	0	4	4	2
<b>TOTAL</b>				<b>14</b>	<b>1</b>	<b>16</b>	<b>31</b>	<b>23</b>

# NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

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### SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	MA3351	Transforms and Partial Differential Equations	BSC	3	1	0	4	4
2.	ME3351	Engineering Mechanics	ESC	3	0	0	3	3
3.	ME3391	Engineering Thermodynamics	PCC	3	0	0	3	3
4.	CE3391	Fluid Mechanics and Machinery	ESC	3	1	0	4	4
5.	ME3392	Engineering Materials and Metallurgy	PCC	3	0	0	3	3
6.	ME3393	Manufacturing Processes	PCC	3	0	0	3	3
<b>PRACTICALS</b>								
7.	ME3381	Computer Aided Machine Drawing	ESC	0	0	4	4	2
8.	ME3382	Manufacturing Technology Laboratory	PCC	0	0	4	4	2
9.	GE3361	Professional Development <sup>§</sup>	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>18</b>	<b>2</b>	<b>10</b>	<b>30</b>	<b>25</b>

§ Skill Based Course

### SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	ME3491	Theory of Machines	PCC	3	0	0	3	3
2.	ME3451	Thermal Engineering	PCC	4	0	0	4	4
3.	ME3492	Hydraulics and Pneumatics	PCC	3	0	0	3	3
4.	ME3493	Manufacturing Technology	PCC	3	0	0	3	3
5.	CE3491	Strength of Materials	PCC	3	0	0	3	3
6.	GE3451	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7.		NCC Credit Course Level 2 <sup>#</sup>		3	0	0	3	3 <sup>#</sup>
<b>PRACTICALS</b>								
8.	CE3481	Strength of Materials and Fluid Machinery Laboratory	PCC	0	0	4	4	2
9.	ME3461	Thermal Engineering Laboratory	PCC	0	0	4	4	2
<b>TOTAL</b>				<b>18</b>	<b>0</b>	<b>8</b>	<b>26</b>	<b>22</b>

# NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.



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**SEMESTER V**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	ME3591	Design of Machine Elements	PCC	4	0	0	4	4
2.	ME3592	Metrology and Measurements	PCC	3	0	0	3	3
3.		Professional Elective I	PEC	-	-	-	-	3
4.		Professional Elective II	PEC	-	-	-	-	3
5.		Professional Elective III	PEC	-	-	-	-	3
6.		Mandatory Course-I <sup>&amp;</sup>	MC	3	0	0	3	Non-Credit Course
<b>PRACTICALS</b>								
7.	ME3511	Summer Internship*	EEC	0	0	0	0	1
8.	ME3581	Metrology and Dynamics Laboratory	PCC	0	0	4	4	2
<b>TOTAL</b>				-	-	-	-	<b>19</b>

\*Two weeks Summer Internship carries one credit and it will be done during IV semester summer vacation and same will be evaluated in V semester.

<sup>&</sup> Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC- I)

**SEMESTER VI**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	ME3691	Heat and Mass Transfer	PCC	3	1	0	4	4
2.		Professional Elective IV	PEC	-	-	-	-	3
3.		Professional Elective V	PEC	-	-	-	-	3
4.		Professional Elective VI	PEC	-	-	-	-	3
5.		Professional Elective VII	PEC	-	-	-	-	3
6.		Open Elective – I <sup>*</sup>	OEC	3	0	0	3	3
7.		Mandatory Course-II <sup>&amp;</sup>	MC	3	0	0	3	Non-Credit Course
8.		NCC Credit Course Level 3 <sup>#</sup>		3	0	0	3	3 <sup>#</sup>
<b>PRACTICALS</b>								
9.	ME3681	CAD/CAM Laboratory	PCC	0	0	4	4	2
10.	ME3682	Heat Transfer Laboratory	PCC	0	0	4	4	2
<b>TOTAL</b>				-	-	-	-	<b>23</b>

\*Open Elective – I shall be chosen from the emerging technologies.

<sup>&</sup> Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC- II)

<sup>#</sup> NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA



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**SEMESTER VII / VIII\***

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	ME3791	Mechatronics and IoT	PCC	3	0	0	3	3
2.	ME3792	Computer Integrated Manufacturing	PCC	3	0	0	3	3
3.	GE3791	Human Values and Ethics	HSMC	2	0	0	2	2
4.	GE3792	Industrial Management	HSMC	3	0	0	3	3
5.		Open Elective – II**	OEC	3	0	0	3	3
6.		Open Elective – III***	OEC	3	0	0	3	3
7.		Open Elective – IV***	OEC	3	0	0	3	3
<b>PRACTICALS</b>								
8.	ME3781	Mechatronics and IoT Laboratory	PCC	0	0	4	4	2
9.	ME3711	Summer Internship <sup>#</sup>	EEC	0	0	0	0	1
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>23</b>

#Two weeks Summer Internship carries one credit and it will be done during VI semester summer vacation and same will be evaluated in VII semester.

\*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

\*\*Open Elective – II shall be chosen from the emerging technologies.

\*\*\*Open Elective III and IV (Shall be chosen from the list of open electives offered by other Programmes).

**SEMESTER VIII /VII\***

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>PRACTICALS</b>								
1.	ME3811	Project Work / Internship	EEC	0	0	20	20	10
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>	<b>10</b>

\*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.



**TOTAL CREDITS:167**

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### MANDATORY COURSES I\*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS
				L	T	P	
1.	MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3
2.	MX3082	Elements of Literature	MC	3	0	0	3
3.	MX3083	Film Appreciation	MC	3	0	0	3
4.	MX3084	Disaster Risk Reduction and Management	MC	3	0	0	3

\*Mandatory Courses are offered as Non-Credit courses

### MANDATORY COURSES II\*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS
				L	T	P	
1.	MX3085	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3
2.	MX3086	History of Science and Technology in India	MC	3	0	0	3
3.	MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3
4.	MX3088	State, Nation Building and Politics in India	MC	3	0	0	3
5.	MX3089	Industrial Safety	MC	3	0	0	3

\*Mandatory Courses are offered as Non-Credit courses



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## PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1	VERTICAL 2	VERTICAL 3	VERTICAL 4	VERTICAL 5	VERTICAL 6	VERTICAL 7	VERTICAL 8	VERTICAL 9	VERTICAL 10
MODERN MOBILITY SYSTEMS	PRODUCT AND PROCESS DEVELOPMENT	ROBOTICS AND AUTOMATION	DIGITAL AND GREEN MANUFACTURING	PROCESS EQUIPMENT AND PIPING DESIGN	CLEAN AND GREEN ENERGY TECHNOLOGIES	COMPUTATIONAL ENGINEERING	DIVERSIFIED COURSES GROUP 1	DIVERSIFIED COURSES GROUP 2	DIVERSIFIED COURSES GROUP 3
Automotive Materials, Components, Design & Testing	Value Engineering	Sensors and Instrumentation	Digital Manufacturing and IoT	Design of Pressure Vessels	Bioenergy Conversion Technologies	Computational Solid Mechanics	Automobile Engineering	Turbo Machines	Advanced Vehicle Engineering
Conventional and Futuristic Vehicle Technology	Additive Manufacturing	Electrical Drives and Actuators	Lean Manufacturing	Failure Analysis and NDT Techniques	Carbon Footprint estimation and reduction techniques	Computational Fluid Dynamics and Heat transfer	Measurements and Controls	Non-traditional Machining Processes	Advanced Internal Combustion Engineering
Renewable Powered Off Highway Vehicles and Emission Control Technology	CAD/CAM	Embedded Systems and Programming	Modern Robotics	Material Handling and solid processing Equipment	Energy Conservation in Industries	Theory on Computation and Visualization	Design Concepts in Engineering	Industrial safety	Casting and Welding Processes
Vehicle Health Monitoring, Maintenance and Safety	Design For X	Robotics	Green Manufacturing Design and Practices	Rotating Machinery Design	Energy Efficient Buildings	Computational Bio-Mechanics	Composite Materials and Mechanics	Design of Transmission System	Process Planning and Cost Estimation
CAE and CFD Approach in Future Mobility	Ergonomics in Design	Smart Mobility and Intelligent Vehicles	Environment Sustainability and Impact Assessment	Thermal and Fired Equipment design	Energy Storage Devices	Advanced Statistics and Data Analytics	Electrical Drives and Control	Thermal Power Engineering	Surface Engineering
Hybrid and Electric Vehicle Technology	New Product Development	Haptics and Immersive Technologies	Energy Saving Machinery and Components	Industrial Layout Design and Safety	Renewable Energy Technologies	CAD and CAE	Power Plant Engineering	Design for Manufacturing	Precision Manufacturing
Thermal Management of Batteries and Fuel Cells	Product Life Cycle Management	Drone Technologies	Green Supply Chain Management	Design Codes and Standards	Equipment for Pollution Control	Machine Learning for Intelligent Systems	Refrigeration and Air Conditioning	Power Generation Equipment Design	Gas Dynamics and Jet Propulsion
-	-	-	-	-	-	-	Dynamics of Ground Vehicles	-	Operational Research

**Registration of Professional Elective Courses from Verticals:**

**Refer to the Regulations 2021, Clause 6.3. (Amended on 27.07.2023)**

PROGRESS THROUGH KNOWLEDGE



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## PROFESSIONAL ELECTIVE COURSES : VERTICALS

### VERTICAL 1 : MODERN MOBILITY SYSTEMS

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1.	CME331	Automotive Materials, Components, Design and Testing	PEC	2	0	2	4	3
2.	CME332	Conventional and Futuristic Vehicle Technology	PEC	3	0	0	3	3
3.	CME333	Renewable Powered Off Highway Vehicles and Emission Control Technology	PEC	3	0	0	3	3
4.	CME334	Vehicle Health Monitoring, Maintenance and Safety	PEC	3	0	0	3	3
5.	CME335	CAE and CFD Approach in Future Mobility	PEC	2	0	2	4	3
6.	CME336	Hybrid and Electric Vehicle Technology	PEC	3	0	0	3	3
7.	CME337	Thermal Management of Batteries and Fuel Cells	PEC	3	0	0	3	3

### VERTICAL 2 : PRODUCT AND PROCESS DEVELOPMENT

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1.	CME338	Value Engineering	PEC	3	0	0	3	3
2.	CME339	Additive Manufacturing	PEC	2	0	2	4	3
3.	CME340	CAD/CAM	PEC	3	0	0	3	3
4.	CME341	Design For X	PEC	3	0	0	3	3
5.	CME342	Ergonomics in Design	PEC	3	0	0	3	3
6.	CME343	New Product Development	PEC	3	0	0	3	3
7.	CME344	Product Life Cycle Management	PEC	3	0	0	3	3

### VERTICAL 3: ROBOTICS AND AUTOMATION

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact Period	Credits
				L	T	P		
1.	MR3491	Sensors and Instrumentation	PEC	3	0	0	3	3
2.	MR3392	Electrical Drives and Actuators	PEC	3	0	0	3	3
3.	MR3492	Embedded Systems and Programming	PEC	2	0	2	4	3
4.	MR3691	Robotics	PEC	3	0	0	3	3
5.	CMR338	Smart Mobility and Intelligent Vehicles	PEC	3	0	0	3	3
6.	CME345	Haptics and Immersive Technologies	PEC	3	0	0	3	3
7.	CRA332	Drone Technologies	PEC	3	0	0	3	3

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#### VERTICAL 4: DIGITAL AND GREEN MANUFACTURING

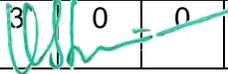
Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact Period	Credits
				L	T	P		
1.	CME346	Digital Manufacturing and IoT	PEC	2	0	2	4	3
2.	CME347	Lean Manufacturing	PEC	3	0	0	3	3
3.	CME348	Modern Robotics	PEC	2	0	2	4	3
4.	CME349	Green Manufacturing Design and Practices	PEC	3	0	0	3	3
5.	CME350	Environment Sustainability and Impact Assessment	PEC	3	0	0	3	3
6.	CME351	Energy Saving Machinery and Components	PEC	3	0	0	3	3
7.	CME352	Green Supply Chain Management	PEC	3	0	0	3	3

#### VERTICAL 5: PROCESS EQUIPMENT AND PIPING DESIGN

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact Period	Credits
				L	T	P		
1.	CME353	Design of Pressure Vessels	PEC	3	0	0	3	3
2.	CME354	Failure Analysis and NDT Techniques	PEC	2	0	2	4	3
3.	CME355	Material Handling and Solid Processing Equipment	PEC	3	0	0	3	3
4.	CME356	Rotating Machinery Design	PEC	3	0	0	3	3
5.	CME357	Thermal and Fired Equipment Design	PEC	3	0	0	3	3
6.	CME358	Industrial Layout Design and Safety	PEC	2	0	2	4	3
7.	CME359	Design Codes and Standards	PEC	3	0	0	3	3

#### VERTICAL 6: CLEAN AND GREEN ENERGY TECHNOLOGIES

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total contact Periods	Credits
				L	T	P		
1.	CME360	Bioenergy Conversion Technologies	PEC	3	0	0	3	3
2.	CME361	Carbon Footprint Estimation and Reduction Techniques	PEC	3	0	0	3	3
3.	CME362	Energy Conservation in Industries	PEC	3	0	0	3	3
4.	CME363	Energy Efficient Buildings	PEC	3	0	0	3	3
5.	CME364	Energy Storage Devices	PEC	3	0	0	3	3
6.	CME365	Renewable Energy Technologies	PEC	3	0	0	3	3
7.	CME366	Equipment for Pollution Control	PEC	3	0	0	3	3

  
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**VERTICAL 7: COMPUTATIONAL ENGINEERING**

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total contact periods	Credits
				L	T	P		
1.	CME367	Computational Solid Mechanics	PEC	3	0	0	3	3
2.	CME368	Computational Fluid Dynamics and Heat transfer	PEC	3	0	0	3	3
3.	CME369	Theory on Computation and Visualization	PEC	3	0	0	3	3
4.	CME370	Computational Bio-Mechanics	PEC	3	0	0	3	3
5.	CME371	Advanced Statistics and Data Analytics	PEC	3	0	0	3	3
6.	CME372	CAD and CAE	PEC	2	0	2	4	3
7.	CRA342	Machine Learning for Intelligent Systems	PEC	3	0	0	3	3

**VERTICAL 8: DIVERSIFIED COURSES GROUP 1**

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1.	CME380	Automobile Engineering	PEC	3	0	0	3	3
2.	ME3001	Measurements and Controls	PEC	3	0	0	3	3
3.	CME381	Design Concepts in Engineering	PEC	3	0	0	3	3
4.	CME382	Composite Materials and Mechanics	PEC	3	0	0	3	3
5.	CME383	Electrical Drives and Control	PEC	3	0	0	3	3
6.	CME384	Power Plant Engineering	PEC	3	0	0	3	3
7.	CME385	Refrigeration and Air Conditioning	PEC	3	0	0	3	3
8.	CAU332	Dynamics of Ground Vehicles	PEC	3	0	0	3	3

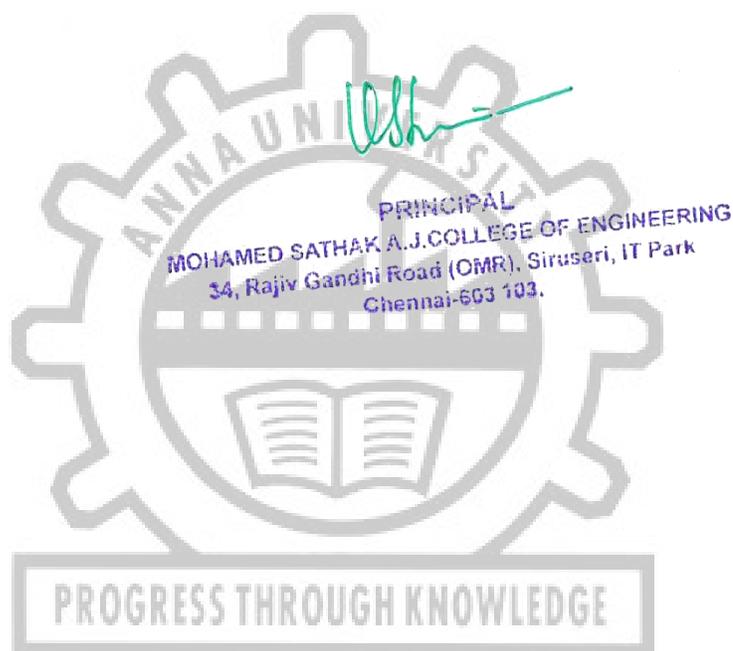
**VERTICAL 9: DIVERSIFIED COURSES GROUP 2**

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1.	CAE353	Turbo Machines	PEC	3	0	0	3	3
2.	CME387	Non-traditional Machining Processes	PEC	3	0	0	3	3
3.	CME388	Industrial safety	PEC	3	0	0	3	3
4.	CME389	Design of Transmission System	PEC	3	0	0	3	3
5.	CME390	Thermal Power Engineering	PEC	3	0	0	3	3
6.	CME391	Design for Manufacturing	PEC	3	0	0	3	3
7.	CME392	Power Generation Equipment Design	PEC	3	0	0	3	3

  
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**VERTICAL 10: DIVERSIFIED COURSES GROUP 3**

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact periods	Credits
				L	T	P		
1.	CME393	Advanced Vehicle Engineering	PEC	3	0	0	3	3
2.	CME394	Advanced Internal Combustion Engineering	PEC	3	0	0	3	3
3.	CME395	Casting and Welding Processes	PEC	3	0	0	3	3
4.	CME396	Process Planning and Cost Estimation	PEC	3	0	0	3	3
5.	CME397	Surface Engineering	PEC	3	0	0	3	3
6.	CME398	Precision Manufacturing	PEC	3	0	0	3	3
7.	CME386	Gas Dynamics and Jet Propulsion	PEC	3	0	0	3	3
8.	CME399	Operational Research	PEC	3	0	0	3	3



### OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories)

#### OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)

To be offered other than Faculty of Information and Communication Engineering

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCS351	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2.	OCS352	IoT Concepts and Applications	OEC	2	0	2	4	3
3.	OCS353	Data Science Fundamentals	OEC	2	0	2	4	3
4.	CCS333	Augmented Reality / Virtual Reality	OEC	2	0	2	4	3

#### OPEN ELECTIVES – III

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCE353	Lean Concepts, Tools And Practices	OEC	3	0	0	3	3
2.	OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
3.	OMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3
4.	OMG353	Democracy and Good Governance	OEC	3	0	0	3	3
5.	OME354	Applied Design Thinking	OEC	3	0	0	3	3
6.	MF3003	Reverse Engineering	OEC	3	0	0	3	3
7.	OPR351	Sustainable Manufacturing	OEC	3	0	0	3	3
8.	AU3791	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
9.	OAS352	Space Engineering	OEC	3	0	0	3	3
10.	OIM351	Industrial Management	OEC	3	0	0	3	3
11.	OIE354	Quality Engineering	OEC	3	0	0	3	3
12.	OSF351	Fire Safety Engineering	OEC	3	0	0	3	3
13.	OAE352	Fundamentals of Aeronautical engineering	OEC	3	0	0	3	3
14.	OML351	Introduction to non-destructive testing	OEC	3	0	0	3	3
15.	OMR351	Mechatronics	OEC	3	0	0	3	3
16.	ORA351	Foundation of Robotics	OEC	3	0	0	3	3

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17.	OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
18.	OAI351	Urban Agriculture	OEC	3	0	0	3	3
19.	OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
20.	OEE352	Electric Vehicle Technology	OEC	3	0	0	3	3
21.	OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
22.	OCH351	Nano Technology	OEC	3	0	0	3	3
23.	OCH352	Functional Materials	OEC	3	0	0	3	3
25.	OFD352	Traditional Indian Foods	OEC	3	0	0	3	3
26.	OFD353	Introduction to food processing	OEC	3	0	0	3	3
27.	OPY352	IPR for Pharma Industry	OEC	3	0	0	3	3
28.	OTT351	Basics of Textile Finishing	OEC	3	0	0	3	3
29.	OTT352	Industrial Engineering for Garment Industry	OEC	3	0	0	3	3
30.	OTT353	Basics of Textile Manufacture	OEC	3	0	0	3	3
31.	OPE351	Introduction to Petroleum Refining and Petrochemicals	OEC	3	0	0	3	3
32.	OPE334	Energy Conservation and Management	OEC	3	0	0	3	3
33.	OPT351	Basics of Plastics Processing	OEC	3	0	0	3	3
34.	OEC351	Signals and Systems	OEC	3	0	0	3	3
35.	OEC352	Fundamentals of Electronic Devices and Circuits	OEC	3	0	0	3	3
36.	CBM348	Foundation Skills in integrated product Development	OEC	3	0	0	3	3
37.	CBM333	Assistive Technology	OEC	3	0	0	3	3
38.	OMA352	Operations Research	OEC	3	0	0	3	3
39.	OMA353	Algebra and Number Theory	OEC	3	0	0	3	3
40.	OMA354	Linear Algebra	OEC	3	0	0	3	3
41.	OBT352	Basics of Microbial Technology	OEC	3	0	0	3	3
42.	OBT353	Basics of Biomolecules	OEC	3	0	0	3	3
43.	OBT354	Fundamentals of Cell and Molecular Biology	OEC	3	0	0	3	3



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**OPEN ELECTIVES – IV**

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCE354	Basics of Integrated Water Resources Management	OEC	3	0	0	3	3
2.	OHS352	Project Report Writing	OEC	3	0	0	3	3
3.	OMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
4.	OMA356	Random Processes	OEC	3	0	0	3	3
5.	OMA357	Queueing and Reliability Modelling	OEC	3	0	0	3	3
6.	OMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3
7.	OMG355	Multivariate Data Analysis	OEC	3	0	0	3	3
8.	OME355	Industrial Design & Rapid Prototyping Techniques	OEC	3	0	0	3	3
9.	MF3010	Micro and Precision Engineering	OEC	3	0	0	3	3
10.	OMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
11.	AU3002	Batteries and Management system	OEC	3	0	0	3	3
12.	AU3008	Sensors and Actuators	OEC	3	0	0	3	3
13.	OAS353	Space Vehicles	OEC	3	0	0	3	3
14.	OIM352	Management Science	OEC	3	0	0	3	3
15.	OIM353	Production Planning and Control	OEC	3	0	0	3	3
16.	OIE353	Operations Management	OEC	3	0	0	3	3
17.	OSF352	Industrial Hygiene	OEC	3	0	0	3	3
18.	OSF353	Chemical Process Safety	OEC	3	0	0	3	3
19.	OML352	Electrical, Electronic and Magnetic materials	OEC	3	0	0	3	3
20.	OML353	Nanomaterials and applications	OEC	3	0	0	3	3
21.	OMR353	Sensors	OEC	3	0	0	3	3
22.	ORA352	Concepts in Mobile Robots	OEC	3	0	0	3	3
23.	MV3501	Marine Propulsion	OEC	3	0	0	3	3
24.	OMV351	Marine Merchant Vessels	OEC	3	0	0	3	3
25.	OMV352	Elements of Marine Engineering	OEC	3	0	0	3	3
26.	CRA332	Drone Technologies	OEC	3	0	0	3	3

  
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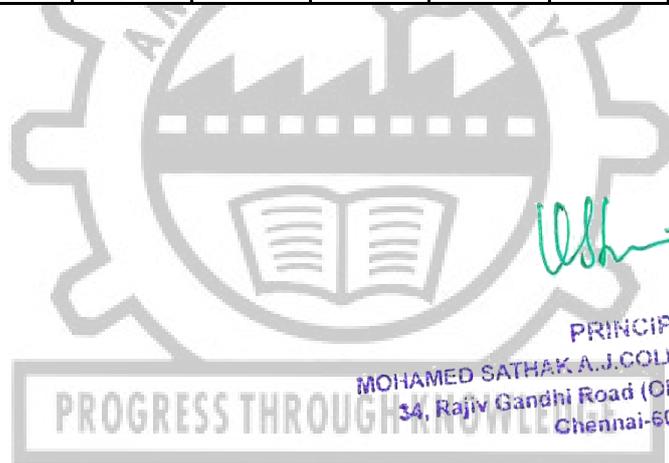
27.	OGI352	Geographical Information System	OEC	3	0	0	3	3
28.	OAI352	Agriculture Entrepreneurship Development	OEC	3	0	0	3	3
29.	OEN352	Biodiversity Conservation	OEC	3	0	0	3	3
30.	OEE353	Introduction to control systems	OEC	3	0	0	3	3
31.	OEI354	Introduction to Industrial Automation Systems	OEC	3	0	0	3	3
32.	OCH353	Energy Technology	OEC	3	0	0	3	3
33.	OCH354	Surface Science	OEC	3	0	0	3	3
34.	OFD354	Fundamentals of Food Engineering	OEC	3	0	0	3	3
35.	OFD355	Food safety and Quality Regulations	OEC	3	0	0	3	3
36.	OPY353	Nutraceuticals	OEC	3	0	0	3	3
37.	OTT354	Basics of Dyeing and Printing	OEC	3	0	0	3	3
38.	FT3201	Fibre Science	OEC	3	0	0	3	3
39.	OTT355	Garment Manufacturing Technology	OEC	3	0	0	3	3
40.	OPE353	Industrial Safety	OEC	3	0	0	3	3
41.	OPE354	Unit Operations in Petro Chemical Industries	OEC	3	0	0	3	3
42.	OPT352	Plastic Materials for Engineers	OEC	3	0	0	3	3
43.	OPT353	Properties and Testing of Plastics	OEC	3	0	0	3	3
44.	OEC353	VLSI Design	OEC	3	0	0	3	3
45.	CBM370	Wearable devices	OEC	3	0	0	3	3
46.	CBM356	Medical Informatics	OEC	3	0	0	3	3
47.	OBT355	Biotechnology for Waste Management	OEC	3	0	0	3	3
48.	OBT356	Lifestyle Diseases	OEC	3	0	0	3	3
49.	OBT357	Biotechnology in Health Care	OEC	3	0	0	3	3

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## SUMMARY

B.E. MECHANICAL ENGINEERING										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/VIII	VIII/VII	
1	HSMC	4	3					5		13
2	BSC	12	7	4	2					25
3	ESC	5	11	9						24
4	PCC			11	20	9	8	8		56
5	PEC					9	12			21
6	OEC						3	9		12
7	EEC	1	2	1		1		1	10	13
8	Non-Credit /(Mandatory)					√	√			
<b>Total</b>		<b>22</b>	<b>23</b>	<b>25</b>	<b>22</b>	<b>19</b>	<b>23</b>	<b>23</b>	<b>10</b>	<b>167</b>



  
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### **ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)**

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

Complete details are available in clause 4.10 (Amendments) of Regulations 2021.

### **VERTICALS FOR MINOR DEGREE(In addition to all the verticals of other programmes)**

<b>Vertical I</b>	<b>Vertical II</b>	<b>Vertical III</b>	<b>Vertical IV</b>	<b>Vertical V</b>
<b>Fintech and Block Chain</b>	<b>Entrepreneurship</b>	<b>Public Administration</b>	<b>Business Data Analytics</b>	<b>Environment and Sustainability</b>
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics for Management	Sustainable infrastructure Development
Fundamentals of Investment	Team Building and Leadership Management for Business	Constitution of India	Datamining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity and Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

(Choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

**VERTICAL 1: FINTECH AND BLOCK CHAIN**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG331	Financial Management	PEC	3	0	0	3	3
2.	CMG332	Fundamentals of Investment	PEC	3	0	0	3	3
3.	CMG333	Banking, Financial Services and Insurance	PEC	3	0	0	3	3
4.	CMG334	Introduction to Blockchain and its Applications	PEC	3	0	0	3	3
5.	CMG335	Fintech Personal Finance and Payments	PEC	3	0	0	3	3
6.	CMG336	Introduction to Fintech	PEC	3	0	0	3	3

**VERTICAL 2: ENTREPRENEURSHIP**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG337	Foundations of Entrepreneurship	PEC	3	0	0	3	3
2.	CMG338	Team Building and Leadership Management for Business	PEC	3	0	0	3	3
3.	CMG339	Creativity and Innovation in Entrepreneurship	PEC	3	0	0	3	3
4.	CMG340	Principles of Marketing Management for Business	PEC	3	0	0	3	3
5.	CMG341	Human Resource Management for Entrepreneurs	PEC	3	0	0	3	3
6.	CMG342	Financing New Business Ventures	PEC	3	0	0	3	3

**VERTICAL 3: PUBLIC ADMINISTRATION**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG343	Principles of Public Administration	PEC	3	0	0	3	3
2.	CMG344	Constitution of India	PEC	3	0	0	3	3
3.	CMG345	Public Personnel Administration	PEC	3	0	0	3	3
4.	CMG346	Administrative Theories	PEC	3	0	0	3	3
5.	CMG347	Indian Administrative System	PEC	3	0	0	3	3
6.	CMG348	Public Policy Administration	PEC	3	0	0	3	3

**VERTICAL 4: BUSINESS DATA ANALYTICS**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG349	Statistics for Management	PEC	3	0	0	3	3
2.	CMG350	Datamining for Business Intelligence	PEC	3	0	0	3	3
3.	CMG351	Human Resource Analytics	PEC	3	0	0	3	3
4.	CMG352	Marketing and Social Media Web Analytics	PEC	3	0	0	3	3
5.	CMG353	Operation and Supply Chain Analytics	PEC	3	0	0	3	3
6.	CMG354	Financial Analytics	PEC	3	0	0	3	3

**VERTICAL 5: ENVIRONMENT AND SUSTAINABILITY**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CES331	Sustainable infrastructure Development	PEC	3	0	0	3	3
2.	CES332	Sustainable Agriculture and Environmental Management	PEC	3	0	0	3	3
3.	CES333	Sustainable Bio Materials	PEC	3	0	0	3	3
4.	CES334	Materials for Energy Sustainability	PEC	3	0	0	3	3
5.	CES335	Green Technology	PEC	3	0	0	3	3
6.	CES336	Environmental Quality Monitoring and Analysis	PEC	3	0	0	3	3
7.	CES337	Integrated Energy Planning for Sustainable Development	PEC	3	0	0	3	3
8.	CES338	Energy Efficiency for Sustainable Development	PEC	3	0	0	3	3

