

## Department of Electrical and Electronics Engineering

Date: 08.05.2023

### Minutes of Board of Studies Meeting

Board of Studies (BoS) meeting of M.Tech., Power Electronics and Drives programme was conducted on 29.04.2023 in virtual mode from 10.30am to 4.00pm.

All the internal members of VFSTR attended the meeting in person while all the external members participated the meeting virtually with link:

**Zoom Link:**

<https://us06web.zoom.us/j/81486134146?pwd=OWMwa2lNWjFETmYwNW5vam1SbzRZQT09>

**Agenda of the BoS Meeting:**

1. To discuss and finalize the curriculum structure and detailed syllabus of M.Tech., PED Programme for the regulation 2022.
2. To approve the R22 curriculum and syllabus of M.Tech., PED Programme and recommend to the Academic council.
3. Any other points with the permission of Chairperson.

The following members were present either thorough offline or online.

Sl.	Name of the Faculty	Designation & Addresses	Position
1	Dr. Polamraju V.S. Sobhan	Assoc. Professor & HoD	Chairperson
2	Dr. K. Mercy Rosalina	Professor	Member & Dean R&D nominee
3	Dr. M. Umamaheswara Rao	Asst. Professor	Member & Secretary
4	Dr. G. Srinivasa Rao	Professor & Dean R&D	Member
5	Dr. M. Subba Rao	Assoc. Professor	Member
6	Dr. K. Balakrishna	Assoc. Professor	Member
7	Dr. A.R. Vijay Babu	Assoc. Professor	Member
8	Dr. Narasimharaju B. L	Professor Department of Electrical Engineering National Institute of Technology, Warangal - 506004, Telangana, INDIA Phone: 9448401052, 08702462247 Email: blnraju@nitw.ac.in, narasimharaju.bl@gmail.com	Member
9	Dr. Jithendranath J.	Senior Project Engineer, Hitachi Energy Technology Services P Ltd · Grid and Power Quality Solutions 2/4 A Mount Tower Mount Poonamallee Road, Chennai – 600089, Tamil Nadu Mobile: +91-9949537586 Email: jithendranath.j@hitachienergy.com	Member
10	Dr. B. Satish Babu	Sr. Staff Engineer, Sr. Staff Engineer, Infineon Technologies, Bangalore, Phone: 9958006750 Email: satishbabu.bhogineni@infineon.com	Special Invitee

11	DrM.Sarada	Professor, Department of ECE, VFSTR University	Invited Member & School Dean Nominee
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In the beginning of the meeting the Chairperson of the BoS, Dr. Polamraju V.S. Sobhan, Associate Professor and Head, department of EEE welcomed all the members and briefed them about the progress of the Department.

Chairperson presented about the *NEP 2020 Compliant Regulation - R22* which emphasis on creating learning centric (continuous learning and continuous assessment model), offering M.Tech. PED.

The BoS members expressed their highly appreciation and satisfaction about

- Revision in tune with National Education Policy 2020
- the reduction in total credits
- Module wise course syllabus

**The following points were discussed in the BoS meeting:**

1. R22 M.Tech. PED curriculum structure with credits, credits distribution.
2. 2 Modules instead of 5 units.
3. Assessment methods (Formative & Summative).
4. Electives.
5. NPTEL courses offered as Electives

**The following are the views expressed by the external members**

**Dr. Narasimharaju B. L**

- Appreciated introduction of latest courses related to EVs and controllers in curriculum.
- Suggested to include Overview of Semiconductor devices and qualitative analysis of advanced devices like Sic and GaN in Unit-I of Module-I in Power Conversion Technologies course.
- Suggested to include Selective harmonic elimination PWM technique in Unit-II of Module-I in Power Conversion Technologies course.
- Suggested to include BLDC and SRM concepts Unit-II of Module-II in Electric Drives Course.
- Suggested to include Drive cycles and Sizing of components of EVs in Unit-II of Module-I in Electric Vehicles Technology course.
- Suggested to include Stability of converter based on state-space model in UNIT-II Module-I in Switch Mode Power Conversion course.

**Dr. Jithendranath J**

- Appreciated Employment Orientation Program for all specializations of M.Tech in university.
- Suggested to include advanced machine modeling techniques of BLDC, PMSM
- Concepts in Unit-II of Module-II in Modeling and Analysis of Electrical Machines course.
- Suggested to include Luo converter in place of SEPIC converter in UNIT-I Module-II in Optimization Techniques course.
- Suggested to change Module-2 as Module-1 and vice-versa in Smart Grid Technologies course.

**Dr. B. Satish Babu**

- Appreciated the Teaching Assistantship course for M.Tech.
- Suggested to include review of basic concepts of Electric drives in Unit-I of Module-I in Electric Drives Course.
- Suggested to remove specific converter from the Unit-II of Module-I in Switch Mode Power Conversion course.
- Suggested to include basic converter topologies in UNIT-I Module-I in Switch Mode Power Conversion course.
- Suggested to remove Tabu search, NN and Fuzzy, Meta Huristic, Simulated Annealing techniques from Unit-I of Module-II in Switch Mode Power Conversion course.
- Suggested to add Real time applications to soft computing related to power electronics in Soft Computing Techniques course.

All the external BoS members appreciated

- Revision in tune with National Education Policy 2020
- the reduction in total credits
- Module wise course syllabus
- Add on certification courses
- Teaching Assistantship

**The following resolutions made after the discussion:**

- BoS Members approved the curriculum structure, syllabus of M.Tech., PED programme and it follows based on the NEP 2020. Curriculum structure is provided in Appendix-A.
- Major restructuring has taken place in the curriculum which is oriented towards continuous learning and assessment based on Module structure.
- The curriculum is encompassing the courses that enable employability or entrepreneurship or skill development, provided in Appendix- B.
- The significant changes are made in the content of all courses and hence the courses are considered as new courses provided in Appendix- C.
- Total average percentage of syllabus revised was 66% compared to previous curriculum.

Approved the following SWAYAM-NPTEL courses as Electives

- DC Micro grid and Control Systems
- Digital Control in Switched Mode Power Converters and FPGA-based Prototyping
- Smart Grid: Basics to Advanced Technologies
- Sustainable Power Generation Systems
- Deep Learning
- Data Science for Engineers
- C-Based VLSI Design

Based on the suggestions given by the members, the Chairperson of BoS told that, those fruitful suggestions would be incorporated appropriately in the curriculum and syllabi


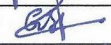
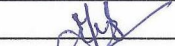



of the regulation R22 and this will be recommended to the Academic Council of VFSTR for the approval.

There being no further points for discussion, the Chairperson thanks all the external, internal, invited members and announced that the meeting was adjourned.

  
Member Secretary

  
Chairperson

The following are the members present for the board of studies meeting held at Department of Electrical and Electronics Engineering on 17.06.2022

Sl. No.	Name of the Member	Designation	Signature
<b>External Members:</b>			
1.	Dr. Narasimharaju B. L	Professor Department of Electrical Engineering National Institute of Technology, Warangal - 506004, Telangana, INDIA Phone: 9448401052, 08702462247 Email: blnraju@nitw.ac.in, narasimharaju.bl@gmail.com	Participated the meeting virtually
2.	Dr. Jithendranath J.	<i>Senior Project Engineer,</i> Hitachi Energy Technology Services P Ltd · Grid and Power Quality Solutions 2/4 A Mount Tower Mount Poonamallee Road, Chennai – 600089, Tamil Nadu Mobile: +91-9949537586 Email :jithendranath.j@hitachienergy.com	
3	Dr. B. Satish Babu	Sr. Staff Engineer, Infineon Technologies, Bangalore, Phone: 9958006750	
<b>Internal Members:</b>			
1	Dr. Polamraju V.S. Sobhan	Associate Professor, &HoD, Dept. of EEE, VFSTR	
12	Dr. G. Srinivasa Rao	Professor, Dept. of EEE, VFSTR	
2.	Dr. K. Mercy Rosalina	Professor, Dept. of EEE, VFSTR	
4.	Dr. M. Subba Rao	Associate Professor, Dept. of EEE, VFSTR	
5.	Dr. K. Balakrishna	Associate Professor, Dept. of EEE, VFSTR	
6	Dr. A.R. Vijay Babu	Associate Professor, Dept. of EEE, VFSTR	

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## Department of Electrical and Electronics Engineering

### APPENDIX - A

#### M.TechPED Programme: Curriculum Structure

### I Year - I Semester

Sl. No.	Course Code	Course Title	L	T	P	C
1		Power Conversion Technologies	2	2	2	4
2		Electric Drives	2	2	2	4
3		Modeling and Analysis of Electrical Machines	2	2	2	4
4		Department Elective - 1	2	-	2	3
5		Department Elective - 2	2	-	2	3
6		Cyber Security	1	2	-	2
7		Employment Orientation Program	-	2	2	2
<b>Grand Total</b>			<b>11</b>	<b>10</b>	<b>12</b>	
			<b>33</b>		<b>22</b>	

### I Year - II Semester

Sl. No.	Course Code	Course Title	L	T	P	C
1		Switch Mode Power Conversion	2	2	2	4
2		Processor Applications in Electrical Engineering	2	2	2	4
3		Department Elective - 3	2	-	2	3
4		Department Elective - 4	2	-	2	3
5		Research Methodology & IPR	-	2	-	2
6		Interdepartmental Project	-	1	3	2
7		Teaching Assistantship	-	-	4	2
<b>Total</b>						<b>20</b>
8		Add-on Certification Course -1	3	-	2	4
<b>Grand Total</b>			<b>11</b>	<b>7</b>	<b>17</b>	
			<b>35</b>		<b>24</b>	

## II Year- I Semesters

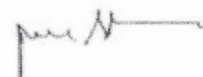
Sl. No.	Course Code	Course Title	L	T	P	C
1		Project / Internship	-	2	24	13
2		Add-on Certification Course - 2 (MOOCs Self Study Course)	4	-	-	4
<b>Grand Total</b>			<b>4</b>	<b>2</b>	<b>24</b>	<b>17</b>

## II Year- II Semesters

Sl. No.	Course Code	Course Title	L	T	P	C
1		Project / Internship	-	2	24	13
2		Add-on Certification Course - 3 (MOOCs Self Study Course)	4	-	-	4
<b>Grand Total</b>			<b>4</b>	<b>2</b>	<b>24</b>	<b>17</b>

## Department Electives Courses

Sl. No.	Course Code	Course Title	L	T	P	C
1		Electric Vehicles Technology	2	-	2	3
2		Optimization Techniques	2	-	2	3
3		Advanced Control Systems	2	-	2	3
4		Energy Audit, Conservation and Management	2	-	2	3
5		Smart Grid Technologies	2	-	2	3
6		Flexible of AC Transmission Systems	2	-	2	3
7		Soft Computing Techniques in Electrical Engineering	2	-	2	3
8		Programmable Logic Controllers	2	-	2	3
9		PV Technologies and Applications	2	-	2	3
10		Energy Storage and Management System	2	-	2	3
11		EV Charging Infrastructure and BMS	2	-	2	3
12		Modelling and Simulation of Electric Vehicles	2	-	2	3
13		Intelligent Transport Systems	2	-	2	3
14		Digital Control of Power Electronics and Drive Systems	2	-	2	3
15		High Voltage DC Transmission	2	-	2	3



**Chairperson**

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## Department of Electrical and Electronics Engineering

### APPENDIX - B

#### List of Courses that Enables Employability or Entrepreneurship or Skill Development

S. No.	Year and Semester	Course Title	Employability / Entrepreneurship / Skill development
1	I Year I Semester	Power Conversion Technologies	Skill development
2	I Year I Semester	Electric Drives	Skill development
3	I Year I Semester	Modeling and Analysis of Electrical Machines	Skill development
4	I Year I Semester	Cyber Security	Skill development
5	I Year I Semester	Employment Orientation Program	Employability
6	I Year II Semester	Switch Mode Power Conversion	Employability
7	I Year II Semester	Processor Applications in Electrical Engineering	Skill development
8	I Year II Semester	Research Methodology & IPR	Skill development
9	I Year II Semester	Interdepartmental Project	Employability
10	I Year II Semester	Teaching Assistantship	Employability
11	II Year	Project	Employability
12	II Year	Internship	Employability
13	Department Electives	Electric Vehicles Technology	Entrepreneurship
14	Department Electives	Optimization Techniques	Skill development
15	Department Electives	Advanced Control Systems	Skill development
16	Department Electives	Energy Audit, Conservation and Management	Entrepreneurship
17	Department Electives	Smart Grid Technologies	Skill development
18	Department Electives	Flexible of AC Transmission Systems	Skill development
19	Department Electives	Soft Computing Techniques in Electrical Engineering	Employability
20	Department Electives	Programmable Logic Controllers	Skill development
21	Department Electives	PV Technologies and Applications	Entrepreneurship
22	Department Electives	Energy Storage and Management System	Employability
23	Department Electives	EV Charging Infrastructure and BMS	Employability
24	Department Electives	Modelling and Simulation of Electric Vehicles	Skill development
25	Department Electives	Intelligent Transport Systems	Entrepreneurship
26	Department Electives	Digital Control of Power Electronics and Drive Systems	Skill development
27	Department Electives	High Voltage DC Transmission	Skill development

**Chairperson**



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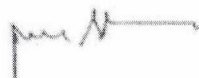
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## Department of Electrical and Electronics Engineering

### APPENDIX - C

#### List of New Courses in the R22 Curriculum

S. No.	Year and Semester	Course Title
1	I Year I Semester	Power Conversion Technologies
2	I Year I Semester	Electric Drives
3	I Year I Semester	Modeling and Analysis of Electrical Machines
4	I Year I Semester	Cyber Security
5	I Year I Semester	Employment Orientation Program
6	I Year II Semester	Switch Mode Power Conversion
7	I Year II Semester	Processor Applications in Electrical Engineering
8	I Year II Semester	Research Methodology & IPR
9	I Year II Semester	Interdepartmental Project
10	I Year II Semester	Teaching Assistantship
11	II Year	Project
12	II Year	Internship
13	Department Electives	Electric Vehicles Technology
14	Department Electives	Optimization Techniques
15	Department Electives	Advanced Control Systems
16	Department Electives	Energy Audit, Conservation and Management
17	Department Electives	Smart Grid Technologies
18	Department Electives	Flexible of AC Transmission Systems
19	Department Electives	Soft Computing Techniques in Electrical Engineering
20	Department Electives	Programmable Logic Controllers
21	Department Electives	PV Technologies and Applications
22	Department Electives	Energy Storage and Management System
23	Department Electives	EV Charging Infrastructure and BMS
24	Department Electives	Modelling and Simulation of Electric Vehicles
25	Department Electives	Intelligent Transport Systems
26	Department Electives	Digital Control of Power Electronics and Drive Systems
27	Department Electives	High Voltage DC Transmission

  
Chairperson



## Department of Electrical and Electronics Engineering

### APPENDIX - D List of New Courses in the R22 Curriculum

S. No.	Year and Semester	Course Title	Employability / Entrepreneurship / Skill development
1	I Year I Semester	Power Conversion Technologies	60%
2	I Year I Semester	Electric Drives	20%
3	I Year I Semester	Modeling and Analysis of Electrical Machines	25%
4	I Year I Semester	Cyber Security	100%
5	I Year I Semester	Employment Orientation Program	60%
6	I Year II Semester	Switch Mode Power Conversion	55%
7	I Year II Semester	Processor Applications in Electrical Engineering	50%
8	I Year II Semester	Research Methodology & IPR	50%
9	I Year II Semester	Interdepartmental Project	100%
10	I Year II Semester	Teaching Assistantship	100%
11	II Year	Project	50%
12	II Year	Internship	50%
13	Department Electives	Electric Vehicles Technology	100%
14	Department Electives	Optimization Techniques	50%
15	Department Electives	Advanced Control Systems	50%
16	Department Electives	Energy Audit, Conservation and Management	100%
17	Department Electives	Smart Grid Technologies	50%
18	Department Electives	Flexible of AC Transmission Systems	40%
19	Department Electives	Soft Computing Techniques in Electrical Engineering	100%
20	Department Electives	Programmable Logic Controllers	20%
21	Department Electives	PV Technologies and Applications	100%
22	Department Electives	Energy Storage and Management System	100%
23	Department Electives	EV Charging Infrastructure and BMS	100%
24	Department Electives	Modelling and Simulation of Electric Vehicles	100%
25	Department Electives	Intelligent Transport Systems	100%
26	Department Electives	Digital Control of Power Electronics and Drive Systems	20%
27	Department Electives	High Voltage DC Transmission	20%

Chairperson

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Slides Outline

School of Electrical, Electronics and Communication Engineering (SEEC)

Department of Electrical and Electronics Engineering

Dr. Polamraju, V.S. Sobhan  
Associate Professor and Head  
Department of Electrical and Electronics Engineering

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Narasimharaju B L  
Jithendranath J  
Satish  
Satish  
Dr G Srinivasarao  
Dr G Srinivasarao

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4	Analyse the operation of PMUS, PDCS, WAMS	Analyse	2	1.2,3,4
5	Analyse the functionalities of SCADA and	Analyse	2	1.2,4

**TEXT BOOKS:**

1. Stuart Borlase. "Smart Grids, Infrastructure, Technology and Solutions", CRC Press, 2013.
2. Ali Keyhani. "Design of Smart Power Grid Renewable Energy Systems", Wiley IEEE, 1st Edition, 2011.

**REFERENCE BOOKS:**

1. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong, Wu, Akihiko Yokoyama and Nick Jenkins. "Smart Grid: Technology and Applications", Wiley, 2012.
2. James Momoh. "Smart Grid: Fundamentals of Design and Analysis", Wiley, IEEE Press, 2012.
3. A.G. Phadke and J.S. Thorp. "Synchronized Phasor Measurements and their Applications", Springer, 2010.

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**TYPES OF CHARGERS.**  
 AC charging and DC charging - On board and off board charger specification - Type of Mode of charger Mode 2, Mode 3 and Mode 4 - EVSE associated charging time calculation - Selection and sizing of fast and slow charger (AC & DC) - AC Pile Charger, DC Pile Charger.

**PRACTICES:**

- Slow charger design rating.
- Fast charger design rating.
- EVSE associated charge times calculation.

**MODULE-2**

**UNIT-1** **12L+8T+0P=20 Hours**  
**EVSE COMMUNICATION:**  
 Power Module selection and technical specification - Selection of EVSE Communication Protocol (PLC / Ethernet / Modbus/ CAN Module ) - Communication gateway - Specification of open charge point protocol (OCCP 1.6/2.0) - Bharat DC001 & AC001 Charger specification - Communication Interface between charger and CMS ( Central Management System) - Payment apps.

**UNIT-2** **12L+8T+0P=20 Hours**  
**CHARGING COMMUNICATION:**  
 Selection of AC charger type-1, type -2 and type -3 - Communication between AC charger and EV - Selection of DC charger connector GB/T, CHAdeMO, CCS-1 and CSS-2 - Communication methodology of DC fast chargers.

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**6. FLEXIBLE AC TRANSMISSION SYSTEMS**

L	T	P	C
2	-	2	3

**PREREQUISITE KNOWLEDGE:** Electrical circuit Analysis, Power Transmission and Distribution, Power Electronics.

**COURSE DESCRIPTION AND OBJECTIVES:**  
 This course deals with the fundamental concepts of FACTS technology which are emerging in the area of power systems. The objective of this course is to understand the role of FACTS technology in delivering quality power at bulk levels.

**MODULE - 1**

**UNIT-1** **8L+8T+0P=16 Hours**  
**POWER FLOW IN AC SYSTEMS:**  
 Introduction - Power Flow in AC Systems, Loading capability Limits, Dynamic stability considerations, controllable parameters, basic types of FACTS controllers.

**UNIT-2** **8L+8T+0P=16 Hours**  
**VOLTAGE SOURCE CONVERTERS:**  
 Single phase and 3-phase full wave bridge converters, transformer connections for 12, 24, 48 pulse operation, 3 level voltage source converters, PWM converters.

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