KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)
S.P.G.Chidambara Nadar - C.Nagammal Campus
S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

Department of Electrical and Electronics Engineering

M.E. Power Systems Engineering

(Regulations 2020 – Autonomous)

Vision of the Department:

To make the Department of Electrical and Electronics Engineering of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

Mission of the Department:

To impart highly innovative and technical knowledge in the field of Electrical and Electronics Engineering to the urban and unreachable rural student folks through Total Quality Education.

Program Educational Objectives (PEOs):

PEO 1: Graduates of the programme will have an enlightening career in core field of Power Systems Engineering.

PEO 2: Graduates of the programme will demonstrate their practical skills by undergoing innovative research in recent trends of Power Systems Engineering.

PEO 3: Graduates of the programme will practice ethics and exhibit project management skills to work in collaborative and multi-disciplinary tasks.

PEO 4: Graduates of the programme will demonstrate lifelong independent learning skills and thereby pursue higher studies in reputed institutions.

Program Specific Outcomes (PSOs):

PSO 1: Ability to apply the various principles of Power Systems Engineering to analyze and solve real time problems existing in the power industry.

PSO 2: Ability to acquire abreast knowledge in the emerging technologies of Power Systems Engineering and demonstrate the skills acquired in developing quality products in scientific and business applications.

The credit requirement for the programme M.E. Power Systems Engineering (as per Regulation 2020) is outlined below:

SEMESTER I

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
Theory								
1.	MA1103	Applied Mathematics for Power System Engineers	FC	4	3	1	0	4
2.	PS1101	Advanced Power System Operation and Control	PC	3	3	0	0	3
3.	PS1102	Computer Aided Power System Analysis (Theory Cum Laboratory)	PC	5	3	0	2	4
4.	PS1103	Electromagnetic Transients in Power Systems	PC	3	3	0	0	3
5.	PS1104	System Theory	PC	4	3	1	0	4
6.		Professional Elective I	PE	3	3	0	0	3
			Total	**22**	**18**	**2**	**2**	**21**

SEMESTER II

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
Theory								
1.	PS1201	Advanced Power System Protection	PC	3	3	0	0	3
2.	PS1202	Extra High Voltage AC and DC Transmission	PC	3	3	0	0	3
3.	PS1203	Power System Deregulation	PC	3	3	0	0	3
4.	PS1204	Power System Dynamics	PC	4	3	1	0	4
5.		Professional Elective II	PE	3	3	0	0	3
6.		Online Course (NPTEL / SWAYAM)	OL	3	3	0	0	3
Practical								
7.	PS1211	Advanced Power System Simulation Laboratory	PC	4	0	0	4	2
8.	PS1221	Technical Paper Writing and Patent Filing	EEC	3	1	0	2	2
			Total	**26**	**19**	**1**	**6**	**23**

SEMESTER III

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
Theory								
1.		Professional Elective III	PE	3	3	0	0	3
2.		Professional Elective IV	PE	3	3	0	0	3
3.		Open Elective I*	OE	3	3	0	0	3
Practical								
4.	PS1321	Project Work Phase I	EEC	12	0	0	12	6
			Total	**21**	**9**	**0**	**12**	**15**

* Open Elective : Industry Certification Courses (for promoting Interdisciplinary)

SEMESTER IV

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
Practical								
1.	PS1421	Project Work Phase II	EEC	24	0	0	24	12
			Total Credits	**24**	**0**	**0**	**24**	**12**

Semester wise Credits	I	II	III	IV	Total Credits
	21	**23**	**15**	**12**	**71**

11. Computation of Locational Marginal Pricing (LMP) in Restructured power systems

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of this course, students will be able to

CO1: Analyze stability analysis on single machine and multi machine configuration.

CO2: Calculate Available Transfer Capacity and Locational marginal pricing for Deregulated power system.

CO3: Design active filter to mitigate and compute harmonic indices.

CO4: Demonstrate the operation of power system under dynamic conditions.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S. No.	Description of Equipment	Quantity Required
1.	Personal Computers (Intel Core i3, 250 GB, 1 GB RAM)	30
2.	Printer	1
3.	Server (Intel Core i3, 4 GB RAM) (High Speed Processor)	1
4.	Software: EMTP / ETAP / CYME / MIPOWER / Matlab/ any Power system simulation software	5 User Licenses
5.	Compilers: C / C++	30 users

PS1221 TECHNICAL PAPER WRITING AND PATENT FILING

L	T	P	C
1	0	2	2

OBJECTIVES:

- To impart knowledge and skills required for research
- To understand the problem formulation, analysis and solutions
- To familiarize in technical paper writing/presentation without violating professional ethics
- To give an idea about IPR, registration and its enforcement
- To give an knowledge about IPR Laws

UNIT I RESEARCH PROBLEM FORMULATION 3

Meaning of research problem- Sources of research problem, criteria characteristics of a good research problem, errors in selecting a research problem, scope and objectives of research problem.

UNIT II LITERATURE REVIEW 3

Importance of literature review in defining a problem, literature review, critical literature review, identifying gap areas from literature and research database. Use of tools / techniques for Research like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

UNIT III TECHNICAL WRITING /PRESENTATION 3

Effective technical writing, how to write report, paper, developing a research proposal, format of research proposal, a presentation and assessment by a review committee.

UNIT IV INTRODUCTION TO INTELLUCTUAL PROPERTY RIGHTS 3

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad –Patent Agents.

UNIT V REGISTRATION OF IPRs 3

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Patent Drafting.

TOTAL: 15+30=45 PERIODS

OUTCOMES:

Upon Successful Completion of this course, the students will be able to

CO1: Construct problem formulation for a typical research work.
CO2: Examine the contribution of various researchers in the research topic identified.
CO3: Prepare an article / proposal based on research findings.
CO4: Outline the basic concepts involved in IPR and copyrights.
CO5: Describe the process of patent filing and registration.

REFERENCES:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. *An introduction to Research Methodology.*
2. Kothari, C., 2017. *Research methodology methods and techniques*, New Age International (P) Ltd.,
3. Khanna, J.K., 1985. *Knowledge: Evolution, Structure & Research Methodology*. Ess Ess Publications.
4. Trochim, W.M., 2005. *Research methods: The concise knowledge base*. Atomic Dog Publishing.
5. Wadehra, B.L., 2006. *Law Relating to Patents, Trade Marks, Copyright Designs and Geographical Indications: Including Semiconductor Integrated Circuits and Layout-design; Protection of Plant Varieties & TRIPS*. Universal Law Publishing Company.
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7. Satarkar, S.P., 2003. *Intellectual property rights and copyrights*. Ess Ess Publications.
8. Bouchoux, D.E., 2012. *Intellectual property: The law of trademarks, copyrights, patents, and trade secrets*. Cengage Learning.
9. Ganguli, P., 2001. *Intellectual Property Rights: Unleashing the Knowledge Economy*. Tata McGraw-Hill Publishing Company.
10. Frey, C.B., 2013. *Intellectual property rights and the financing of technological innovation: public policy and the efficiency of capital markets*. Edward Elgar Publishing.

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DEPARTMENT OF CIVIL ENGINEERING
M.E. STRUCTURAL ENGINEERING
(Regulations 2020 – Autonomous)

SI.No	Category of Courses	Credits
1.	Foundation Courses - Humanities and Social Sciences including Management Courses, Basic Science and Engineering Science Courses (HS+BS+ES)	04
2.	Professional Core Courses (PC)	27
3.	Professional Elective Courses (PE)	15
4.	Employability Enhancement Courses (EEC)	21
5.	Online Courses (OL)	03
6.	Open Elective Courses (OE)	03
7.	Audit Courses (AC)	--
8.	Value Added Courses	--

SUMMARY

S.No	Subject Area	Credits per Semester								Credits Total
		I	II	III	IV	V	VI	VII	VIII	
1	FC	4								04
2	PC	9	15	3						27
3	PE	6	3	6						15
4	EEC		1	8	12					21
5	OL		3							03
6	OE			3						03
	Total	19	22	20	12					73

I TO IV SEMESTERS CURRICULAM & SYLLABI

SEMESTER I

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA1101	Advanced Mathematical Methods	FC	4	4	0	0	4
2.	ST1101	Advanced Concrete Structures	PC	3	3	0	0	3
3.	ST1102	Dynamics of Structures	PC	3	3	0	0	3
4.	ST1103	Theory of Elasticity and Plasticity	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Professional Elective II	PE	3	3	0	0	3
			TOTAL	**19**	**19**	**0**	**0**	**19**

SEMESTER II

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ST1201	Advanced Steel Structures	PC	3	3	0	0	3
2.	ST1202	Computer Aided Analysis and Design	PC	5	3	0	2	4
3.	ST1203	Design of Bridges	PC	3	3	0	0	3
4.	ST1204	Finite Element Analysis of Structures	PC	3	3	0	0	3
5.		Professional Elective III	PE	3	3	0	0	3
6.		Online Course	OL	3	0	0	0	3
PRACTICALS								
7.	ST1211	Advanced Structural Engineering Laboratory	PC	4	0	0	4	2
8	ST1221	Practical Training I (2 weeks)	EEC	0	0	0	0	1
			TOTAL	**22**	**15**	**0**	**6**	**22**

SEMESTER III

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ST1301	Earthquake Analysis and Design of Structures	PC	3	3	0	0	3
2.		Professional Elective IV	PE	3	3	0	0	3
3.		Professional Elective V	PE	3	3	0	0	3
4.		Open Elective	OE*	3	0	0	0	3
PRACTICALS								
5	ST1321	Practical Training II (2 weeks)	EEC	0	0	0	0	1
6.	ST1322	Project Work (Phase I)	EEC	12	0	0	12	6
7.	ST1323	Seminar	EEC	2	0	0	0	1
			TOTAL	**23**	**9**	**0**	**12**	**20**

SEMESTER IV

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1	ST1421	Project Work (Phase II)	EEC	24	0	0	24	12
			TOTAL	**24**	**0**	**0**	**24**	**12**

TOTAL NO. OF CREDITS: 73

* Industry Certification Courses from other PG Programmes

ST1321 **PRACTICAL TRAINING II (2 Weeks)**

L	T	P	C
0	0	0	1

OBJECTIVE:

- To train the students in the field work so as to have a firsthand knowledge of practical problems related to Structural Engineering in carrying out engineering tasks.
- To develop skills in facing and solving the field problems.

SYLLABUS:

The students individually undertake training in reputed Industries during the summer vacation for a specified period of two weeks. At the end of training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:

Upon successful completion of course the students will be able to,

CO1: develop skills in facing and solving the field problems

CO2: solve industry orientated problem related to Structural Engineering

ST1322 **PROJECT WORK (PHASE I)**

L	T	P	C
0	0	12	6

OBJECTIVE:

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To develop the methodology to solve the identified problem.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

SYLLABUS:

The student individually works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 180 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to,

CO1: To identify the prospective topic of work and collection of related review of literature.

C02: To develop the methodology to solve the identified problem.

ST1323 **SEMINAR**

L	T	P	C
0	0	2	1

OBJECTIVE:

- To work on a specific technical topic in Structural Engineering and acquire the skills of written and oral presentation.
- To acquire writing abilities for seminars and conferences.

SYLLABUS:

The students will work for two hours per week guided by a group of staff members. They will be asked to give a presentation on any topic of their choice related to Structural Engineering and to engage in discussion with the audience. A brief copy of their presentation also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic, including Literature review. They will defend their presentation. Evaluation will be based on the technical presentation and the report and also on the interaction shown during the seminar.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

CO1: Present with confidence technical presentations and in group discussions

CO2: Write technical reports / papers for seminars and conferences

ST1421 **PROJECT WORK (PHASE II)**

L	T	P	C
0	0	24	12

OBJECTIVE:

- To solve the identified problem based on the formulated methodology.
- To develop skills to analyze and discuss the test results, and make conclusions.

SYLLABUS:

The student should continue the phase I work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through based on the report and the viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 360 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to,

CO1: To solve the identified problem based on the formulated methodology.

CO2: To develop skills to analyze, narrate the research findings and the conclusions.

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M.E COMMUNICATION AND NETWORKING

(Regulations 2020 – Autonomous)

Sl. No	Category of Courses	Credits
1.	Foundation Courses - Humanities and Social Sciences including Management Courses, Basic Science and Engineering Science Courses (HS+BS+ES)	04
2.	Professional Core Courses (PC)	28
3.	Professional Elective Courses (PE)	15
4.	Open Elective Courses (OE)	03
5.	Employability Enhancement Courses (EEC)	19
6.	Online Courses (OC)	03
7.	Audit Courses (AC)	---
8.	Value Added Courses	---
	Total	**72**

M.E – Communication & Networking (Credits Allocation to Individual Semesters)					
Semester	I	II	III	IV	**Total**
Credits	21	21	18	12	**72**

Credit Distribution to Individual Semesters:

S. No.	Category of Courses	Credits	I	II	III	IV
1.	Foundation Courses (FC)	4 credits	4 credit	-	-	-
2.	Professional Core (PC)	28 credits	14 credit	11 credit	3 credit	-
3.	Professional Elective (PE)	15 credits	3 credit	6 credit	6 credit	-
4.	Employability and Enhancement Course (EEC)	19 credits	-	1 credit	6 credit	12 credit
5.	Open Elective (OE)	3 credits	-	-	3 credit	-
6.	Online Course (OC)	3 credits	-	3 credit	-	-
7.	Audit Course (AU) – (may be recommended but not mandatory)	-	-	-	-	-
	Total	**72**	**21**	**21**	**18**	**12**

SEMESTER - I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA1102	Applied Mathematics for Communication Engineers	FC	4	4	0	0	4
2	CN1101	Advanced Digital Communication Techniques	PC	3	3	0	0	3
3	CN1102	Advanced Digital Signal Processing	PC	4	3	0	0	3
4	CN1103	Advanced Wireless Communications Systems	PC	3	3	0	0	3
5	CN1104	Communication Networks Modelling and Simulation	PC	3	3	0	0	3
6		Professional Elective - I	PE	3	3	0	0	3
PRACTICALS								
7	CN1111	Communication Systems Laboratory	PC	4	0	0	4	2
			Total	25	19	0	4	21

SEMESTER - II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	CN1201	Advanced Wireless Networks	PC	3	3	0	0	3
2	CN1202	Cognitive Radio Networks	PC	3	3	0	0	3
3	CN1203	Communication Network Security	PC	3	3	0	0	3
4		Professional Elective - II	PE	3	3	0	0	3
5		Professional Elective - III	PE	3	3	0	0	3
6		Online Course - I	OC	3	3	0	0	3
PRACTICALS								
7	CN1211	Networking Laboratory	PC	4	0	0	4	2
8	CN1221	Term Paper Writing and Seminar	EEC	2	0	0	2	1
			Total	24	18	0	6	21

SEMESTER - III

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	CN1301	Internet of Things	PC	3	3	0	0	3
2		Professional Elective - IV	PE	3	3	0	0	3
3		Professional Elective - V	PE	3	3	0	0	3
4		Open Elective - I	OC	3	3	0	0	3
PRACTICALS								
5	CN1321	Project Work Phase - I	EEC	12	0	0	12	6
			Total	24	12	0	12	18

SEMESTER - IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1	CN1421	Project Work Phase - II	EEC	24	0	0	24	12
			Total	24	0	0	24	12

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DEPARTMENT OF BIOTECHNOLOGY

M.TECH BIOTECHNOLOGY

R – 2020 AUTONOMOUS CURRICULUM & SYLLABUS

CHOICE BASED CREDIT SYSTEM

VISION:

To make the Department of Biotechnology, unique of its kind in the field of research and development activities pertaining to the field of biotechnology in this part of the world.

MISSION:

To impart highly innovative and technical knowledge in the field of biotechnology to the urban and rural student folks through “Total Quality Education”.

PROGRAM OUTCOMES:

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: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

SEMESTER I

S.NO	CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIOD	CREDITS
				L	T	P		
THEORY								
1	MA1105	Applied Statistics for Biotechnologists	FC	3	1	0	4	4
2	MB1101	Advances in Bioprocess Technology	PC	3	0	0	3	3
3	MB1102	Computational Biology	PC	3	0	0	3	3
4	MB1103	Immunotechnology	PC	3	0	0	3	3
5		Professional Elective I	PE	3	0	0	3	3
6		Professional Elective II	PE	3	0	0	3	3
7		Professional Elective III	PE	3	0	0	3	3
PRACTICALS								
8	MB1111	Advanced Biochemistry and Microbiology laboratory	PC	0	0	6	6	3
TOTAL				**21**	**1**	**6**	**28**	**25**

SEMESTER II

S.NO	CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIOD	CREDITS
				L	T	P		
THEORY								
1	MB1201	Advanced Genetic Engineering	PC	3	0	0	3	3
2	MB1202	Biosafety and Bioethics	PC	3	0	0	3	3
3	MB1203	Bioseparation Technology	PC	3	0	0	3	3
4		Professional Elective IV	PE	3	0	0	3	3
5		Professional Elective V	PE	3	0	0	3	3
6		Open Elective	OE	3	0	0	3	3
7		Online course	OL	(NPTEL/SWAYAM)				3
PRACTICALS								
8	MB1211	Immunotechnology Laboratory	PC	0	0	6	6	3
TOTAL				**18**	**0**	**6**	**24**	**24**

SEMESTER III

S.NO	CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIOD	CREDITS
				L	T	P		
PRACTICALS								
1	MB1311	Advanced Genetic Engineering Laboratory	PC	0	0	6	6	3
2	MB1312	Integrated Bioprocess Laboratory	PC	0	0	6	6	3
3	MB1321	Project Phase –I	EEC	0	0	12	12	6
TOTAL				**0**	**0**	**24**	**24**	**12**

SEMESTER IV

S.NO	CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIOD	CREDITS
				L	T	P		
PRACTICALS								
1	MB1421	Project Phase – II	EEC	0	0	24	24	12
TOTAL				**0**	**0**	**24**	**24**	**12**

TOTAL NO OF CREDITS: 73

SEMESTER I, PROFESSIONAL ELECTIVES- I

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	CREDITS
1	MB1131	Metabolic Process and Engineering (For Biotechnology Stream)	PE	3	3	0	0	3
2	MB1132	Molecular Concepts in Biotechnology (For Engineering Stream)	PE	3	3	0	0	3
3	MB1133	Principles of Chemical Engineering (For Science Stream)	PE	3	3	0	0	3

REFERENCES

1. Niazi, S.K. and Brown, J.L., 2017. *Fundamentals of modern bioprocessing*. CRC Press.
2. Saha, G., Barua, A. and Sinha, S., 2017. *Bioreactors: Animal Cell Culture Control for Bioprocess Engineering*. CRC Press.
3. Biotech, A.P., 2001. *Protein purification handbook*

MB1321 **PROJECT PHASE - I**

L	T	P	C
0	0	12	6

OBJECTIVES

- To Make the students identify a problem/process relevant to their field of interest that can be carried out
- To Make them equipped to search databases and journals to collect relevant data and identify a solution
- To Plan, learn and perform experiments to verify the solution

COURSE OUTCOMES:

At the end of the course students will be able to

CO 1: Identify the field of interest towards research/industrial problems
CO 2: equip the students to search and think about logical solutions

SEMESTER IV

MB1421 **PROJECT PHASE - II**

L	T	P	C
0	0	24	12

OBJECTIVES

1. Train students to analyze a problem/ think innovatively to develop new methods/product /process
2. Make them comprehend how to find solutions/ create products economically and in an environmentally sustainable way
3. Enable them to acquire technical and experimental skills to validate the solution, analyze the results and communicate

COURSE OUTCOMES:

At the end of the project the student will be able to

CO 1: Formulate problems statement for developing new methods/solutions/processes.
CO 2: Plan experiments in a logical manner/ work out sustainability
CO 3: Execute experiments systematically and collect the data.
CO 4: Assess, interpret and communicate the results