

**Department of Electrical and Electronics Engineering****Minutes of 2nd Board of Studies Meeting (UG)**

The Second Board of Studies meeting of Electrical and Electronics Engineering Department was held on 31st March 2021 at 10:00 A.M in the Seminar Hall, Department of EEE, Sri Manakula Vinayagar Engineering College, with Head of the Department in the Chair.

The following members were present for the BoS meeting

SI.No	Name of the Member with Designation and official Address	MEMBERS AS PER UGC NORMS
1	Dr.S.Anbumalar Professor and Head Department of EEE SMVEC, Madagadipet-605107	Chairman
2	Dr.A.Kavitha Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (University Nominee)
3	Dr. P. Lakshmi Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (Academic Council Nominee)
4	Dr. J. Kanakaraj Professor and Head Department of EEE PSG College of Technology (Autonomous) Coimbatore – 641 004.	Subject Expert (Academic Council Nominee)
5	Er.S. Selva Kumar, B.Tech. Senior Engineer Qualcomm India Private Limited Bengaluru, Karnataka - 560001	Representative from Industry
6	Er.K.Ramraj Technical Director LED FORSE India Poornankuppam Puducherry – 605 007.	Postgraduate Alumnus (nominated by the Principal)
7	Dr. P. Jamuna Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member
8	Dr.D.Raja Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member

9	Dr.M.Susithra Associate Professor Department of EEE,SMVEC , Madagadipet-605107	Internal Member
10	Dr.S.Ganesh Kumaran Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member
11	Mrs. T. Gayathiri Professor and Head Dept of Mathematics,SMVEC, Madagadipet-605107	Internal Member
12	Dr.K.Kathikeyan Associate Professor Dept. of Chemistry, SMVEC, Madagadipet-605107	Internal Member
13	Mrs.G.Namita Associate Professor Dept. of English, SMVEC Madagadipet-605107,	Internal Member
14	Dr.D.Mohan Radheep Associate Professor Dept. of Physics, SMVEC, Madagadipet-605107	Internal Member
15	Mr. A. Janagiraman Assistant Professor Department of EEE,SMVEC, Madagadipet-605107	Internal Member

Agenda of the Meeting

- 1) Confirmation of minutes of 1st BoS meeting and the Curriculum Structure of B.Tech Electrical and Electronics Engineering of R-2019 and R-2020 Regulations – Modifications if any.
- 2) To apprise about the Pondicherry University **Regulations R-2013, its curriculum and syllabi followed for** the Present B.Tech., Electrical and Electronics Engineering, Fourth year students admitted in the academic Year 2017-18 and Third Year students admitted in the academic Year 2018-19.
 - ❖ Examination and Evaluation - SMVEC Autonomous System
- 3) To discuss and approve the proposed Curriculum structure and syllabi of III year, V and VI semesters, under Autonomous Regulations (i) R-2019 (ii) R-2020 for the B.Tech – Electrical and Electronics Engineering students admitted in the Academic Year 2019-20 and 2020-2021 respectively.
 - ❖ Credit Requirement
 - ❖ Course structures
 - ❖ Professional Core Courses
 - ❖ Professional Elective Courses
 - ❖ Open Electives offered to other departments
- 4) To discuss and approve the Eligible Diploma Programmes for the Lateral entry students admission into Second year under Autonomous Regulations R-2020 for the B.Tech – Electrical and Electronics Engineering programme.
- 5) To discuss and approve the revised Vision, Mission, Programme Educational Objectives and Programme Specific Outcomes of the department.
- 6) To discuss and approve Academic Calendar for the Even Semester of Academic year 2020-21.
 - ❖ Online classes are scheduled for I, II, III & IV years since 27.03.2021 onwards.
- 7) To discuss about the uniqueness of the Curriculum
 - ❖ Employability Enhancement Course

- Artificial Intelligence, E-plan Electric P-8, Ansys Multiphysics
- ❖ Skill Development Courses- Foreign language /IELTS
- ❖ NPTEL/MOOC Courses
- ❖ Indian Constitution, Essence of Indian traditional knowledge etc are introduced as Mandatory courses
- ❖ Statistical laboratory

8) To discuss and recommend the panel of examiners to the Academic Council.

Minutes of the Meeting

Dr.S.Anbumalar, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal members and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

Item:1 Chairman, BoS, appraised the minutes of 1st BoS (**Given in Annexure I**), its implementation and then it is confirmed with the approval for the incorporation of minor revisions needed as mentioned below.

- The case study and applications in all five units of the course “Electric circuit Analysis” are difficult for the students to understand and hence it can be removed.
 - ✓ The above corrections are incorporated in the “Electric circuit Analysis” course as per the suggestion of BoS members.
- The course content in “Power electronics and drives” is vast and it will be difficult to complete the syllabus within 60 hours. Hence, it can be separated into two courses, namely 1. Power Electronics and 2. Electric drives.
 - ✓ The course “Power Electronics” is retained in fifth semester of R-2019 curriculum and in sixth semester of R-2020 curriculum. Whereas the course “Electric drives” is included as a Professional Elective course in semester VI for both the Regulations by replacing the courses “Advanced Control Systems (U19EEE65)” and “Modern Power Electronic Converters (U20EEE613)” in R-2019 and R-2020 regulations respectively.

The above corrections are approved by BoS members and the details are given in Annexure- II and III.

Item:2 Chairman, BoS, appraised about the Pondicherry University Regulations R-2013, its curriculum and syllabi followed for the present B.Tech – Electrical and Electronics Engineering, Fourth year students admitted in the Academic Year 2017-18 and Third year students admitted in the Academic Year 2018-19.

- ❖ Examination and evaluation – SMVEC Autonomous system.

The BoS noted the Agenda.

Item:3 The SMVEC Autonomous Regulations R-2019, R-2020, its curriculum for 1 to 8 semesters and syllabi for 5th and 6th semesters, for B.Tech – Electrical and Electronics Engineering were **discussed and** the following comments were given by BoS members.

Sl. No	Subject / general point	Comments
1.	*Control system	<ul style="list-style-type: none"> • Mason Gain Formula can be removed • Other systems in Electrical analogous can be removed • Steady state error may be mentioned as error analysis • Stability analysis may be rearranged after error analysis

		<ul style="list-style-type: none"> •Effects of movement of poles and zeros can be removed • Root locus: Construction and Interpretation may be mentioned as Root locus Techniques •Relative stability analysis, gain and Phase margin can be removed •Selection of controller can be removed •Compensation techniques using root locus can be removed
2.	*Control Systems Lab	<ul style="list-style-type: none"> •Chemical process can be removed •PMDC can be replaced by DC motor •Simulation platform can be removed in the experiment titles. •Determination of transfer function of a motor can be added.
3.	*Power Electronics and drives	Power electronics and drives course have to be separated into two subjects 1. Power Electronics 2. Electric Drives
4.	*Power Electronics and drives Lab	<ul style="list-style-type: none"> •Remove the experiment on solid state relay, can be combined to any other experiments •The experiment “Designs of IGBT based PWM inverter” can be reframed like study of single phase and three phase IGBT based PWM inverter. •Verification of 120° and 180° modes of operation of Inverters can be removed •The following experiments from the control system lab can be added in power electronics and drives lab <ol style="list-style-type: none"> 1. Speed control of Inverter fed Induction motor. 2. Study of microcontroller based BLDC Motor Drive.
5.	* Electrical Machine Design	<ul style="list-style-type: none"> •Have to add the design of lap and wave winding in the second unit instead of first unit. •Have to remove the design of computer based design concepts in the all units and may be added separately in last unit. •Have to remove the portion of leakage in armature in first unit.
6.	Special Electrical Machines	Specific Applications has been removed from all units.
7.	* Transmission and Distribution	<ul style="list-style-type: none"> •“One line diagram” can be replaced by “single line diagram” in the first unit. •Current and voltage calculation in DC distributor can be removed from the first unit •. MATLAB software package can be removed. •Shunt and series compensation topics can be removed from the third unit. •Fifth unit syllabus can be rearranged
8.	* Measurements And Instrumentation Lab	<ul style="list-style-type: none"> •Measurement of Insulation resistance using megger can be specified •The experiment “spectrum analysis of periodic and non-periodic signals” can be moved to power electronics and drives lab.

9.	* Electrical Energy Audit And Conservation	<ul style="list-style-type: none"> • In unit II, rename “Case studies on energy efficient motors” as “energy efficient motors” • In unit II, remove “feasibility of cogeneration” • In unit IV, power analyzer can be moved in front of metering techniques • In unit V, include tariff. HVAC and energy management may be moved to unit 2; economic justification may be coined as economic analysis of various power systems
10.	*High Voltage Engineering	<ul style="list-style-type: none"> • Applications in Unit 1 can be removed • “High voltage laboratory layout” topic can be removed from unit V.
11.	*Utilization Of Electrical Energy	<ul style="list-style-type: none"> • In Unit IV, lighting scheme can be removed. • In Unit V, the Green building concept can be included.
12.	*Digital Signal Processing	<ul style="list-style-type: none"> • Remove application in all the units. • Remove introduction to MATLAB topic and Programming and realization using MATLAB topics in unit 5
13.	*Smart Grid	<ul style="list-style-type: none"> • Performance and stability analysis in smart grid can be included in unit 4 • The case study in unit 3 can be removed • The topics “Fault current limiting Shunt compensation, D-STATCOM, Active filtering, Shunt compensator with energy storage” can be removed from unit 5
14.	*Renewable Energy Sources	<ul style="list-style-type: none"> • In unit 2, elementary design principle can be removed • In unit 3, the chapter name can be changed to Alternate energy sources. • In unit 4, voltage flicker can be changed to power quality issues. • In unit 5, carbon contents can be added
15.	*Industrial Electrical System	<ul style="list-style-type: none"> • unit-1 heading can be changed to Electrical control components • unit-IV heading can be changed to industrial installation components • unit V heading can be changed to Industrial Automation
16.	*Power System Analysis	<ul style="list-style-type: none"> • Unit-III – the topics can be rearranged • Unit-V Order has to be changed
17.	*Power System Analysis Lab	<ul style="list-style-type: none"> • The software name MATLAB/SIMULINK can be removed • The experiment “Short circuit studies of Power System” can be removed • The experiment “Modeling of a SMIB and Multi-machine power systems” may be able to be modified as a study experiment. • The following experiments can be removed <ol style="list-style-type: none"> 1. Modeling of a SMIB and Multi-machine power systems 2. Study of Power System Transient Stability

18.	*Automotive Electronics For Electrical Engineering	<ul style="list-style-type: none"> •Unit II: Check Fuel injection for petrol and diesel •Unit IV : Remove software tool MATLAB, Simulink and SIMSCAPE tool
19.	Fuzzy And Neural Systems	<ul style="list-style-type: none"> • The application for Fuzzy Logic Controls for Electrical systems can be specified • The application for ANN can be specified.
20.	*Microprocessor and Microcontrollers	<ul style="list-style-type: none"> • The AVR ATmega microcontroller can be replaced by PIC microcontroller

***The Courses are common for both R2019 and R2020 Regulations. The above corrections are incorporated and the Syllabi (Given in Annexure-IV) are approved by the BoS members.**

Item:4 The Eligible Diploma Programmes for the Lateral entry students admission into Second year B.Tech – Electrical and Electronics Engineering programme under Autonomous Regulations 2020 were **discussed and approved by the BoS members.**

The Diploma programmes eligible for B.Tech (EEE) admission are

- Electrical Engineering
- Electrical and Electronics Engineering
- Electronics and Instrumentation Engineering
- Instrumentation Engineering/Technology
- Electronics and Communication Engineering.
- Electronics Engineering
- Medical Electronics
- Instrumentation and Control Engineering
- Applied Electronics

Item:5 The Vision, Mission, Programme Educational Objectives and Programme Specific Outcomes of Electrical and Electronics Engineering department are revised and presented in the 2nd BoS meeting. It was **approved by BoS members and the statements are given in Annexure- V.**

Item:6 The Academic Calendar for the Even Semester of Academic year 2020-21(**given in Annexure-VI**) were **discussed and approved.**

- The classes are scheduled in the online mode for I, II, III & IV years since 27.03.2021 onwards.

Item:7

The uniqueness of the Curriculum such as Employability Enhancement Course, Foreign language /IELTS as a Skill Development Courses, NPTEL/MOOC Courses, Mandatory courses etc, **were discussed by the BoS members.**

- Employability Enhancement Course for the semester I to VI are

Sl.NO	Semester	Batch	Course Planned
1	I SEM	Batch -1	AutoCAD for Electrical
2		Batch -2	Python Programming
3	II SEM	Batch -1	Python Programming
4		Batch -2	AutoCAD for Electrical
5	III SEM	Batch -1	Design and Documentation using ePLAN Electric P8
6		Batch -2	ANSYS -Multiphysics
7	IV SEM	Batch -1	ANSYS -Multiphysics
8		Batch -2	Design and Documentation using ePLAN Electric P8
9	V SEM	Batch -1	DigSILENT Power Factory
10		Batch -2	Artificial Intelligence and Edge Computing
11	VI SEM	Batch -1	Artificial Intelligence and Edge Computing
12		Batch -2	DigSILENT Power Factory

- Foreign languages suggested to the students are
 - Japanese
 - French
 - Germany
- NPTEL/MOOC Courses suggested to the students are



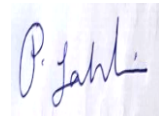




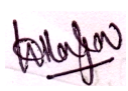



S.No	YEAR/SEM	Course Name	Duration of the course
1	II/IV	Digital Electronic Circuits	12 Weeks
		Fundamentals of Semiconductor Devices	12 Weeks
2	III/VI	Fuzzy sets, Logic and systems & Applications	12 Weeks
		Sensors and Actuators	12 Weeks
2	IV/VIII	Power System Engineering	12 Weeks
		Recent Advances in Transmission Insulator	4 Weeks



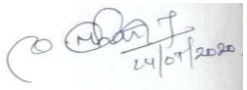

- Mandatory courses included in semester V and VI are
 - Indian Constitution
 - Essence of Indian traditional knowledge
 - Professional Ethics

Item:8

The list of question paper setters and Evaluators **(given in Annexure-VII)** was presented and recommended by the BoS members to the academic council.

The meeting for III year syllabi approval was concluded at 2:00 PM by **Dr. S.Anbumalar**, Chairman, Board of Studies, Department of Electrical and Electronics Engineering, Sri Manakula Vinayagar Engineering College.

Sl.No	Name of the Member with Designation and official Address	MEMBERS AS PER UGC NORMS	Signature
1	Dr.S.Anbumalar Professor and Head Department of EEE SMVEC, Madagadipet-605107	Chairman	
2	Dr.A.Kavitha Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (University Nominee)	
3	Dr. P. Lakshmi Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (Academic Council Nominee)	
4	Dr. J. Kanakaraj Professor & Head Department of EEE PSG College of Technology (Autonomous) Coimbatore – 641 004.	Subject Expert (Academic Council Nominee)	
5	Er.S. Selva Kumar, B.Tech. Senior Engineer Qualcomm India Private Limited Bengaluru, Karnataka - 560001	Representative from Industry	
6	Er.K.Ramraj Technical Director LED FORSE India Poornankuppam Puducherry – 605 007.	Postgraduate Alumnus (nominated by the Principal)	
7	Dr. P. Jamuna Professor Department of EEE, SMVEC	Internal Member	
8	Dr.D.Raja Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	
9	Dr.M.Susithra Associate Professor Department of EEE, SMVEC , Madagadipet-605107	Internal Member	
10	Dr.S.Ganesh Kumaran Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	
11	Dr.T.Gayathri Professor and Head	Internal Member	

	Dept of Mathematics, SMVEC, Madagadipet-605107		
12	Dr.K.Kathikeyan Associate Professor Dept. of Chemistry, SMVEC, Madagadipet-605107	Internal Member	
13	Mrs.G.Namita Associate Professor Dept. of English, SMVEC Madagadipet-605107,	Internal Member	
14	Dr.D.Mohan Radheep Associate Professor Dept. of Physics, SMVEC, Madagadipet-605107	Internal Member	
15	Mr. A. Janagiraman Assistant Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	

Annexure – I

Minutes of 1st Board of Studies Meeting (BoS)

**Department of Electrical and Electronics Engineering****Composition of Board of Studies**

SL.NO.	MEMBERS AS PER UGC NORMS	MEMBERS NOMINATED
1.	Head of the Department concerned (Chairman)	Dr.S.Anbumalar, M.E., Ph.D., Professor and Head/EEE/SMVEC
2.	Entire faculty of each specialization	1. Dr. K. Suresh , M.E., Ph.D., Professor/EEE/SMVEC 2. Dr.P.Jamuna, M.Tech., Ph.D., Professor/EEE/SMVEC 3. Dr.M.Susithra, M.E., Ph.D., Associate Professor/EEE/SMVEC 4. Dr.S.GaneshKumaran, M.E., Ph.D., Associate Professor/EEE 5. Mrs.M.Sugasini Assistant Professor, Dept. of Mathematics, SMVEC 6. Dr.K.Kathikeyan Associate Professor, Dept. of Chemistry, SMVEC 7. Mrs.G.Namita Associate Professor, Dept. of English, SMVEC 8. Dr.D.Mohan Radheep Associate Professor ,Dept. of Physics, SMVEC
3.	Two experts in the subject from outside the college nominated by the Academic Council	1.Dr. J. Kanakaraj, M.E., Ph.D., Professor & Head, Department of EEE , PSG College of Technology (Autonomous) Coimbatore – 641 004. 2.Dr. P. Lakshmi,M.E., Ph.D., Professor, Department of EEE, College of Engineering, Guindy, Anna University, Chennai. 600 025.
4.	One Expert nominated by the Vice Chancellor from a panel of six recommended by the college Principal	Dr.A.Kavitha,M.Tech., Ph.D Professor, Department of EEE, College of Engineering Guindy, Anna University, Chennai-600025
5	One representative from industry / corporate sector/allied area relating to placement	Er.S. Selva Kumar, B.Tech. Validation Engineer Infineon Technologies India Private Limited Bengaluru, Karnataka - 560001
6	One Post Graduate meritorious alumnus nominated by the Principal	Er.K.Ramraj,M.Tech Technical Director, LED FORSE India, Poornankuppam,Puducherry – 605 007.



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



Department of Electrical and Electronics Engineering

Minutes of 1st Board of Studies Meeting (UG)

The first Board of Studies meeting of Department of Electrical and Electronics Engineering was held on 18th July 2020 at 11:00 A.M in the Seminar Hall, Department of EEE, Sri Manakula Vinayagar Engineering College, with Head of the Department in the Chair.

The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	MEMBERS AS PER UGC NORMS
1	Dr.S.Anbumalar Professor and Head Department of EEE SMVEC, Madagadipet-605107	Chairman
2	Dr.A.Kavitha Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (University Nominee)
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5	Er.S. Selva Kumar, B.Tech. Validation Engineer Infineon Technologies India Private Limited Bengaluru, Karnataka - 560001	Representative from Industry
6	Er.K.Ramraj Technical Director LED FORSE India Poornankuppam Puducherry – 605 007.	Postgraduate Alumnus (nominated by the Principal)
7	Dr. K. Suresh Professor Department of EEE, SMVEC	Internal Member
8	Dr. P. Jamuna Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member

9	Dr.M.Susithra Associate Professor Department of EEE,SMVEC , Madagadipet-605107	Internal Member
10	Dr.S.GaneshKumaran Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member
11	Mrs.M.Sugasini Assistant Professor Dept of Mathematics,SMVEC, Madagadipet-605107	Internal Member
12	Dr.K.Kathikeyan Associate Professor Dept. of Chemistry, SMVEC, Madagadipet-605107	Internal Member
13	Mrs.G.Namita Associate Professor Dept. of English, SMVEC Madagadipet-605107,	Internal Member
14	Dr.D.Mohan Radheep Associate Professor Dept. of Physics, SMVEC, Madagadipet-605107	Internal Member
15	Mr.D.Raja Associate Professor Department of EEE,SMVEC, Madagadipet-605107	Internal Member
16	Mr. A. Janagiraman Assistant Professor Department of EEE,SMVEC, Madagadipet-605107	Internal Member

Agenda of the Meeting

- 1) To apprise and approve the Pondicherry University **Regulations R2013**, its curriculum for 1 to 8 semesters and syllabi for 1 to 8 semesters for the Present B.Tech., Electrical and Electronics Engineering, Fourth year students admitted in the academic Year 2017-18 and Third Year students admitted in the academic Year 2018-19.
 - ❖ Examination and Evaluation-SMVEC Autonomous System
- 2) To discuss and approve the SMVEC Autonomous Regulations R2019, its curriculum for 1 to 8 semesters and syllabi for 1 to 4 semesters from the Academic Year 2020-21 onwards, for B.Tech – Electrical and Electronics Engineering students admitted in the Academic Year 2019-20(present Second Year)
 - ❖ Credit Requirement
 - ❖ Course structures
 - ❖ Professional Core Courses
 - ❖ Professional Elective Courses
 - ❖ Open Electives offered to other departments
 - ❖ Employment Enhancement Courses
 - ❖ AICTE – Mandatory Courses
- 3) To discuss and approve the SMVEC Autonomous Regulations R2020, its curriculum for 1 to 8 semesters and syllabi for 1 to 4 semesters , for B.Tech – Electrical and Electronics Engineering students admitted from the Academic Year 2020-21 onwards
 - ❖ Credit Requirement
 - ❖ Course structures
 - ❖ Professional Core Courses
 - ❖ Professional Elective Courses
 - ❖ Open Electives offered to other departments
 - ❖ Employment Enhancement Courses
 - ❖ AICTE – Mandatory Courses

- 4) To discuss about the uniqueness of the Curriculum
 - ❖ Employability Enhancement Course introduced from I to VI semesters
 - ❖ Skill oriented Courses
 - ❖ Multidisciplinary courses
 - ❖ Human values, Ethics, NSS, Physical Education etc. are introduced as Mandatory courses
 - ❖ Optimization laboratory
 - ❖ Entrepreneurship development courses
- 5) To discuss and approve Evaluation Systems
 - ❖ Mark weightage for Continuous Assessment and End Semester Examination
 - ❖ Question paper pattern
 - ❖ Marks requirement to pass the course
 - ❖ Semester Grade Point Average (SGPA), Cumulative Grade Point Average (CGPA) and Percentage Conversion
 - ❖ Classification of Degree
- 6) To discuss and approve the Innovative Teaching Practices/Methodology, Training to be adopted to handle the emerging / Advanced Technological concept courses
- 7) To discuss and recommend the panel of examiners to the academic council
- 8) Any other item with the permission of chair
 - ❖ To suggest Exam fee and Remuneration to the examiners

Minutes of the Meeting

Dr.S.Anbumalar, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal members and thanked them for accepting to become the member of the Board of Studies and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

Item:1 The Pondicherry University **Regulations R2013**, its curriculum for 1 to 8 semesters and syllabi for 1 to 8 semesters for the B.Tech., Electrical and Electronics Engineering were **discussed and approved** for the Fourth year students admitted in the academic Year 2017-18 and Third Year students admitted in the academic Year 2018-19. It has also been approved to conduct Examination and Evaluation by SMVEC Autonomous System.

Item:2 The SMVEC Autonomous Regulations R2019, its curriculum for 1 to 8 semesters and syllabi for 1 to 4 semesters, for B.Tech – Electrical and Electronics Engineering were **discussed**.

The following comments were given by BoS members for the Autonomous R2019 Regulations:

Sl. No	Subject / general point	Comments
Comments for curriculum of R-2019 Regulations		
1.	*NPTEL courses	NPTEL courses need not be a mandatory course. It will be difficult for the average students to complete the course.
2.	*Project work	• Give equal weightage to all 3 reviews
Comments for syllabi of R-2019 Regulations		
3.	*Electrical Machines –I	<ul style="list-style-type: none"> • Combine Single phase and three phase transformer. • Combine DC motor and DC generator • Testing of Transformer can be in a separate unit

		<ul style="list-style-type: none"> • Testing of generator can be in a separate unit • Remove the application of DC generator. • Three phase test can be added in the syllabus with vector diagrams.
4.	* Electrical Machines -I Lab	<ul style="list-style-type: none"> • Give equal weightage to transformer and dc machines experiments
5.	Electronic Devices and Circuits	<ul style="list-style-type: none"> • Reduce the syllabus • Change Unit title as Opto electronic devices <p>Remove the semiconductor portion which the students studied already in 12th standard to reduce the bulkiness of the syllabus</p> <p>Use of Specification sheet can be mentioned explicitly.</p> <p>If possible advanced devices can be added in the syllabus</p>
6.	Electronics Lab	Remove the words “verify its performance characteristics” in relaxation oscillator experiment
7.	*Electrical Machines – II	<p>Certain changes needed in unit 5</p> <p>The sequence can be Construction and Operation of special machines, and then applications</p> <ul style="list-style-type: none"> • Unit- I – Single phase and three phase machine can be combined
8.	*Electrical Machines -II Lab	<ul style="list-style-type: none"> • Load test can be combined • Experiments 3 and 5 can be combined • Types of Braking can be included
9.	*Electric Circuit Analysis Lab	Remove the software name” MATLAB” in experiments so that any software can be used based on need
10.	*Linear Integrated Circuits	<p>Use some short form in the syllabus like S&H, Vto I / I to V</p> <p>Syllabus is heavy, hence reduce it.</p>
11.	*Power plant Engineering	Some topics in Unit 5 can be corrected to focus more on power plant economics
12.	*Linear Integrated Circuits Lab	<p>Modify the experiment name as Application of IC TPS40200</p> <p>Experiments 11 and 12 can be a study experiments</p>
13.	Special Electrical Machines	This elective paper can be floated in higher semester

***The Courses are common for both R2019 and R2020 Regulations**

The above corrections are incorporated and the updated version of Curriculum and Syllabi under R2019 Autonomous Regulations is approved by the BoS members for the students admitted in the Academic Year 2019-20(present Second Year) from the Academic Year 2020-21 onwards.

Item:3 The SMVEC Autonomous Regulations R2020, its curriculum for 1 to 8 semesters and syllabi for 1 to 4 semesters, for B.Tech – Electrical and Electronics Engineering, were discussed. The various points related to Credit Requirement, Course structure, Professional Core Courses, Professional Elective Courses, and Open Electives offered to other departments, Employment Enhancement Courses and AICTE – Mandatory Courses etc., were discussed.


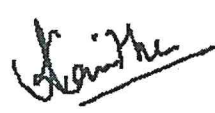
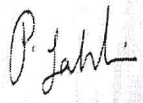

The following comments were given by BoS members for the Autonomous R2020 regulation

Sl.No	Subject / general point	Comments
Comments for syllabi of R-2020 Regulations		
1.	Electrical Engineering Lab	Winding of Transformer and Energy Audit experiments can be converted into Study experiments because it will be difficult for the students to do in first year level. In Troubleshooting experiments– two case study is enough instead of five.
2.	Measurements and instrumentation	Syllabus is Heavy, to reduce it <ul style="list-style-type: none"> • Remove magnetic measurements • Change the electronic measuring instruments unit title as digital instruments • Change unit IV title as Bridges • Remove storage devices and dot matrix • Remove interfacing and Level detection ;its level is high • Modify unit 5 only as Transducers ;remove data acquisition
3.	Micro controller and its applications	Remove the following topics <ul style="list-style-type: none"> • PF corrections ;It is heavy • BLDC should be in the drives paper • Experiments 8 and 17,it is heavy • Verify that the ICs are available in the market • Remove power electric application topics

The above corrections are incorporated in the updated version of SMVEC Autonomous Regulations R2020, its curriculum & Syllabi and approved by the BoS members for the students admitted from the Academic Year 2020-21 onwards.

Item:4	The uniqueness of the Curriculum such as Employability Enhancement Courses, Skill oriented Courses, Multidisciplinary courses, Human values, Ethics, NSS, Physical Education, Optimization laboratory and Entrepreneurship development courses etc., were discussed by the BoS members.
Item:5	The Examination and Evaluation Systems related items such as Mark weightage for Continuous Assessment & End Semester Examination, Question paper pattern, Marks requirement to pass the course, Semester Grade Point Average (SGPA), Cumulative Grade Point Average (CGPA) & Percentage Conversion and Classification of Degree etc., were discussed and approved by the BoS.
Item:6	The Innovative Teaching Practices/Methodology, Training to be adopted to handle the emerging / Advanced Technological concept courses were discussed and approved
Item:7	The panel of examiners was presented and recommended to the academic council by the BoS.
Item:8	Any other item with the permission of chair ❖ The BoS members stated that the Exam fee and Remuneration to the examiners can be fixed by the college based on its financial condition.

The meeting for U.G Regulations approval was concluded at 2:30 PM by **Dr. S.Anbumalar**, Chairman, Board of Studies, Department of Electrical and Electronics Engineering, Sri Manakula Vinayagar Engineering College.

Sl.No	Name of the Member with Designation and official Address	MEMBERS AS PER UGC NORMS	Signature
1	Dr.S.Anbumalar Professor and Head Department of EEE SMVEC, Madagadipet-605107	Chairman	
2	Dr.A.Kavitha Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (University Nominee)	
3	Dr. P. Lakshmi Professor Department of EEE College of Engineering Guindy Anna University Chennai. 600 025.	Subject Expert (Academic Council Nominee)	
4	Dr. J. Kanakaraj Professor & Head Department of EEE PSG College of Technology (Autonomous) Coimbatore – 641 004.	Subject Expert (Academic Council Nominee)	

5	Er.S. Selva Kumar, B.Tech. Validation Engineer Infineon Technologies India Private Limited Bengaluru, Karnataka - 560001	Representative from Industry	S. Selva
6	Er.K.Ramraj Technical Director LED FORSE India Poornankuppam Puducherry – 605 007.	Postgraduate Alumnus (nominated by the Principal)	E. Ram Raj
7	Dr. K. Suresh Professor Department of EEE, SMVEC	Internal Member	Dr. K. Suresh
8	Dr. P. Jamuna Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	Dr. P. Jamuna
9	Dr.M.Susithra Associate Professor Department of EEE, SMVEC , Madagadipet-605107	Internal Member	Dr. M. Susithra
10	Dr.S.GaneshKumaran Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	S. Ganesh Kumaran
11	Mrs.M.Sugasini Assistant Professor Dept., of Mathematics, SMVEC, Madagadipet-605107	Internal Member	M. Sugasini
12	Dr.K.Kathikeyan Associate Professor Dept. of Chemistry, SMVEC, Madagadipet-605107	Internal Member	Dr. K. Kathikeyan
13	Mrs.G.Namita Associate Professor Dept. of English, SMVEC Madagadipet-605107,	Internal Member	M. G. Namita
14	Dr.D.Mohan Radheep Associate Professor Dept. of Physics, SMVEC, Madagadipet-605107	Internal Member	Dr. D. Mohan Radheep
15	Mr.D.Raja Associate Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	Mr. D. Raja
16	Mr. A. Janagiraman Assistant Professor Department of EEE, SMVEC, Madagadipet-605107	Internal Member	A. Janagiraman

Annexure – II

(Revised syllabus of “Electric Circuit Analysis”)

U19EET32	ELECTRIC CIRCUIT ANALYSIS	L	T	P	C	Hrs
		2	2	0	3	60

Course Objectives

- To gain knowledge on computing electrical parameters like current, voltage and power using various network theorems for AC and DC circuits
- To gain knowledge on three phase circuits using phasor diagram and to apply for different load conditions
- To gain knowledge on the analysis of electric circuits using Graph theory.
- To gain knowledge on transient response of RL, RC and RLC circuits for DC and AC excitation
- To gain knowledge of R, L, C components for resonance and coupled circuits

Course Outcomes

After completion of the course, the students will be able to

CO1 - Analyze and solve DC networks using various network theorems. **(K4)**

CO2 - Analyze and solve AC networks using various network theorems. **(K4)**

CO3 - Analyze the behavior of three phase circuits using network topology for different type of loads under balanced and unbalanced conditions. **(K4)**

CO4 - Analyze the steady state and transient behavior of RL, RC and RLC circuit using Laplace transformations for DC and AC excitations. **(K4)**

CO5 - Analyze the resonance and tuned circuits for series and parallel connections. **(K4)**

UNIT I CIRCUIT ANALYSIS AND NETWORK THEOREMS FOR DC CIRCUITS (12 Hrs)

Review - Mesh and Nodal methods for DC circuits. Theorems – Thevenin’s, Norton’s, Superposition, Compensation, Tellegan’s, Reciprocity, Maximum power transfer theorem, Millman’s theorem.

UNIT II CIRCUIT ANALYSIS AND NETWORK THEOREMS FOR AC CIRCUITS (12 Hrs)

Mesh and Nodal methods for AC circuits. Theorems - Thevenin, Norton’s, Superposition, Compensation, Tellegan’s, Reciprocity, Maximum power transfer theorems, Millman’s theorem.

UNIT III THREE PHASE CIRCUITS AND NETWORK TOPOLOGY (12 Hrs)

Three phase circuits: Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected balanced and unbalanced loads.

Basic concepts of graph theory: Graph, directed graph, branch, chord, Tree, incidence and reduced incidence matrices - application to network solutions - tie set, cut set, duality and dual networks- Introduction to two port networks.

UNIT IV TRANSIENT ANALYSIS OF FIRST AND SECOND ORDER CIRCUITS (12 Hrs)

Transient response of RL, RC and RLC circuits to DC and AC excitation - Natural and forced oscillations - Laplace transform application to transient solution.

UNIT V RESONANCE AND COUPLED CIRCUITS (12 Hrs)

Resonant circuits: series, parallel and series – parallel circuits – effect of variation of Q on resonance. Relations between circuit parameters - Q, resonant frequency and bandwidth.

Coupled circuits: Self-inductance, mutual inductance – coefficient of coupling – dot convention – analysis of simple coupled circuits- Inductively coupled circuits- single tuned and double tuned circuits.

Text Books

1. William H Hayt, J. E. Kemmerly and Steven M Durbin, “Engineering Circuit Analysis”, McGraw Hill, 8th Edition, 2013.
2. Charles K. Alexander and Matthew N. Q. Sadiku, “Fundamentals of Electric Circuits”, McGraw-Hill International Edition, 3rd Edition, 2013.
3. Richard C. Dorf and James A. Svoboda, “Introduction to Electric Circuits”, John Wiley & Sons, Inc. 7th Edition, 2015.
4. Allan H. Robbins, Wilhelm C. Miller, “Circuit Analysis Theory and Practice”, Cengage Learning India, 5th Edition, 2013.

Reference Books

1. A. Sudhakar, Shyammohan S. Palli , “Circuits and Networks: Analysis and Synthesis”, McGraw Hill Publications, 5th Edition, 2015.
2. Mahmood Nahvi, Joseph Edminister, “Electric Circuits (Schaum's Outline series)”, McGraw-Hill Publications, 5th Edition, 2017.
3. Sukhija and Nagsarkar, “Circuits and Networks”, Oxford University Press, 2nd Edition, 2016.

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1. <https://nptel.ac.in/courses/108/108/108108076/>
2. <https://www.electronics-tutorials.ws/accircuits/series-circuit.html>
3. <https://www.youtube.com/watch?v=83IVK6i8EB0&list=PLX2gX-ftPVXUkVZ2eafafDwcs5nDldeBD>
4. <https://www.youtube.com/watch?v=zDcXt9Vx34o>
5. <https://www.youtube.com/watch?v=YLGrugmDvc0>
6. https://www.academia.edu/35158206/EE8251_CIRCUIT_THEORY_OBJECTIVES

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3
2	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3
3	3	3	3	2	3	-	-	-	-	-	-	2	3	2	3
4	3	3	3	2	3	-	-	-	-	-	-	2	3	2	3
5	3	3	3	2	3	-	-	-	-	-	-	2	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Annexure – III

(Revised V and VI semester curriculum)

- ✓ The course “Power Electronics” is retained in fifth semester of R-2019 curriculum and in sixth semester of R-2020 curriculum. Whereas the course “Electric drives” is included as a Professional Elective course in semester VI for both the Regulations by replacing the courses “Advanced Control Systems (U19EEE65)” and “Modern Power Electronic Converters (U20EEE613)” in R-2019 and R-2020 regulations respectively.

SEMESTER – V (R-2019 Regulations)		
Sl. No.	Course Code	Course Title
Theory		
1	U19EET51	Measurements and Instrumentation for Electrical Engineering
2	U19EET52	Control Systems
3	U19EET53	Transmission and Distribution
4	U19EET54	Microprocessor and Microcontroller
5	U19EEE5X	Professional Elective - II
6	U19XXO5X	Open Elective - II
Practical		
7	U19EEP51	Numerical Methods and Optimization Lab
8	U19EEP52	Measurements and Instrumentation Lab
9	U19EEP53	Control Systems Lab
10	U19EEP54	Microcontroller and its applications Lab
Employability Enhancement Course		
11	U19EEC5X	Certification Course - III
12	U19EES51	Skill Development Course 5: Foreign Language / IELTS - I
13	U19EES52	Skill Development Course 6: Presentation Skills using ICT
Mandatory Course		
14	U19EEM51	Essence of Indian Traditional Knowledge
Professional Elective – II (Offered in Semester V)		
1	U19EEE51	Utilization of Electrical Energy
2	U19EEE52	Renewable Energy Sources
3	U19EEE53	Electrical Energy Audit and Conservation
4	U19EEE54	Automotive Electronics for Electrical Engineering
5	U19EEE55	Industrial Electrical System

SEMESTER – V (R-2020 Regulations)		
Sl. No.	Course Code	Course Title
Theory		
1	U20BST542	Numerical Methods and Optimization
2	U20EET513	Power Electronics
3	U20EET514	Control Systems
4	U20EET515	Transmission and Distribution
5	U20EEE5XX	Professional Elective - II
6	U20XXO5XX	Open Elective-II
Practical		
7	U20BSP543	Numerical Methods and Optimization Lab
8	U20EEP510	Power Electronics and Drives Lab
9	U20EEP511	Control Systems Lab
Employability Enhancement Course		
10	U20EEC5XX	Certification Course – V
11	U20EES504	Skill Development Course 4: Foreign Language/ IELTS - I

12	U20EES505	Skill Development Course 5: Presentation Skill using ICT
Mandatory Course		
13	U20EEM505	Indian Constitution
Professional Elective – II (Offered in Semester V)		
1	U20EEE506	Utilization of Electrical Energy
2	U20EEE507	Electrical Traction
3	U20EEE508	Electrical Energy Audit and Conservation
4	U20EEE509	Automotive Electronics for Electrical Engineering
5	U20EEE510	Industrial Electrical System

SEMESTER – VI (R-2019 Regulations)		
Sl. No	Course Code	Course Title
Theory		
1	U19EET61	Embedded System
2	U19EET62	Power Electronics
3	U19EET63	Power System Analysis
4	U19EET64	Electrical Machine Design
5	U19EEE4X	Professional Elective - III
6	U19XXO4X	Open Elective – III
Practical		
7	U19EEP61	Embedded System Lab
8	U19EEP62	Power Electronics and Drives Lab
9	U19EEP63	Power System Analysis Lab
Employability Enhancement Course		
10	U19EEC6X	Certification Course - IV
11	U19EES61	Skill Development Course 7: Foreign Language / IELTS - II
12	U19EES62	Skill Development Course 8: Technical Seminar
13	U19EES63	Skill Development Course 9: NPTEL / MOOC - I
Mandatory Course		
14	U19EEM61	Professional Ethics
Professional Elective – III (Offered in Semester VI)		
1	U19EEE61	Smart Grid
2	U19EEE62	High Voltage Engineering
3	U19EEE63	Special Electrical Machines
4	U19EEE64	Digital Signal Processing
5	U19EEE65	Electric Drives

SEMESTER – VI (R-2020 Regulations)		
Sl. No	Course Code	Course Title
Theory		
1	U20EET616	Embedded System
2	U20EET617	Renewable Energy Sources
3	U20EET618	Power System Analysis
4	U20EET619	Electrical Machine Design
5	U20EEE6XX	Professional Elective - III #
6	U20XXO6XX	Open Elective – III \$
Practical		
7	U20EEP612	Embedded System Lab
8	U20EEP613	Renewable Energy Lab
9	U20EEP614	Power System Analysis Lab
Employability Enhancement Course		
10	U20EEC6XX	Certification Course – VI
11	U20EES606	Skill Development Course 6: Foreign Language / IELTS - II

12	U20EES607	Skill Development Course 7: Technical Seminar
13	U20EES608	Skill Development Course 8: NPTEL / MOOC - I
Mandatory Course		
14	U20EEM606	Essence of Indian Traditional Knowledge
Professional Elective – III (Offered in Semester VI)		
1	U20EEE611	Smart Grid
2	U20EEE612	High Voltage Engineering
3	U20EEE613	Electric Drives
4	U20EEE614	Digital Signal Processing
5	U20EEE615	Fuzzy and Neural Systems

Annexure IV

(Semester V and VI - Curriculum and Syllabi of R-2019 and R-2020)

SEMESTER – V (R-2019 Regulations)		
Sl. No.	Course Code	Course Title
Theory		
1	U19EET51	Measurements and Instrumentation for Electrical Engineering
2	U19EET52	Control Systems
3	U19EET53	Transmission and Distribution
4	U19EET54	Microprocessor and Microcontroller
5	U19EEE5X	Professional Elective - II
6	U19XXO5X	Open Elective - II
Practical		
7	U19EEP51	Numerical Methods and Optimization Lab
8	U19EEP52	Measurements and Instrumentation Lab
9	U19EEP53	Control Systems Lab
10	U19EEP54	Microcontroller and its applications Lab
Employability Enhancement Course		
11	U19EEC5X	Certification Course - III
12	U19EES51	Skill Development Course 5: Foreign Language / IELTS - I
13	U19EES52	Skill Development Course 6: Presentation Skills using ICT
Mandatory Course		
14	U19EEM51	Essence of Indian Traditional Knowledge
Professional Elective – II (Offered in Semester V)		
1	U19EEE51	Utilization of Electrical Energy
2	U19EEE52	Renewable Energy Sources
3	U19EEE53	Electrical Energy Audit and Conservation
4	U19EEE54	Automotive Electronics for Electrical Engineering
5	U19EEE55	Industrial Electrical System

SEMESTER – V (R-2020 Regulations)		
Sl. No.	Course Code	Course Title
Theory		
1	U20BST542	Numerical Methods and Optimization
2	U20EET513	Power Electronics
3	U20EET514	Control Systems
4	U20EET515	Transmission and Distribution
5	U20EEE5XX	Professional Elective - II
6	U20XXO5XX	Open Elective-II
Practical		
7	U20BSP543	Numerical Methods and Optimization Lab
8	U20EEP510	Power Electronics and Drives Lab
9	U20EEP511	Control Systems Lab
Employability Enhancement Course		
10	U20EEC5XX	Certification Course – V
11	U20EES504	Skill Development Course 4: Foreign Language/ IELTS - I
12	U20EES505	Skill Development Course 5: Presentation Skill using ICT
Mandatory Course		
13	U20EEM505	Indian Constitution
Professional Elective – II (Offered in Semester V)		
1	U20EEE506	Utilization of Electrical Energy
2	U20EEE507	Electrical Traction
3	U20EEE508	Electrical Energy Audit and Conservation
4	U20EEE509	Automotive Electronics for Electrical Engineering
5	U20EEE510	Industrial Electrical System

U19EET51 / U20EET411	MEASUREMENTS AND INSTRUMENTATION FOR ELECTRICAL ENGINEERING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To give the students an insight into the constructional details and working principles of various measuring instruments.
- To provide the use of different types of analog and digital meters for measuring electrical and physical quantities.
- To demonstrate various Bridges for the measurement of resistance, inductance and capacitance.
- To provide the procedure to calibrate an energy meter.
- To understand and apply different types of sensors for the measurement of physical quantities such as speed, torque, pressure, displacement, temperature, etc.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Acquire knowledge of the characteristics of measuring instruments and their classification. **(K2)**

CO2 - Conversant in construction, working of measuring A.C and D.C meters and their proficient use. **(K3)**

CO3 - Acquire knowledge in various methods of digital meters and its measurement. **(K3)**

CO4 - Acquire knowledge of construction and working principle of various types of display devices and bridge comparison methods for R, L and C measurement. **(K3)**

CO5 - Demonstrate the various types of transducers used for physical measurements. **(K3)**

UNIT I INTRODUCTION TO MEASUREMENT

(9 Hrs)

Functional elements of Generalized measurement system - Types of measurement - Classification of instruments - Static and Dynamic characteristics of instruments - Mean, Standard deviation - error - Accuracy, Precision, Sensitivity, Linearity, Resolution, Hysteresis, Threshold, Input impedance - loading effects - Probability of errors- Errors in Measurements - Systematic and random errors, propagation of errors, Limiting errors of instruments.

UNIT II ELECTRICAL INSTRUMENTS

(9 Hrs)

Essential requirements of an instrument - Ammeter and voltmeter - Moving coil - Moving Iron - Extension of voltmeter and ammeter range - Electro dynamo meter type Wattmeter - Induction type Energy meter - Principle of operation, construction, Torque equation, types, testing and Calibration using direct and phantom loading - Measurement of active and reactive powers in balanced and unbalanced systems - Instrument Transformers - Construction, phasor diagrams, testing, application of current transformer and potential transformer - Magnetic measurements – Determination of B-H curve and measurement of iron loss.

UNIT III DIGITAL INSTRUMENTS

(9 Hrs)

Digital Volt Meter and its design - Voltage ratio measurement techniques - Digital ohmmeter, capacitance meter - impedance meters (Polar and Cartesian types) - Decibel meters - Q meter - tan-delta meter - Modulation index meter - Sampling theory and its applications in current, voltage, power, energy measurements - Signal analyzers: wave, network, harmonic distortion, spectrum and logic analyzers - Digital Frequency Meter - Measurement of Frequency - Study of Phasor Measurement Units (PMU).

UNIT IV BRIDGES AND DISPLAY DEVICES

(9 Hrs)

Bridges: Measurement of low and high resistances – D.C potentiometer - Wheat stone, Kelvin and Kelvin Double bridge - A.C bridges for measurement of L and C - General principles, sensitivity analysis, Maxwell, Anderson bridge, Hays, Owen and Heavy side Campbell bridges for inductance; Maxwell, De Sauty and Wein bridges for capacitance - Measurement of earth resistance - localization of cable faults by Murray and Varley loop test - Methods of reducing bridge errors - Wagner Earthing Device.

Display Devices: CRT display, analog and digital CRO, LED, and LCD.

UNIT V TRANSDUCERS

(9 Hrs)

Transducers - Definition and classification - Linear Displacement: Resistive Potentiometers, strain gauge, LVDT, Capacitive Piezoelectric - Rotational Displacement: magnetic, stroboscope, gyroscope – Force: Strain gauge – Torque: magnetostrictive, strain gauge – Position: synchro Transmitter and receiver – speed: Magnetic and photo electric pickup transducer - Pressure: Manometers, Bourdon – Temperature: Thermistors, thermocouple – Flow: Electromagnetic, Ultrasonic – Level: Differential Pressure cell, Ultrasonic – Density: Hydrometer - Voltage, current and power: Hall Effect transducer

Text Books

1. A.K. Sawhney, "A Course in Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai and Co., New Delhi, 19th Edition, 2015.
2. J. B. Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, Delhi, 12th Edition, 2009.
3. E. O. Doebelin and D. N. Manik, "Measurement Systems – Applications and Design", Tata McGraw Hill Education Pvt. Ltd., Special Indian Edition, 2007.

Reference Books

1. David Bell, "Electronic Instrumentation and Measurements", Oxford University Press, 1st Edition, 2013.
2. A. J. Bouwens, "Digital Instrumentation", Tata McGraw Hill Publications, 16th Reprint Edition, 2008.
3. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill Education, 4th Edition, 2019.
4. C.S. Rangan, G.R. Sharma and V. S. V. Mani, "Instrumentation Devices and Systems", Tata McGraw Hill Book Co., New Delhi, 1st Edition, 2004.

Web References

1. https://www.omega.de/green/pdf/CAP_LEV_MEAS.PDF
2. <https://nptel.ac.in/courses/108/105/108105153/>
3. <http://www.nptelvideos.in/2012/11/industrial-instrumentation.html>
4. <http://vlabs.iitkgp.ernet.in/asnm/>
5. <https://www.youtube.com/watch?v=xLjk5DrScEU>
6. <http://www.wisegeek.com/what-are-transducers.htm>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	-	-	-	-	-	-	-	-	1	2	3	3
2	2	2	2	-	-	-	-	-	-	-	-	1	2	3	3
3	2	2	2	-	-	-	-	-	-	-	-	-	2	3	3
4	2	2	2	-	-	-	-	-	-	-	-	2	2	3	3
5	2	2	2	-	-	-	-	-	-	-	-	2	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EET52 /
U20EET514

CONTROL SYSTEMS

L	T	P	C	Hrs
2	2	0	3	60

Course Objectives

- To provide the use of transfer function models for analysis of physical systems.
- To provide adequate knowledge in the time response of systems and error analysis.
- To provide basic knowledge for obtaining the open loop and closed-loop frequency responses of systems.
- To get an exposure in the design of P/I/D controllers.
- To introduce about the state variable representation and stability analysis.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Develop the transfer function for the block diagram / signal flow graph model of electrical / mechanical / electro-mechanical systems. **(K3)**

CO2 - Analyze the performance of control system using time-domain approach. **(K4)**

CO3 - Analyze performance characteristics of system using Frequency response methods. **(K3)**

CO4 - Design P/I/D controllers for the System in order to meet design specifications. **(K4)**

CO5 - Express the control systems into state space models and analyze the performance of the system. **(K2)**

UNIT I MODELING OF LINEAR TIME INVARIANT SYSTEMS (12 Hrs)

Control systems - Open loop and Closed loop – Feedback control system characteristics - Mathematical modeling of Electrical, Mechanical and Electro-Mechanical systems - electrical analogues systems - Block diagrams reduction techniques - Signal flow graphs - Transfer functions.

UNIT II TIME DOMAIN ANALYSIS (12 Hrs)

Standard test signals – Transient analysis of first and second order systems using step input - Time responses – Time domain specifications – Error Analysis - Stability analysis - Concept of stability – Routh Hurwitz stability criterion - Root locus Techniques - Effect of adding poles and zeros.

UNIT III FREQUENCY DOMAIN ANALYSIS (12 Hrs)

Frequency response analysis – Correlation between frequency response and time-response analysis - frequency domain specifications - Bode plot - Polar plot - Nyquist stability criterion.

UNIT IV CONTROLLER DESIGN (12 Hrs)

Introduction to controllers - P-I-D controllers - Tuning methods - Ziegler-Nichol's Tuning - Performance criteria – Compensator design - Lead, Lag, Lead-Lag compensation using Bode Plot.

UNIT V STATE VARIABLE ANALYSIS (12 Hrs)

State Space Representation, Concept of state variables – State models for linear and time invariant Systems – Controllable, Observable, Jordan Canonical Forms - Solution of State Equation, State Transition Matrix – controllability and observability – Transfer function to State space model.

Text Books

1. I. J. Nagarath and M. Gopal, "Control Systems Engineering", New Age International Publishers, 6th Edition (Multi colour Edition), 2018.
2. Katsuhiko Ogata, "Modern Control Engineering", Pearson, 5th Edition, 2015.

Reference Books

1. Richard C. Dorf and Robert. H. Bishop, "Modern Control Systems", Pearson Education, 12th Edition, 2011.
2. John J. D'Azzo, Constantine H. Houpis and Sttuart N. Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor and Francis Reprint, 6th Edition, 2014.
3. Benjamin C. Kuo, "Automatic Control Systems", PHI Learning Private Ltd, 9th Edition 2014.

Web References

1. https://www.tutorialspoint.com/control_systems/control_systems_useful_resources.html
2. <http://www.controlsacademy.com/>
3. <https://nptel.ac.in/courses/108/102/108102043/>
4. <https://www.isa.org/technical-topics/control-systems/>
5. <https://nptel.ac.in/courses/108/106/108106098/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	3	3	2	-	-	-	-	-	-	-	3	3	1
2	2	3	3	3	2	-	-	-	-	-	-	-	3	3	1
3	2	3	3	3	2	-	-	-	-	-	-	-	3	3	1
4	2	3	3	3	2	-	-	-	-	-	-	-	3	3	1
5	2	3	3	3	2	-	-	-	-	-	-	-	3	3	1
6	2	3	3	3	2	-	-	-	-	-	-	-	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U19EET53 /
U20EET515

TRANSMISSION AND DISTRIBUTION

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To provide the structure of the electrical power system with various types of A.C/D.C Transmission and distribution systems
- To explain about the classification of transmission lines and their technical parameters.
- To understand the concept of transmission line models and its performance.
- To understand the necessity and importance of various insulators and cables used in power system.
- To have an overview of the modern electrification schemes and recent technologies in Transmission and Distribution systems

Course Outcomes

After completion of the course, the students will be able to

CO1 - Summarize the structure of Generation, Transmission and Distribution with real time connection schemes. **(K2)**

CO2 - Calculate the line parameters in the transmission system and their effects in the overhead lines. **(K3)**

CO3 - Analyze on different types of transmission lines (short, medium, long) and its performance. **(K2)**

CO4 - Choose the adaptable types of insulators and cables for transmission and distribution systems. **(K3)**

CO5 - Compare various schemes of electrification and gain knowledge on High Voltage AC / DC systems **(K2)**

UNIT I DISTRIBUTION SYSTEMS

(9 Hrs)

Structure of electric power systems - Single Line Diagram of Generation, Transmission and Distribution Systems - Comparison of distribution systems – Radial and Ring main – DC two wire, AC single phase and three phase systems – Selection of Feeders and Distributors – secondary distribution system - Kelvin's law and its limitations.

UNIT II LINE PARAMETERS AND EFFECTS ON TRANSMISSION SYSTEM

(9 Hrs)

Resistance, inductance and capacitance of single and three phase transmission lines - symmetrical and unsymmetrical spacing – transposition - single and double circuits - stranded and bundled conductors - application of self and mutual GMD–Skin, Proximity and Corona effect - inductive and radio interference - Computation of line parameters.

UNIT III PERFORMANCE ANALYSIS ON TRANSMISSION SYSTEMS

(9 Hrs)

Development of equivalent circuits for short, medium and long lines – Calculation of efficiency and voltage regulation – Tuned power lines - Power circle diagrams for sending and receiving ends - transmission capacity, steady state stability limit – voltage control of lines.

UNIT IV INSULATORS AND CABLES FOR DISTRIBUTION SYSTEMS

(9 Hrs)

Insulators: types and comparison – voltage distribution in string insulator – string efficiency – Methods of improving string efficiency – Stress and sag calculations – effect of wind and ice – supports at different levels. Cables: types – capacitance of cables – insulation resistance - dielectric stress and grading - dielectric loss - thermal characteristics - capacitance of three core cables.

UNIT V RECENT TRENDS IN TRANSMISSION

(9 Hrs)

Design of Rural distribution, planning and design of town electrification schemes – Need for power system interconnections systems – Components of a HVDC system - Types of DC links — Modern trends in DC Transmission systems – Comparison of HVDC and HVAC Transmission systems – Introduction to FACTS - FACTS controllers – Shunt and Series – Grounding methods in power stations.

Text Books

1. R. Padiyar, "HVDC Power Transmission Systems – Technology and System Interactions", New Age International Publishers, 2012.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.
3. A. K. Theraja and B. L. Theraja, "Text Book of Electrical Technology: Volume 3: Transmission, Distribution and Utilization", S. Chand, 23rd Edition, 2004.

Reference Books

1. Hadi Saadat, 'Power System Analysis,' PSA Publishing; Third Edition, 2010.
2. V. K. Metha and Rohit Metha, "Principles of Power System", S. Chand, 3rd Edition, 2005.
3. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes,

Fourth Edition, 2012.

4. Luces M.Fualken berry Walter Coffey, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.

Web References

1. https://swayam.gov.in/nd1_noc20_ee39/preview
2. https://swayam.gov.in/nd1_noc20_ee86/preview
3. <https://www.eei.org/ourissues/ElectricityTransmission/Documents/>
4. https://www.osha.gov/SLTC/etools/electric_power/illustrated_glossary/index.html
5. http://solareis.anl.gov/documents/docs/APT_61117_EVS_TM_08_4.pdf

COs / POs and PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	-	2	-	-	-	-	-	-	3	3	2	3
2	3	3	3	-	2	-	-	-	-	-	-	3	3	2	3
3	3	3	3	-	2	-	-	-	-	-	-	3	3	2	3
4	3	3	3	-	2	-	-	-	-	-	-	3	3	2	3
5	3	3	3	-	2	-	-	-	-	-	-	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EET54 /
U20EET412

**MICROPROCESSOR AND
MICROCONTROLLER**

L T P C Hrs
3 0 0 3 45

Course Objectives

- To get familiar with basic architecture and programming techniques of microprocessor 8085.
- To learn interfacing of memory and data transfer techniques using microcontroller.
- To understand the interfacing of input/output devices required for real time applications.
- To introduce the basic concepts of embedded system design using microcontroller.
- To equip the student with ability to design PWM control for various application such as AC-DC, DC-DC converter, etc.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Illustrate the architecture of microprocessor and to develop skills in writing assembly language program. **(K3)**

CO2 - Have a clear understanding of microcontroller architecture with functional details of each pin. **(K3)**

CO3 - Write and debug Assembly and C programs for 8 bit Microcontroller. **(K3)**

CO4 - Interface input/output peripheral devices and to implement the advanced communication protocol like I²C and SPI using PIC Microcontroller. **(K4)**

CO5 - Design and develop microcontroller based real-time applications. **(K4)**

UNIT I ARCHITECTURE AND PROGRAMMING OF 8085 MICROPROCESSOR (9 Hrs)

8085 Microprocessor: Architecture, Addressing modes, Instruction set, Need for Assembly language – Development of Assembly language programs – Machine cycles and Timing diagrams, Programming and Interfacing. Application: Interfacing of stepper motor control with 8085 microprocessor.

UNIT II INTRODUCTION TO 8 and 16 BIT MICROCONTROLLER (9 Hrs)

Microprocessor and Microcontroller difference, RISC and CISC programmer's model, Criteria for selecting microcontroller. Overview of PIC family, PIC Microcontroller architecture, status register, Special function registers, RAM, ROM and EEPROM space, On-Chip peripherals, PIC16F877A and PIC24F pin configuration and function of each pin, Fuse bits of PIC – Case study on traffic light control using PIC Microcontroller

UNIT III PIC24F ASSEMBLY LANGUAGE PROGRAMMING AND PROGRAMMING IN C (9 Hrs)

PIC24F data types and assembler directives, Addressing modes of PIC24F, Data transfer, Arithmetic, Logic and Compare, Rotate and Shift, Branch and Call instructions, MPLABX setup for assembly language programming, PIC24F I/O Port Programming, Time delay loop, Look-up table, Bit addressability, MACROS, Intel HEX file.

Timer programming, Input capture and Wave Generator, PWM programming External Interrupt programming, ADC programming, EEPROM programming – Program using PIC24F Timer to generate waveforms.

UNIT IV SERIAL COMMUNICATION PROTOCOLS AND PERIPHERAL INTERFACING (9 Hrs)

Serial communication protocols: introduction to UART protocol, I²C protocol and its Programming, SPI protocol and its Programming, Serial Port programming using polling and interrupt.

Peripheral interfacing and its programming : LCD and Keyboard Interfacing, Relay interfacing, Stepper and DC Motor control, RTC Interfacing, LM35 Temperature sensor interfacing, MAX7219 display controller interfacing – Program using PIC24F microcontroller for interfacing ultrasonic sensors.

UNIT V ADVANCED MICROCONTROLLER (9 Hrs)

dsPIC33EV: Block diagram, Clock Distribution System, interrupt, Timer, PWMX control registers, high-speed PWMX module register- interconnection diagram, ADC-signal processing and conditioning.

Text Books

1. Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Micro Digital Education, Illustrated Edition, 2017.
2. Ramesh S Gaonkar, "Microprocessor Architecture: Programming and Applications with the 8085", Prentice Hall of India, New Delhi, 5th Edition, 2011.

Reference Books

1. Sunil Mathur, Jeebananda Panda, "Microprocessor and microcontroller", PHI Learning Private Limited, New Delhi, 1st Edition, 2016.
2. dsPIC33EV data sheet

Web References

1. <https://www.microchip.com> ›
2. <https://www.youtube.com/watch?v=S1QCZW92fU4>
3. <https://www.microchip.com/promo/explorer-8-development-board>
4. <https://www.mikroe.com/easymx-pro-stm32>

5. https://www.microchip.com/DevelopmentTools/ProductDetails/DM240001-2#utm_source=MicroSolutions&utm_medium=Link&utm_term=FY17Q3&utm_content=MCU16&utm_campaign=Article

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
2	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
3	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
4	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
5	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EEP51 /
U20BSP543

**NUMERICAL METHODS AND
OPTIMIZATION LABORATORY**

L	T	P	C	Hrs
0	0	2	1	30

Course Objectives

- To learn the techniques of solving non-linear equation.
- To find the solutions of simultaneous equations.
- To introduce the iterative methods.
- To know the numerical interpolation.
- To study about the numerical integration.

Course Outcomes

After completion of the course, the students will be able to

CO 1 - Solve polynomial equation.

CO 2 - Find out the root of the Algebraic and Transcendental equations.

CO 3 - Know the applications of interpolation.

CO 4 - Apply the Trapezoidal formula

CO 5 - Evaluate the integrals using simpson's formula.

List of experiments:

1. Roots of non-linear equation using bisection method.
2. Roots of non-linear equation using Newton's method.
3. Solve the system of linear equations using Gauss - elimination method.
4. Solve the system of linear equations using Gauss - Seidal iteration method
5. Solve the system of linear equations using Gauss - Jordan method.
6. To find the largest Eigen value of a matrix by power - method.
7. Interpolation by Lagrange Polynomial
8. Interpolation by Newton Polynomial
9. Find the area by using trapezoidal rule.
10. Find the area by using Simpson's rules.
11. Optimization by using Interpolation Method.
12. Optimization by using Graphical Method.

Reference Books

1. Atul Goyal, Madhuchanda Rakshit Suchet Kumar, "Numerical Methods", New India publishing Agency, 1st Edition, 2019.
2. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers", McGraw Hill, 8th Edition, 2020.
3. T. Veerarajan, "Operation Research", McGraw Hill, 1st Edition, 2018.
4. Sia, "Numerical Methods", Sia Publishers and Distributors Pvt. Ltd., 1st Edition, 2018.
5. Rajesh Kumar Gupta, "Numerical Methods - Fundamental and Applications", Cambridge University Press, 1st Edition, 2019.
6. A. Ravi Ravindran, "Operations Research Methodologies", Taylor and Francis, 1st Edition, 2019.
7. Kevin J. Hastings, "Introduction to the Mathematics of Operations Research with Mathematica", Taylor and Francis, 2nd Edition, 2019.
8. P. K. Gupta, D. S. Hira, "Operations Research", S. Chand, 5th Edition, 2018

Web References

1. <https://nptel.ac.in/courses/111/106/111106101/>
2. <https://www.geektonight.com/operation-research-notes-pdf/#.XrXzoP8za00>
3. <http://freecomputerbooks.com/Numerical-Methods-with-Applications.html>
4. <http://www.pphmj.com/journals/IJNMA.htm>

U19EEP52/ U20EEP408	MEASUREMENTS AND INSTRUMENTATION LAB	L	T	P	C	Hrs
		0	0	2	1	30

Course Objectives

- To give the students an insight into the constructional and working principles of various measuring instruments.
- To demonstrate various Bridges for the measurement of resistance, inductance and capacitance using simulation and hardware set ups.
- To provide the concept of magnetism and methods used for calculation of magnetic losses.
- To provide the procedure for calibration on measuring instruments.
- To apply different types of sensors for the measurement of physical quantities.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Realize the advantages and necessity of measurement systems. **(K2)**

CO2 - Measure the Resistance, Inductance and capacitance using AC and DC bridges. **(K3)**

CO3 - Determine the magnetization characteristics and hysteresis losses using BH curve. **(K3)**

CO4 - Calibrate the measuring instruments used in domestic and commercial applications. **(K3)**

CO5 - Determine the characteristics of various transducers and to apply for the measurement of physical quantities. **(K3)**

List of Experiments

1. (a) Measurement of resistance using Wheatstone bridge
(b) Measurement of **insulation resistance using Megger**
2. (a) Measurement of inductance and Q-factor using Anderson's Bridge.
(b) Measurement of capacitance using Schering Bridge.
3. **Extension range of voltmeter and ammeter.**
4. Calibration of single phase and three phase Energy meter using loading method.
5. Measurement of magnetic system (B-H loop and magnetic losses).
6. Calibration of Current Transformer and Potential Transformer
7. Characteristic of Temperature transducers **(LDR / thermistor / thermocouple).**
8. Measurement using **R/L/C** transducers
9. Measurement of Voltage, current and power using Hall Effect transducer.
10. Characteristics of Optical Transducers **(LDR/Phototransistor/Photovoltaic/photoconductive cells)**
11. Measurement of speed using Magnetic and photo electric pickup transducers.
12. Measurement of Position using synchro Transmitter and receiver

Reference Books

1. A. K. Sawhney, "A course in Electrical and Electronics Measurement and Instrumentation", Dhanpat Rai and Sons, 19th Edition, 2015.
2. William D. Coopers and Albert D. Helfrick, "Modern Electronic instrumentation and Measurements Techniques", Pearson Education India, 1st Edition, 2002.
3. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Education, 4th Edition, 2019.
4. C. D. Johnson, "Process Control Instrumentation Technology", Pearson Education India, 8th Edition, 2015.
5. Electrical Business Magazine, (Online edition of Electrical Industry Magazine)
6. Instrumentation and Measurement Magazine, IEEE.
7. Instrumentation and Measurement, IEEE Transactions.
8. Science, Measurement and Technology, IET Journal.
9. Measurements, Elsevier Journal.

Web References

1. https://www.omega.de/green/pdf/CAP_LEV_MEAS.PDF
2. <https://nptel.ac.in/courses/108/105/108105153/>
3. <http://www.nptelvideos.in/2012/11/industrial-instrumentation.html>
4. <http://vlabs.iitkgp.ernet.in/asnm/>
5. <http://www.wisegEEK.com/what-are-transducers.htm>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	-	-	-	-	-	-	-	-	-	2	2	2
2	3	2	2	-	-	-	-	-	-	-	-	-	2	2	2
3	2	2	2	-	-	-	-	-	-	-	-	-	2	2	2
4	2	2	2	-	-	-	-	-	-	-	-	-	2	2	2
5	2	2	2	-	-	-	-	-	-	-	-	-	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Course Objectives

- To provide the concepts of modeling and simulation of physical systems.
- To provide adequate knowledge in time response of systems and error analysis.
- To give basic knowledge in obtaining the open loop and closed-loop frequency responses of systems.
- To understand the concept of stability and its analysis.
- To get adequate knowledge about practical tuning of P/I/D controllers for motors/converters.

Course Outcomes

After completion of the course, the students will be able to

- CO1** - Interpret different electrical and mechanical systems with its modeling. **(K2)**
CO2 - Use the time domain analysis, to predict stability of a system performance of the system. **(K3)**
CO3 - Demonstrate frequency domain analysis of a system. **(K3)**
CO4 - Familiarize with the tuning procedure of P/I/D controllers for converter/motor applications. **(K5)**
CO5 - Design a controller for any system to meet the desired performance. **(K4)**

List of Experiments

1. Mathematical modeling and simulation of physical systems
 - Mechanical
 - Electrical
2. Simulation of a RC lead/lag compensating network /second order systems for the given specifications and to obtain its frequency response.
3. Determination of Transfer function of a separately excited DC Motor.
4. Design and implementation of PID controller for DC motor
5. Stability analysis of a system using Root Locus
6. Determination of transfer functions of a physical system using frequency response and Bode's asymptotes.
7. Position and speed control of DC servo motor
8. Design of Lead/Lag/Lead-Lag Compensator for DC Motor
9. Design of P/I/D Controllers for Temperature control system
10. Design of P/I/D Controllers for Level control system
11. Simulation of Controllability and Observability of a system
12. Simulation of open loop and closed loop speed control of 3 phase induction motor.
13. Simulation of open loop and closed loop control DC buck converter.

Reference Books

1. Hasan Saeed, "Automatic Control Systems (With Matlab Programs)", S. K. Kataria & Son, 1st Edition, 2010.
2. I. J. Nagarath and M. Gopal, "Control Systems Engineering", New Age International Publishers, 6th Edition, 2018.
3. Katsuhiko Ogata, "Modern Control Engineering", Pearson, 5th Edition, 2015.
4. Benjamin C. Kuo, "Automatic Control Systems", PHI Learning Private Ltd, 9th Edition, 2014.

Web References

1. http://saadat.us/control_systems_labs.html
2. <https://www.quanser.com/solution/control-systems/>
3. <http://ncr.mae.ufl.edu/papers/te02.pdf>
4. <https://futureengineering.in/control-system-lab/>
5. <http://vlabs.iitb.ac.in/vlab/>

COs/POs/PSOs Mapping

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3	3	3	3	3	3	-	-	-	3	-	-	-	2	2	3
4	3	3	3	3	3	-	-	-	3	-	-	-	2	2	3
5	3	3	3	3	3	-	-	-	3	-	-	-	2	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

U19EEP54 /
U20EEP409

MICROCONTROLLER AND ITS APPLICATIONS
LAB

L	T	P	C	Hrs
0	0	2	1	30

Course Objectives

- To become familiar with architecture and instruction set for 8085.
- To provide hands-on training of interfacing external sensors and actuators with microcontroller
- To impart knowledge for on-chip peripheral programs
- To impart knowledge to generate pulses for electrical applications.
- To impart knowledge to do minor projects using microcontroller for solving real world engineering problems

Course Outcomes

After completion of the course, the students will be able to

CO1 - Develop assembly language program for microprocessor 8085. **(K3)**

CO2 - Analyze various platforms for programming by knowing the complete hardware configurations. **(K4)**

CO3 - Analyze abstract problems and apply a combination of hardware and software to address the problem. **(K4)**

CO4 - Design a control algorithm for various applications using microcontrollers. **(K3)**

CO5 - Design and generate pulses for real time electrical applications. **(K3)**

List of Experiments

Microprocessor Experiments using 8085:

1. 8 bit - Addition, Subtraction, Multiplication and Division
2. Assembly Language Programming: Subroutines, parameter passing to subroutines

Microcontroller Experiments using PIC:

3. PIC Assembly language- Programming using the PIC Instruction Set.
4. a) PIC Timer to generate accurate delay using polling and interrupt
b) PIC Timer to generate waveforms
c) Seven Segment Display interfacing with PIC
5. a) 16x2 LCD interfacing with PIC
b) 4x4 matrix keyboard interfacing with PIC
6. PIC USART programming
7. PIC on-chip ADC for interfacing analog sensors

Application of Microcontroller using PIC:

8. Experimentation of DC Motor Interfacing And Speed/Direction Control With PIC18
9. Stepper motor interfacing with PIC18
10. DS1307 RTC Interfacing with PIC18
11. MAX7219 LED matrix driver Interfacing with PIC24F using SPI protocol
12. Interface to peripherals and use of the I2C bus
13. Design of zero crossing detector
14. a.) Design Frequency Counter which displays frequency of unknown pulse on 16x2 LCD using PIC24F on-chip Timer.
b.) Design Pulse period meter which displays ON-time of unknown pulse on 16x2 LCD using PIC24F on-chip Timer
15. Design Bluetooth controlled 2-ch variable frequency square wave generator using PIC24F UART and on-chip Timer.
16. Design 4 Channel Data Logger which measures Voltage between 0-5V on 4 ADC Channels of PIC24F and transmit it to Host PC at every 1 second where it stored in excel sheet with timestamp for future analysis.

Reference Books

1. Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Micro Digital Education, Illustrated Edition, 2017.
2. Ramesh S Gaonkar, "Microprocessor Architecture: Programming and Applications with the 8085", Prentice Hall of India, New Delhi, 5th Edition, 2011.
3. Sunil Mathur, Jeebananda Panda, "Microprocessor and microcontroller", PHI Learning Private Limited, New Delhi, 1st Edition, 2016.
4. dsPIC33EV data sheet.

Web References

1. <https://www.microchip.com> ›
2. <https://www.youtube.com/watch?v=S1QCZW92fU4>
3. <https://www.microchip.com/promo/explorer-8-development-board>
4. <https://www.mikroe.com/easymx-pro-stm32>
5. https://www.microchip.com/DevelopmentTools/ProductDetails/DM240001-2#utm_source=MicroSolutions&utm_medium=Link&utm_term=FY17Q3&utm_content=MCU16&utm_campaign=Article

COs/POs/PSOs Mapping

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	3	3	2	-	-	-	-	-	-	2	2	2	3
2	2	3	3	3	2	-	-	-	-	-	-	2	2	2	3
3	2	3	3	3	2	-	-	-	-	-	-	2	2	2	3
4	2	3	3	3	2	-	-	-	-	-	-	2	2	2	3
5	2	3	3	3	2	-	-	-	-	-	-	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EEC5X /	CERTIFICATION COURSE – III /	L	T	P	C	Hrs
U20EEC5XX	CERTIFICATION COURSE - V	0	0	4	-	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

**U19EES51 /
U20EES504**

**SKILL DEVELOPMENT COURSE 5 /
SKILL DEVELOPMENT COURSE 4:**
(Foreign Language / IELTS – I)

L	T	P	C	Hrs
0	0	2	-	30

Student should choose the Foreign Language/IELTS course like Japanese/French/ Germany/IELTS, etc. approved by the Department committee comprising of HoD, Programme Academic Coordinator, Class advisor and language Experts. The courses are to be approved by Academic Council on the recommendation of HoD at the beginning of the semester if necessary, subject to ratification in the next Academic council meeting. Students have to complete the courses successfully. The Committee will monitor the progress of the student and recommend the grade (100% Continuous Assessment pattern) based on the completion of course. The marks attained for this course is not considered for CGPA calculation

**U19EES52 /
U20EES505**

**SKILL DEVELOPMENT COURSE 6: /
SKILL DEVELOPMENT COURSE 5**
(Presentation Skills using ICT)

L	T	P	C	Hrs
0	0	2	-	30

The methodology used is “learning by doing”, a hands-on approach, enabling the students to follow their own pace. The teacher, after explaining the project, became a tutor, answering questions and helping students on their learning experience.

Communication Technology (CT) skills

- Understand ICT workflow in cloud computing.
- Manage multitasking.
- Deal with main issues using technology in class.
- Record, edit and deliver audio and video.
- Automate assessments and results.

Teaching tools

- Different ways to create audiovisual activities.
- Handle audiovisual editors.
- Collaborative working.
- Individualize learning experience.
- Get instant feedback from students.

Each one of the students will be assigned an ICT Topic and the student has to conduct a detailed study and have to prepare a report, running to 15 or 20 pages for which a demo to be performed followed by a brief question and answer session. The demo will be evaluated by the internal assessment committee for a total of 100 marks. The marks attained for this course is not considered for CGPA calculation.

U19EEM51 /
U20EEM606

**ESSENCE OF INDIAN TRADITIONAL
KNOWLEDGE**

L T P C Hrs
2 0 0 - 30

Course Objectives

- To get a knowledge in Indian Culture
- To Know Indian Languages and Literature and the fine arts in India
- To make the students to understand the various Religion and Philosophy
- To familiarize with the Fine Arts in India
- To explore the Science and Scientists of Medieval and Modern India

Course Outcomes

After completion of the course, the students will be able to

- CO1- familiarize with the philosophy of Indian culture.
CO2 -Distinguish the Indian languages and literature.
CO3 -Learn the philosophy of ancient, medieval and modern India.
CO4 -Acquire the information about the fine arts in India.
CO5 -Know the contribution of scientists of different eras.

UNIT - I Introduction to Culture

Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT - II Indian Languages, Culture and Literature

Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India Indian Languages and Literature-II: Northern Indian languages & literature

UNIT - III Religion and Philosophy

Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – IV Fine Arts in India (Art, Technology & Engineering)

Indian Painting, Indian handicrafts, Music, divisions of Indian classical music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

UNIT – V Education System in India

Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Reference Books

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450 494-X, 200
4. S. Narain, "Examinations in ancient India", Arya Book Depot, 1993
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN 13: 978- 8120810990, 2014

Web references

1. <https://nptel.ac.in/courses/109/104/109104102/>
2. <https://nptel.ac.in/courses/101/104/101104065/>
3. <https://nptel.ac.in/courses/109/108/109108158/>
4. <https://nptel.ac.in/courses/109/106/109106059/>
5. <https://nptel.ac.in/noc/courses/noc17/SEM1/noc17-ae01/>

Course Objectives

- To design optimized illumination system for domestic and industrial applications.
- To acquire knowledge about the different types of heating and welding.
- To make awareness in the usage of refrigeration and air conditioning system.
- To familiarize with the construction and working of traction systems.
- To impart the knowledge on electroplating techniques and operations of batteries.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Develop a clear idea on lighting requirement for domestic and industrial needs in an efficient way. **(K3)**

CO2 – Analysis the different types of heating and welding schemes used in the industries **(K4)**

CO3 – Repair the minor faults that occurs in refrigerator and in air conditioning system **(K4)**

CO4 – Analyze the speed-time characteristics and performance of the electric traction. **(K4)**

CO5 – Calculate the power requirement and efficiency of domestic appliances. **(K4)**

UNIT I ILLUMINATION

(9 Hrs)

Introduction – basic terminologies – laws of illumination – polar curves – Rousseau's construction – electrical lamps – Basic principles of light control – Types – Design of lighting – illumination calculation (for residential, industrial, commercial, health care, street lightings, sports, administrative complexes) – bureau of energy efficiency star rating for lamps.

UNIT II ELECTRIC HEATING AND WELDING

(9 Hrs)

Role of electric heating for industrial applications – Types of Heating – Resistance – Induction - Arc furnace – Dielectric - solar – heating of building, domestic water heater, Electric oven. Welding methods – Resistance – Arc - Laser – Ultrasonic - Power supply equipment's for welding.

UNIT III REFRIGERATION AND AIR CONDITIONING

(9 Hrs)

Electrical Circuit of Refrigerator – Trouble shooting of Refrigerator – Air conditioning types and their applications – smart air conditioning systems – Trouble shooting of air conditioning.

UNIT IV ELECTRIC TRACTION

(9 Hrs)

Traction system – Power supply – Traction drives – braking – Tractive effort calculations – speed-time characteristics. Locomotives and train – Tram ways and Trolley bus – Recent trends – Metro and Mono rail systems.

UNIT V ELECTROLYSIS AND DOMESTIC APPLIANCES

(9 Hrs)

Electrolysis- Laws of Electrolysis, power supply, Efficiency – Electro Plating. Batteries-Types – Components, rating of batteries – Methods of charging and maintenance. Domestic appliances: Electric iron, Electric toaster – Introduction to Green Building Concept and energy auditing.

Text Books

1. J. B. Gupta, "Utilization of Electrical Power and Traction", Kataria Publications, Reprint Edition, 2020
2. R. K. Rajput, "Utilization of Electrical Power", Lakshmi publications, 2nd Edition, 2016.
3. E. Openhshaw Taylor and V. V. L. Rao, "Utilization of Electric Energy", Orient Longman, New Delhi, 2nd Edition, 2007.

Reference Books

1. S. K. Sahdev, "Utilization of electrical energy and electric traction", New Age International Publisher, 1st Edition, 2016.
2. H. Partap, "Art and Science of Utilization of Electrical Energy", Dhanpat Rai and Sons, Delhi, 2nd Edition, 2015.
3. C. L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", New Age International Publishers, 4th Edition, 2017.
4. Pradip Kumar Sadhu, Soumya Das, "Modern utilization of Electric Power" CBS Publisher, 1st Edition, 2018.

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1. <https://nptel.ac.in/courses/108/105/108105060/>
2. <https://nptel.ac.in/courses/112/107/112107090/>
3. <https://nptel.ac.in/courses/112/105/112105129/>
4. <https://nptel.ac.in/courses/103/108/103108162/>
5. <https://beeindia.gov.in/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	-	-	-	-	-	-	-	-	-	3	2	2
2	3	2	2	-	-	-	-	-	-	-	-	-	3	2	2
3	3	2	2	-	-	-	-	-	-	-	-	-	3	2	2
4	3	2	2	-	-	-	-	-	-	-	-	-	3	2	2
5	3	2	2	-	-	-	-	-	-	-	-	-	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Course Objectives

- To understand the Traction systems and its mechanics for train movement.
- To identify the power supply equipment suited for traction systems and differentiates AC and DC traction drives.
- To analyze various types of equipment used in protection of locomotive system
- To familiarize about various systems of track electrification and power supply system.
- To understand the working of various railway signaling system.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Familiarize the basics of Electric Traction System and its mechanics for train movements. **(K1)**

CO2 - Outline about the different Traction Drives and controlling techniques. **(K2)**

CO3 - Differentiate the best suited protection system for Electric Locomotive. **(K2)**

CO4 - Design the Electric Traction Sub-Systems. **(K3)**

CO5 - Apply the solid state interlocking principle in railway signaling system. **(K2)**

UNIT I INTRODUCTION OF ELECTRIC TRACTION (09 Hrs)

Indian Scenario of Electric traction, Advantages of Electric Traction over other systems of traction, selection of traction system - Electric and Diesel-Electric. Mechanics of train movement- Speed - time curve for train movement- Requirement of tractive effort and T-N curve of a typical train load, Specific energy consumption and Coefficient of adhesion- Suspension and mechanism of torque transmission Concept of Weight Transfer & Effect of un-sprung mass and wheel diameter.

UNIT II TRACTION MOTOR DRIVES (09 Hrs)

Type of traction motor- characteristics- Optimization of design and construction features- Tractive Effort and Drive Ratings- Important Features of Traction Drives- conventional DC and AC Traction drives- Converter Controlled Drives- DC Traction using Chopper Controlled Drives- Poly phase AC /DC Traction Motors- Traction control of DC locomotives and EMU's- Traction control system of AC locomotives- Control gear.

UNIT III PROTECTION OF LOCOMOTIVE EQUIPMENT AND CIRCUITS (09 Hrs)

Broad strategy for protection, Surge protection, Overload protection of main power circuits, Earth fault protection of power auxiliary circuits- Protection from over-voltage and under-voltage, Differential protection of traction circuits- Protection against high and low air pressure in the compressed air circuit- Temperature monitoring, Protection of transformer by buchholz relay- Protection against accidental contact with HT equipment Protection against fires.

UNIT IV ELECTRIC TRACTION SUB-SYSTEMS (OVERHEAD EQUIPMENT) (09 Hrs)

Overhead Equipment (OHE), Sectionalizing, Bonding of Rails and Masts, Materials Employed in OHE Electric Traction Sub-Systems- Power Supply Installations- Layout design of Traction Substation/ Protection, Booster Transformers and Return Conductor- SCADA System.

UNIT V RAILWAY SIGNALLING (09 Hrs)

Block Section Concept-Track Circuits, Interlocking Principle- Train speed and signalling- Solid state Interlocking- Automatic Warning Systems.

Text Books

1. Upadhayay J, Mahindra S.N, "Electric Traction", Allied Publishers Ltd., 1st Edition, 2000.
2. Andreas Steimel, "Electric Traction-Motive Power and Energy Supply, Deutscher Industrieverlag publishers, 2nd Edition, 2014.
3. A.T. D over, "Electric Traction", Pitman Publishing, 4th Edition, 1965.

Reference Books

1. P.S. Rao, "Principle of 25 KV Overhead Equipments", Printpack Pvt. Ltd., 1st Edition, 2000.
2. Gopal K Dubey, "Fundamentals of Electric Drives", Narosa Publishing, 2nd Edition, 2010.
3. H. Partab, "Modern Electric Traction", Dhanpat Rai & Sons, 2017.
4. C. L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", New Age International, 3rd Edition, 2015.
5. J.B. Gupta, "Utilization of Electrical Power and Electric Traction", S. K. Kataria & Sons publications, 10th Edition, 2019.
6. R. B. Brooks, "Electric Traction Hand Book", Sir Isaac Pitman and sons Ltd, London, 1st Edition, 1954.

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1. <https://epd.wisc.edu/courses/fundamentals-of-traction-power-systems-and-overhead-contact-systems/>
2. <http://www.railsystem.net/electric-traction-systems/>
3. <http://hellowbookeas.cf/0271002417-electric-traction-on-the-pennsylvania-railroad-1895-1968.htm>
4. http://www.vssut.ac.in/lecture_notes/lecture1424084684.pdf
5. <https://Electric-Traction-Upadhyay-S-N-Mahendra/dp/8177640054>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
2	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
3	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
4	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
5	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EEE52 /
U20EET617

RENEWABLE ENERGY SOURCES

L	T	P	C	Hrs.
3	0	0	3	45

Course Objectives

- To impart knowledge on renewable energy sources and technologies.
- To gain adequate knowledge on variety of issues in harnessing renewable energy sources.
- To outline about the alternate renewable energy sources for both domestics and industrial applications.
- To provide knowledge about grid connectivity in renewable energy systems.
- To provide in-depth knowledge in the key concepts of energy policies.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Analyze the national and international energy scenario of renewable energy Sources. **(K2)**

CO2 – Design the aerodynamics of wind turbines and calculate their energy production. **(K3)**

CO3 – Analyze electrical power generation from biomass, geothermal, tidal, wave etc. **(K2)**

CO4 – Analyze technical and sustainability issues involved in the integration of renewable energy systems. **(K2)**

CO5 – Compare the cost economics of using renewable energy sources with non-renewable energy sources. **(K2)**

UNIT I OVERVIEW AND SOLAR ENERGY

(09 Hrs)

Overview: Limitations of conventional energy resource - Importance of renewable sources - Types – Limitations - Present Indian and international energy scenario. Solar Energy: radiation – extra-terrestrial - spectral distribution - solar constant - solar radiation on earth – measurements. Solar thermal system – solar thermal power and its conversion - solar collectors - types and applications. Photovoltaic (PV) technology - photovoltaic effect - efficiency of solar cells - semi-conductor materials – Design Concept of solar PV system - standards and applications.

UNIT II WIND AND HYDRO POWER ENERGY

(09 Hrs)

Wind Energy: wind data – properties - speed and power relation - power extracted - wind distribution and speed prediction - wind map of India - wind turbines and electric generators - fundamentals – types of machines and their characteristics - horizontal and vertical wind mills - wind energy farms - off-shore plants- Selection factors. Case study on Wind power generation using micro wind turbine for residential purpose - Hydro Energy: small, mini and micro hydro power plants and their resource assessment - plant layout with major components -selection factors-application.

UNIT III ALTERNATE ENERGY SOURCES

(09 Hrs)

Biomass: Photosynthesis and origin of biomass energy – terms and definitions – pyrolysis, thermo-chemical biomass conversion to energy, gasification, anaerobic digester, fermentation, gaseous fuel; Geothermal: resources, hot spring, steam system, site selection, associated problems in development. Ocean and Tidal energy: principle of OTEC – wave energy conversion machines – fundamentals of tidal power, conversion systems and limitations – Introduction to fuel cells.

UNIT IV GRID INTEGRATION

(09 Hrs)

Wind power interconnection requirement - low-voltage ride through (LVRT), ramp-rate limitations, supply of ancillary services for frequency and voltage control - load and reserve requirement – issues in interconnection - steady - state and dynamic performance of power system – interfacing solar system with grid - protective relaying, islanding, Power quality issues.

UNIT V RENEWABLE ENERGY POLICY

(09 Hrs)

Renewable energy policies: Five Year Plan programmes - Feed-in tariffs - portfolio standards - policy targets, tax incentives – bio-fuels mandates - International policies for climate change and energy security - Economic analysis and comparisons - Life cycle analysis - financial analysis - cost of conserved energy and externalities - Cost assessment of supply technologies versus energy – Efficiency - Renewable Energy Certification – Carbon contents.

Text Books

1. G. N. Tiwari and M. K. Ghosal, “Renewable Energy Resources: Basic Principle and Application”, Alpha Science International Ltd, New Edition, 2005.
2. B. H. Khan, “Non-Conventional Energy Resources”, Tata McGraw Hill, 2nd Edition, 2009.
3. R. Loulou, P. R. Shukla and A. Kanudia, “Energy and Environment Policies for a sustainable Future”, Allied Publishers Ltd, New Delhi, 1997.

Reference Books

1. Solanki Chetan Singh, “Solar Photovoltaic - Fundamentals, Technologies and Applications”, PHI, New Delhi, 3rd Edition, 2015.
2. Mukund R Patel, “Wind and Solar Power Systems”, CRC Press, New York, 2nd Edition, 2011.

3. D. P. Kothari, K. C Singal, Rakesh Ranjan, "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt. Ltd, New Delhi, 2nd Edition, 2013.
4. John Twidell and Tony Weir, "Renewable Energy Resources", Routledge publication, 3rd Edition, 2015.
5. Godfrey Boyle, "Renewable Energy: Power for a Sustainable Future", Oxford University Press, 3rd Edition, 2014.
6. A. K. Mukerjee and Nivedita Thakur, "Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011.
7. Ali Keyhani, "Design of Smart Power Grid Renewable Energy Systems", Wiley Publication, 1st Edition, 2011.

Web References

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2. www.renewableenergyworld.com/rea/tech/home
3. www.eschooltoday.com/energy/renewable-energy
4. <https://www.chetansinghsolanki.in/course.php>
5. <https://nptel.ac.in/courses/108/108/108108078/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	3	-	-	-	-	-	-	-	2	3	2	2
2	3	2	2	3	-	-	-	-	-	-	-	2	3	2	2
3	3	2	2	3	-	-	-	-	-	-	-	2	3	2	2
4	3	2	2	3	-	-	-	-	-	-	-	2	3	2	2
5	3	2	2	3	-	-	-	-	-	-	-	2	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U19EEE53 /
U20EEE508

**ELECTRICAL ENERGY AUDIT AND
CONSERVATION**

L T P C Hrs
3 0 0 3 45

Course Objectives

- To know the necessity of conservation of energy.
- To understand the energy management schemes in motors.
- To understand the energy management methods in lighting schemes.
- To illustrate the metering schemes for energy management.
- To learn economic analysis and management techniques.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Outline about the energy audit process and instruments. **(K2)**

CO2 - Apply the energy efficient methods for improving efficiency of electric motors. **(K2)**

CO3 - Develop good illumination systems and analyze the power factor. **(K3)**

CO4 - Acquire knowledge on various meters used for energy management. **(K2)**

CO5 - Analyze and evaluate cost effective model in electrical equipments. **(K5)**

UNIT I INTRODUCTION

(9 Hrs)

Basics of energy – need for energy management – energy accounting – energy monitoring – targeting and reporting – energy audit – definitions – types of energy audit – audit instruments – audit of process industry – Case studies.

UNIT II ENERGY MANAGEMENT FOR MOTORS AND COGENERATION

(9 Hrs)

Energy management for electric motors: energy efficient controls and starting efficiency – motor efficiency and load analysis – selection of motors – energy efficient motors. Energy management by cogeneration: forms of cogeneration – electrical interconnection.

UNIT III LIGHTING SYSTEMS

(9 Hrs)

Energy management in lighting systems: task and the working space – light sources – ballasts – lighting controls – optimizing lighting energy – reactive power management – capacitor sizing – degree of compensation – capacitor losses –effect of harmonics – lighting and energy standards.

UNIT IV METERING FOR ENERGY MANAGEMENT

(9 Hrs)

Metering for energy management: units of measure – utility meters – demand meters – paralleling of current transformers – instrument transformer burdens – multi tasking solid state meters – metering location vs requirements – power analyzer – metering techniques and practical examples.

UNIT V ECONOMIC ANALYSIS AND MODELS

(9 Hrs)

Power system tariffs – Economic analysis: cash flow model – Time value of money – pay-back method – utility rate structures – cost of electricity – loss evaluation – load management – demand control techniques – utility monitoring and control system – economic analysis of HVAC systems.

Text Books

1. Barney L. Capehart, Wayne C. Turner, and William J. Kennedy, "Guide to Energy Management", The Fairmont Press, Inc., 5th Edition, 2006.
2. Frank Kreith, D. Yogi Goswami, "Energy Management and Conservation Handbook", CRC Press, 2nd Edition, 2016.
3. Wayne C. Turner, "Energy Management Handbook", The Fairmont Press, 4th Edition, 2001.

References Books

1. P. Venkatasashaiah K.V. Sharma, "Energy Management and Conservation", Dreamtech Press, 1st Edition, 2020.
2. Amit K. Tyagi, "Handbook on Energy Audits and Management", TERI, 1st Edition, 2003.
3. ICAI, "Electricity in buildings good practice guide", McGraw-Hill Education, 1st Edition, 2017.

Web References

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2. <https://www.youtube.com/watch?v=onlhwmbl8CA>
3. <https://www.youtube.com/watch?v=CTt4y8bokWs>
4. <https://ieeexplore.ieee.org/document/7977655>
5. <https://ieeexplore.ieee.org/document/993185>
6. <https://ieeexplore.ieee.org/document/6450335>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	3	-	-	-	-	-	-	-	-	1	1	1	1
2	3	2	3	-	-	-	-	-	-	-	-	1	3	2	3
3	3	2	3	-	-	-	-	-	-	-	-	1	3	2	3
4	3	2	2	-	-	-	-	-	-	-	-	1	2	1	2
5	2	2	3	-	-	-	-	-	-	-	-	1	2	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

U19EEE54 / U20EEE509	AUTOMOTIVE ELECTRONICS FOR ELECTRICAL ENGINEERING	L T P C	Hrs
		3 0 0 3	45

Course Objectives

- To study the basics of emission controls and its importance in automobiles.
- To provide adequate knowledge on ignition and injection systems.
- To study the various sensors and actuators used in automobiles for improving fuel economy and emission control.
- To study the various blocks of control units used for control of fuel, ignition and exhaust systems.
- To impart the knowledge on chassis and safety systems.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Acquire knowledge on control elements, emission norms and standards in automobiles.[K2]

CO2 – Classify the electronic fuel injection/ignition components and their functions.[K2]

CO3 – Interface automotive sensors and actuators with microcontrollers.[K2]

CO4 – Diagnose electronic engine control system problems with appropriate diagnostic tools.[K3]

CO5 – Analyse the chassis management system and safety system provided in the vehicles.[K2]

UNIT I INTRODUCTION

(09 Hrs)

Evolution of electronics in automobiles – Emission laws – Emission norms and Standards, Charging systems-Working - design –Types, D.C. and AC dynamo, flywheel magneto charging system and Alternators - controlling and regulator system: Relay/cut-out, voltage and current regulator, electronic regulator, characteristics. Drive for Charging system – Requirements of starting system - Starter motors and starter circuits.

UNIT II IGNITION AND INJECTION SYSTEMS

(09 Hrs)

Ignition systems: Ignition fundamentals - Requirements. Types- Ballast Resistance, Ignition coil characteristics, Cam angle and contact angle gap, spark advance mechanism, spark plug, ignition timing, multi-cylinder distributor, Distributor (contact breaker ignition system), limitations - spark plug: characteristics, material, types, plug fouling - Electronic fuel Control: Basics of combustion – Engine fuelling and exhaust emissions – carburetor – Petrol and diesel fuel injection.

UNIT III SENSOR AND ACTUATORS

(09 Hrs)

Airflow rate, Engine crankshaft angular position, Throttle angle, exhaust gas oxygen sensors, Instrument Cluster panel, fuel gauges, oil temperature gauge, warning light sensors, coolant temperature gauge, speedometer, Odometer, tachometer, trip meter, oil level indicator, parking brake indicator, direction indicators – exhaust gas recirculation actuators, stepper motor actuator and vacuum operated actuator.

UNIT IV ENGINE CONTROL SYSTEMS

(09 Hrs)

Control modes for fuel control-engine control subsystems – ignition control methodologies – Engine management system – Block diagram - different engine control units (ECU's). Vehicle networks: Controller Area Network (CAN) standard – Diagnostics systems in modern automobiles. Digital Engine control system – Development of Motor and Generator Model.

UNIT V CHASSIS AND SAFETY SYSTEMS

(09 Hrs)

Traction control system – Cruise control system – electronic control of automatic transmission – antilock braking system – electronic suspension system - Steering - power steering, collapsible and tiltable steering column – steer by wire – Airbag : working, role of Micro Electro-Mechanical Systems – centralized door locking system – climate control in Vehicle - Vision enhancement, road recognition system, Anti-theft technologies, smart key system,

Text Books

1. Tom Denton, "Automobile Electrical and Electronics Systems", Edward Arnold Publishers, 5th Edition, 2018.
2. William B. Ribbens, "Understanding Automotive Electronics", Newnes Publishing, 8th Edition, 2017.

References Books

1. Barry Hollembeak, "Automotive Electricity, Electronics and Computer Controls", Delmar Publishers, 1st Edition, 2001.
2. Check-chart, Kalton C. Lahue and Alan Harold Ahlstrand, "Fuel System and Emission controls", Good Year Books, 3rd Edition, 2000.
3. Ronald. K. Jurgen, "Automotive Electronics Handbook", McGraw-Hill, 1st Edition, 1999.
4. Robert Bosch GmbH, "Bosch Automotive Electrics and Automotive Electronics Systems and Components, Networking and Hybrid Drive", John Wiley and Sons Inc., 5th Edition, 2007.

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2. <https://www.bosch-mobility-solutions.com/en/products-and-services>
3. <https://www.oreilly.com/library/view/understanding-automotive-electronics/>
4. <https://clr.es/blog/en/sensors-and-actuators-for-safer-driving/>
5. <https://www.te.com/usa-en/industries/sensor-solutions/applications/automotive-sensors.html>
6. <https://www.renesas.com/us/en/solutions/automotive/chassis.html>
7. <https://www.st.com/en/applications/chassis-and-safety.html>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	3	2	-	-	-	-	-	-	-	2	2	3	2
2	3	-	3	2	-	-	-	-	-	-	-	2	2	3	2
3	3	-	3	2	-	-	-	-	-	-	-	2	2	3	2
4	3	-	3	2	-	-	-	-	-	-	-	2	2	3	2
5	3	-	3	2	-	-	-	-	-	-	-	2	2	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U19EEE55 /
U20EEE510

INDUSTRIAL ELECTRICAL SYSTEM

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To impart basic ideas on electrical control components and electrical safety practices
- To provide the electrical wiring for residential and commercial buildings.
- To study on various illumination systems for commercial applications.
- To explain about the various components used for installation purpose.
- To impart knowledge on modern techniques used for the monitoring and control.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Acquire knowledge on electrical components used in industries. **(K2)**

CO2 – Design residential and commercial wiring connection. **(K4)**

CO3 – Design the different illumination systems for industries. **(K3)**

CO4 – Acquire knowledge on selection of installation components for industries. **(K3)**

CO5 – Apply the PLC and SCADA system for the automation of industries. **(K3)**

UNIT I ELECTRICAL CONTROL COMPONENTS

(09 Hrs)

LT system wiring components - selection of cables – wires – switches - distribution box - metering system - Tariff structure - protection components – Fuse – MCB – MCCB – ELCB - inverse current characteristics – symbols - single line diagram (SLD) of a wiring system – Contactor - Isolator – Relays – MPCB - Electric shock and Electrical safety practices.

UNIT II WIRING SYSTEMS

(09 Hrs)

Types of residential and commercial wiring - general rules and guidelines for installation – load calculation and sizing of wire - rating of main switch - distribution board and protection devices - earthing systems - requirements of commercial installation - lighting schemes - selection - sizing of components.

UNIT III ILLUMINATION SYSTEMS

(09 Hrs)

Light – lumen – intensity - candle power - lamp efficiency - specific consumption – glare - space to height ratio - waste light factor - depreciation factor - various illumination schemes - Incandescent lamps and modern luminaires like CFL - LED and their operation - energy saving in illumination systems - design of a lighting scheme - flood lighting.

UNIT IV INDUSTRIAL INSTALLATION COMPONENTS

(09 Hrs)

HT connection - industrial substation - Transformer selection - Industrial loads - motors - Cable and Switchgear selection - Lightning Protection - Earthing design - Power factor correction – kVAR calculations - type of compensation - Introduction to PCC- MCC panels. Specifications of LT Breakers - MCB and other LT panel components. DG (Diesel Generator) Systems - Electrical Systems for the elevator - Battery banks - Sizing the DG - UPS System - Online and OFF line UPS - Battery Banks- Selection of UPS and Battery Banks.

UNIT V INDUSTRIAL AUTOMATION

(09 Hrs)

Study of basic PLC - Role of automation-advantages of process automation - PLC based control system design - Panel Metering - Introduction to distributed control system (DCS) and SCADA system for distribution automation.

Text Books

1. H. Partab , “Art and Science of Utilization of Electrical Energy”, 2nd Edition, Dhanpat Rai and Co., 2017
2. B. P. Patil, M. A. Chaudhari, “Industrial Electrical Systems - I”, 2nd Edition, Nirali Prakashan publications, 2015
3. R. K. Rajput, “Utilization of Electrical Power”, Laxmi Publications., 2nd Edition, 2016.

References Books

1. Frank Lamb, “Industrial Automation: Hands On”, McGraw-Hill Professional, 1st Edition, 2013.
2. C. L. Wadhwa, “Generation, Distribution and Utilization of Electrical Energy”, New Age International, 4th Edition, 2017.

Web References

1. <https://nptel.ac.in/courses/108/105/108105091/>
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-061-introduction-to-electric-power-systems-spring-2011/>

3. <https://nptel.ac.in/courses/108/108/108108077/>

4. <https://nptel.ac.in/courses/108/105/108105088/>

5. <https://nptel.ac.in/courses/108/105/108105062/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	1	-	-	2	-	-	-	-	-	2	1	2	3
2	2	-	1	-	-	2	-	-	-	-	-	1	1	1	1
3	2	-	1	-	-	2	-	-	-	-	-	1	1	1	3
4	2	-	1	-	-	2	-	-	-	-	-	1	2	2	2
5	2	-	2	-	-	2	-	-	-	-	-	2	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U20BST542	NUMERICAL METHODS AND OPTIMIZATION	L	T	P	C	Hrs
		2	2	0	3	60

Course Objectives

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To understand the numerical technique of solving linear simultaneous equations.
- To introduce the numerical techniques of interpolation in various intervals.
- To understand the knowledge of various optimization techniques and methods of solving various types of partial differential equations.
- To acquaint the knowledge of various methods of linear programming problems.

Course Outcomes

After completion of the course, the students will be able to

- CO1** - Understand the basic concepts and numerical techniques of solving algebraic and transcendental equations. [K3]
- CO2** - Understand the knowledge of various numerical techniques of solving linear simultaneous equations. [K3]
- CO3** - Appreciate the numerical techniques of interpolation and error approximations in various Intervals. [K3]
- CO4** - Apply the optimization techniques for various types of partial differential equations. [K3]
- CO5** - Analyze the optimization technique and use the simplex method to solve linear programming problems. [K3]

UNIT I SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS AND EIGEN VALUE PROBLEMS (12 Hrs)

Solution of algebraic and transcendental equations and Eigen value problem – The method of bisection - Method of false position - Newton Raphson method (single and system of two equations) Eigen value and Eigen vector by power method

UNIT II LINEAR SIMULTANEOUS EQUATIONS (12 Hrs)

Solution of linear simultaneous equations and matrix inversion - Gauss Elimination methods -Gauss-Jordan methods - Iterative methods of Gauss Jacobi and Gauss Seidel.

UNIT III INTERPOLATION (12 Hrs)

Interpolation: Finite Differences - Relation between operators - Interpolation by Newton's forward and backward difference formula for equal intervals - Newton's divided difference method and Lagrange's method for unequal intervals - Differentiation based on finite differences - Integration by Trapezoidal and Simpson's rules(Single integration only).

UNIT IV SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (12 Hrs)

Optimization Techniques - Jacobians and their properties - Taylor's series for functions of two variables - Maxima and minima - Lagrange's method of undetermined multipliers.

UNIT V LINEAR PROGRAMMING PROBLEMS (12 Hrs)

Introduction to Linear Programming - Graphical Method - Simplex Method - Maximization and minimization.

Text Books

1. Atul Goyal, Madhuchanda Rakshit Suchet Kumar, "Numerical Methods", New India publishing Agency, 1st Edition, 2019.
2. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers", McGraw Hill, 8th Edition, 2020.
3. T. Veerarajan, "Operation Research", McGraw Hill, 1st Edition, 2018.

Reference Books

1. Sia, "Numerical Methods", Sia Publishers and Distributors Pvt. Ltd., 1st Edition, 2018.
2. Rajesh Kumar Gupta, "Numerical Methods - Fundamental and Applications", Cambridge University Press, 1st Edition, 2019.
3. A. Ravi Ravindran, "Operations Research Methodologies", Taylor and Francis, 1st Edition, 2019.
4. Kevin J. Hastings, "Introduction to the Mathematics of Operations Research with Mathematica", Taylor and Francis, 2nd Edition, 2019.
5. P. K. Gupta, D. S. Hira, "Operations Research", S. Chand, 5th Edition, 2018

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1. <https://nptel.ac.in/courses/111/106/111106101/>
2. <https://www.geektonight.com/operation-research-notes-pdf/#.XrXzoP8za00>
3. <http://freecomputerbooks.com/Numerical-Methods-with-Applications.html>
4. <http://www.pphmj.com/journals/IJNMA.htm>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	1	-	-	-	-	-	-	1	1	1
CO2	3	3	3	2	-	1	-	-	-	-	-	-	1	1	1
CO3	3	3	3	2	-	1	-	-	-	-	-	-	1	1	1
CO4	3	3	1	-	-	-	-	-	-	-	-	-	1	1	1
CO5	3	3	1	-	-	-	-	-	-	-	-	-	1	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Course Objectives

- To acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.
- To make students aware of the theoretical and functional aspects of the Indian Parliamentary System.
- To channelize students thinking towards basic understanding of the legal concepts and its implications for engineers.
- To acquaint students with latest intellectual property rights and innovation environment with related regulatory framework.
- To make students learn about role of engineering in business organizations and e-governance.

Course Outcomes

After completion of the course, the students will be able to

- CO 1 - Identify and explore the basic features and modalities about Indian constitution.
- CO 2 - Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
- CO 3 - Differentiate different aspects of Indian Legal System and its related bodies.
- CO 4 - Discover and apply different laws and regulations related to engineering practices.
- CO 5 - Correlate the role of engineers with different organizations and governance models

UNIT I INDIAN CONSTITUTION

Salient Features - Preamble - Fundamental Rights – Directive Principles of State Policy - Fundamental Duties

UNIT II PARLIAMENTARY SYSTEM

Powers and Functions of President and Prime Minister - Council of Ministers - The Legislature Structure and Functions of Lok Sabha and Rajya Sabha – Speaker

UNIT III THE JUDICIARY

Organization and Composition of Judiciary - Powers and Functions of the Supreme Court - Judicial Review – High Courts.

UNIT IV STATE GOVERNMENTS

Powers and Functions of Governor and Chief Minister – Council of Ministers - State Legislature

UNIT V LOCAL GOVERNMENTS

73rd and 74th Constitutional Amendments – Federalism - Center – State Relations

Text Books

1. Basu D.D, "Introduction to Indian Constitution", Prentice Hall of India, New Delhi, 2015.
2. Gupta D.C, "Indian Government and Politics", Vikas Publishing House, New Delhi, 2010.

Reference Books

1. Pylee M.V, "Introduction to the Constitution of India", Vikas Publishing House, New Delhi, 2011.
2. Kashyap S, "Our Constitution", National Book Trust, New Delhi, 2010

Web References

1. <https://legislative.gov.in/constitution-of-india>
2. https://www.constitutionofindia.net/constitution_of_india
3. <https://www.india.gov.in/my-government/constitution-india>
4. <https://www.clearias.com/constitution-of-india/>
5. <https://www.servat.unibe.ch/icl/in00000.html>

SEMESTER – VI (R-2019 Regulations)		
Sl. No	Course Code	Course Title
Theory		
1	U19EET61	Embedded System
2	U19EET62	Power Electronics
3	U19EET63	Power System Analysis
4	U19EET64	Electrical Machine Design
5	U19EEE4X	Professional Elective - III
6	U19XXO4X	Open Elective – III
Practical		
7	U19EEP61	Embedded System Lab
8	U19EEP62	Power Electronics and Drives Lab
9	U19EEP63	Power System Analysis Lab
Employability Enhancement Course		
10	U19EEC6X	Certification Course - IV
11	U19EES61	Skill Development Course 7: Foreign Language / IELTS - II
12	U19EES62	Skill Development Course 8: Technical Seminar
13	U19EES63	Skill Development Course 9: NPTEL / MOOC - I
Mandatory Course		
14	U19EEM61	Professional Ethics
Professional Elective – III (Offered in Semester VI)		
1	U19EEE61	Smart Grid
2	U19EEE62	High Voltage Engineering
3	U19EEE63	Special Electrical Machines
4	U19EEE64	Digital Signal Processing
5	U19EEE65	Electric Drives

SEMESTER – VI (R-2020 Regulations)		
Sl. No	Course Code	Course Title
Theory		
1	U20EET616	Embedded System
2	U20EET617	Renewable Energy Sources
3	U20EET618	Power System Analysis
4	U20EET619	Electrical Machine Design
5	U20EEE6XX	Professional Elective - III #
6	U20XXO6XX	Open Elective – III \$
Practical		
7	U20EEP612	Embedded System Lab
8	U20EEP613	Renewable Energy Lab
9	U20EEP614	Power System Analysis Lab
Employability Enhancement Course		
10	U20EEC6XX	Certification Course – VI
11	U20EES606	Skill Development Course 6: Foreign Language / IELTS - II
12	U20EES607	Skill Development Course 7: Technical Seminar
13	U20EES608	Skill Development Course 8: NPTEL / MOOC - I
Mandatory Course		
14	U20EEM606	Essence of Indian Traditional Knowledge
Professional Elective – III (Offered in Semester VI)		
1	U20EEE611	Smart Grid
2	U20EEE612	High Voltage Engineering
3	U20EEE613	Electric Drives
4	U20EEE614	Digital Signal Processing
5	U20EEE615	Fuzzy and Neural Systems

U19EET61 /
U20EET616

EMBEDDED SYSTEM

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To gain knowledge about the fundamentals of embedded systems and its communication protocols.
- To understand the architectural features of ARM processor.
- To learn about the different programming techniques for ARM processor
- To impart knowledge on ARM processor peripherals with device driver and its interface circuits
- To provide a platform for the student to design, implement, integrate, and develop software and hardware applications with the real time system.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Explain the basic building process of embedded system. **(K2)**

CO2 - Analyze any type of Microcontroller Architecture in detail. **(K4)**

CO3 - Apply the instruction sets to program ARM processor using Embedded C in KEIL software/ Micro C. **(K3)**

CO4 - Provides the experience to integrate hardware and software for any microprocessor / microcontroller for product designing such as smart-phones, microcomputers etc. **(K4)**

CO5 - Impart the concepts of RTOS in accessing shared resources for optimized CPU performance, timing based operations, video streaming and audio streaming etc. **(K3)**

UNIT I OVERVIEW OF EMBEDDED SYSTEMS

(09 Hrs)

Basics of Embedded Systems – I/O Devices: Types and Examples – Synchronous, ISO- Synchronous and Asynchronous Communication – Serial Communication devices and Protocols: I²C, SPI, UART - Parallel Device Ports.

UNIT II ARM ARCHITECTURE

(09 Hrs)

ARM Programmer's model - Registers – Processor modes - Pipeline - Interrupts – ARM organization - ARM processor families – Instruction sets – Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions – ARM Memory Management Unit.

UNIT III ARM PROCESSOR PROGRAMMING

(09 Hrs)

Writing and optimizing the embedded C Code – Profiling and Cycle Counting – Instruction Scheduling – Register Allocation – Conditional Execution – Looping Constructs – Bit Manipulation - Timers and counters - Watchdog timer. Programming Tools: KEIL IDE.

UNIT IV ARM PROCESSOR PERIPHERALS

(09 Hrs)

SPI and I²C – UART – Analog to Digital conversion – temperature sensor – light sensor– accelerometer - Digital to Analog conversion – Digital sensors.

UNIT V RTOS FOR EMBEDDED SYSTEMS

(09 Hrs)

Introduction to RTOS - Task and Task Scheduler - Scheduling policies – Interrupt Service Routines – Inter process communication mechanisms – Design issues- Introduction to Microcontroller/ Operating System.

Text Books

1. Steve Furber, "ARM System-on-Chip Architecture", Pearson Education, 2nd Edition, 2016.
2. Trevor Martin, "The Insider's Guide to the Philips ARM7-Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series", Hitex (UK) Ltd., 3rd Edition, 2014.
3. Jonathan W. Valvano, Brookes / Cole, "Embedded Microcomputer Systems, Real Time Interfacing", Thomas Learning, 2nd Edition, 1999.

Reference Books

1. Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2nd Edition, 2012.
2. Elicia White, "Making Embedded Systems", O' Reilly Series, 1st Edition, 2011.
3. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM Systems Developer's Guides - Designing and Optimizing System Software", Elsevier, 2008.
4. Peckol, "Embedded system Design", John Wiley and Sons, 2nd Edition, 2010.
5. Frank Vahid, "Embedded System Design—A Unified Hardware and Software Introduction", John Wiley, 1st Edition, 2002.

Web References

1. https://www.tutorialspoint.com/embedded_systems/es_overview.htm
2. <https://developer.arm.com/architectures/learn-the-architecture/introducing-the-arm-architecture/single-page>
3. <https://www.coursera.org/lecture/iot/lecture-1-1-what-are-embedded-systems-Gah7g>
4. <https://nptel.ac.in/courses/108102045/>
5. <https://www.eeweb.com/app-notes/tags/arm>
6. https://en.wikibooks.org/wiki/Embedded_Systems/Real-Time_Operating_Systems

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
2	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
3	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
4	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
5	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

U19EET62 /
U20EET513

POWER ELECTRONICS

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To explain about the operations, switching characteristics of power semiconductor devices
- To study the operations and performance parameters of controlled Rectifiers.
- To analyze the operation and performance of dc to dc converters.
- To impart knowledge on different control techniques for inverters.
- To familiarize the principle of operation of AC voltage controllers and cyclo converters

Course Outcomes

After completion of the course, the students will be able to

CO1 – Discriminate the switching characteristics of power devices and to use for power conversion. **(K2)**

CO2 – Inspect the performance of control rectifiers in continuous and discontinuous modes. **(K2)**

CO3 – Acquire knowledge on operation and analysis of DC to DC converters **(K2)**

CO4 – Outline the operating principles of various types of inverters. **(K2)**

CO5 – Gain knowledge on the operation of AC to AC converters and its applications **(K2)**

UNIT I POWER SEMI-CONDUCTOR DEVICES

(9 Hrs)

Study of switching characteristics of MOSFET, IGBT and SCR. Turn on and Turn off methods of SCR – Protection circuits – Triggering circuits.

UNIT II PHASE-CONTROLLED CONVERTERS

(9 Hrs)

Operation and analysis of single and three phase controlled rectifiers – half and fully controlled Converters with R, RL and RLE loads – Effect of source inductance on controlled rectifiers – Power factor and harmonic improvement methods - series converter, twelve pulse converter, Dual converter- circulating and non-circulating current mode.

UNIT III DC TO DC CONVERTERS

(9 Hrs)

Principles of step down and step up chopper – Class A, B, C, D and E chopper, voltage commutated, current commutated chopper, multi-phase chopper, principle of operation of buck, boost and buck boost regulators – switching schemes.

UNIT IV INVERTERS

(9 Hrs)

Single phase and three phase voltage source inverters – Voltage and harmonic control techniques – Capacitor commutated current source inverter and auto sequential current source inverter.

UNIT V AC CHOPPER AND CYCLO CONVERTERS

(9 Hrs)

Single phase and Three-phase AC voltage controllers – Control strategy – Single phase step-up/step-down midpoint type and bridge type cyclo-converters – Three phase cyclo-converters. Applications – regulated power supply, UPS, solid-state motor starter.

Text Books

1. P. S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 6th Edition, 2018.
2. M.H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, New Delhi, 4th Edition, 2017.

Reference Books

1. Ned Mohan, M. Underland, William P. Robbins, "Power Electronics Converters, applications and design", JohnWiley & sons, Singapore, 2001.
2. M. D. Singh, K. B. Khanchandani, "Power Electronics", Tata McGraw Hill, New Delhi, 2007.
3. Cyril W. Lander, "Power Electronics", McGraw Hill Book Company, Singapore, 1993.
4. Williams B.W., "Power Electronics Devices, drivers, applications and passive components", McMillan Press Ltd., London, 1992.

Web References

1. https://www.tutorialspoint.com/power_electronics/index.htm
2. <https://www.allaboutcircuits.com/technical-articles/a-review-on-power-semiconductor-devices/>
3. <https://www.electrical4u.com/concept-of-power-electronics/>
4. <https://nptel.ac.in/courses/108/101/108101038/>
5. <https://nptel.ac.in/courses/108/102/108102145/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
2	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
3	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
4	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
5	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

U19EET63 /
U20EET618

POWER SYSTEM ANALYSIS

L	T	P	C	Hrs
3	2	0	4	60

Course Objectives

- To create computational models for power system using per unit analysis.
- To perform load flow analysis using Gauss Seidal and Newton-Raphson methods.
- To analyze the sequence network using symmetrical components.
- To impart the knowledge about symmetrical and unsymmetrical faults in power system.
- To demonstrate different methods and factors influencing on power system stability

Course Outcomes

After completion of the course, the students will be able to

- CO1** – Compute the reactance diagram and network matrices. **(K4)**
CO2 - Apply the iterative techniques to solve the power flow analysis used in power system planning. **(K3)**
CO3 - Analyze the Sequence networks using positive, negative and zero sequence network. **(K4)**
CO4 - Carry out short circuit studies to design the circuit breaker ratings in power system **(K4)**
CO5 - Analyze stability problems in power system during pre-fault and post-fault conditions **(K4)**

UNIT I MODELING OF POWER SYSTEM COMPONENTS

(12 Hrs)

Need for system planning and operational studies - Power scenario in India - Power system components – Representation - Single line diagram - Per unit quantities - P.U. impedance / reactance diagram - Formulation of network matrices for the power systems - Bus impedance and bus admittance matrices - Reduction techniques on network matrices for network changes - Z bus Building algorithm.

UNIT II LOAD FLOW STUDIES

(12 Hrs)

Classification of buses - formulation of load flow problem - Load flow solution by Gauss - Seidal, Newton - Raphson and Fast Decoupled Load Flow (FDLF) Analysis - Comparison - Computation of slack bus power, transmission loss and line flow - Voltage Control Methods - Tap-changing and phase - shifting transformers.

UNIT III SYMMETRICAL COMPONENTS AND SEQUENCE NETWORKS

(12 Hrs)

Symmetrical components – Simple problems to calculate symmetrical voltages and currents - Sequence networks- positive, negative and zero sequence networks - Sequence networks of Series impedance, loads and Rotating machines – Advantages and Limitations.

UNIT IV FAULT ANALYSIS

(12 Hrs)

Need for fault analysis - Types of faults - Symmetrical fault analysis through bus impedance matrix - Analysis of unsymmetrical faults- LG, LL and LLG - Analysis of simultaneous unbalanced short circuit and open conductor faults in power systems – short circuit capacity – circuit breaker selection - Representation of various types of faults in sequence networks.

UNIT V STABILITY STUDIES

(12 Hrs)

Definition - Importance of stability analysis- classifications - Steady state and transient stability - Angle and voltage stability - Single Machine Infinite Bus (SMIB) system - swing equation – Swing Curve - Numerical integration methods - Equal area criterion - Critical clearing angle and time - Factors affecting stability - Methods of improving transient stability - Contingency selection and ranking for the power system.

Text Books

1. P. Kundur, "Power System Stability and Control", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th Reprint, 2013.
2. D. P. Kothari and I. J. Nagrath, "Power System Engineering", Tata McGraw-Hill Education, 3rd Edition, 2019.
3. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st Reprint, 2010.

Reference Books

1. M. A. Pai, "Computer Techniques in Power System Analysis", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2nd Edition, 2012.
2. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, "Power System Analysis and Design", Cengage Learning, 5th Edition, 2016.
3. John J. Grainger, Jr. William D. Stevenson, "Power System Analysis", McGraw Hill Education (India) Private Limited, New Delhi, 2nd Edition, 2015.

Web References

1. <https://nptel.ac.in/courses/108/105/108105067/>
2. <https://nptel.ac.in/courses/108/107/108107127/>
3. https://pserc.wisc.edu/webinars/systems_webinars.aspx
4. <https://www.classcentral.com/course/swayam-power-system-analysis-14243>

COs/POs/PSOs Mapping

COs	Program Outcomes(POs)												Program Specific Outcomes(PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	3	-	-	-	-	-	-	1	3	2	2
2	3	2	1	1	3	-	-	-	-	-	-	1	3	2	2
3	3	3	2	2	3	-	-	-	-	-	-	1	3	2	2
4	3	3	2	2	3	-	-	-	-	-	-	1	3	2	2
5	3	3	2	2	3	-	-	-	-	-	-	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EET64 /
U20EET619

ELECTRICAL MACHINE DESIGN

L	T	P	C	Hrs
2	2	0	3	60

Course Objectives

- To understand the design considerations, thermal rating, insulation requirements and magnetic circuit calculations of static and rotating electrical machines.
- The course refreshes the construction details and design aspects of various parts of DC machines.
- To provide the knowledge on the design aspects of transformer with minimum cost.
- The course refreshes the construction details and design aspects of various parts of induction motor.
- To equip the students with construction details and design aspects of synchronous machines and BLDC motor.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Design the machines with proper thermal rating and insulation requirements. **(K3)**

CO2 - Analyze and evaluate the various design parameters of a DC machine for variable speed motor applications in industry. **(K4)**

CO3 - Analyze the various parameters of transformer and to design distribution and power transformers for real time applications. **(K4)**

CO4 - Analyze and formulate the suitable design for three phase induction motor. **(K4)**

CO5 - Apply the design concepts of Synchronous machines and BLDC motors. **(K3)**

UNIT I INTRODUCTION

(12 Hrs)

Design Factors and Limitations – Modern Trends - Major considerations in Electrical Machine Design – Biot Savart law - soft magnetic materials, Electrical steel sheets, Classification of insulating materials – Design of Magnetic circuits – Magnetizing current – Flux leakage – real and apparent flux densities -, heating and cooling curves – rating of electric machines- calculation of effective magnetic flux in a motor- Magnetic circuit and reluctance calculation with two different materials.

UNIT II DESIGN OF DC MACHINES

(12 Hrs)

Construction - Output Equation – Main Dimensions – Choice of specific loadings – Selection of number of poles – Dimensions of yoke, main pole and air gap - Estimation of ampere turns for the magnetic circuits - Design of lap winding and wave winding – Design of Armature – Design of Commutator and brushes – Design of shunt and series field system - reduction of eddy current in conductors in rotating machine.

UNIT III DESIGN OF TRANSFORMERS

(12 Hrs)

Construction – Output Equation (1- ϕ and 3- ϕ) – Expression for volts/ turn, estimation of no. of turns – choice of specific loadings – Overall dimensions -design of yoke, core and winding for core and shell type transformers – Estimation of No load current and Voltage regulation– Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers – Expression for the leakage reactance of core type transformer with concentric coils.

UNIT IV DESIGN OF THREE PHASE INDUCTION MOTORS

(12 Hrs)

Construction - Output equation– Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor - Design of stator slots and Winding, Choice of Length Air Gap, Estimation of Number of Slots for Squirrel Cage Rotor. Design of Rotor Bars and end Ring. Magnetic leakage calculations – Operating characteristics: Magnetizing current - Short circuit current.

UNIT V DESIGN OF SYNCHRONOUS MACHINES AND BLDC MOTORS

(12 Hrs)

Construction - Output equations – choice of specific loadings – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of salient and non salient pole rotors – Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators.

Computer Aided Design: Design of DC machines, Design of single phase Transformer

Text Books

1. A. K. Sawhney "A Course in Electrical Machine Design", Dhanpat Rai & Sons, New Delhi, 6th Edition, 2016.
2. M. V. Deshpande, "Design and Testing of Electrical Machines", PHI learning Pvt. Ltd, 3rd Edition, 2010.
3. S. K. Sen, "Principles of Electrical Machine Designs with Computer Programmes", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2nd Edition, 2009.

Reference Books

1. A. Shanmugasundaram, G. Gangadharan, R. Palani, "Electrical Machine Design Data Book", New Age International Pvt. Ltd., 1st Edition, 2011.
2. A.Nagoor kani, "A Simplified text in Electrical Machine Design", RBA publications, Second Edition, 2013.
3. Thomas A. Lipo, "Introduction to AC Machine Design", John wiley & sons inc., 1st Edition, 2017.
4. K. M. Vishnumurthy, "Computer aided design of electrical machines", B S Publications, 1st Edition, 2015.

Web References

1. <http://nptel.vtu.ac.in/econtent/courses/EEE/06EE63/2.php>.
2. <https://nptel.ac.in/courses/108/106/108106023>.
3. <https://www.windings.com/technical-reference/basic-motor-design-tutorial>.
4. <https://ndl.iitkgp.ac.in/homestudy/engineering>.
5. <http://electrical-engineering-portal.com/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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2	3	2	2	3	-	-	-	-	-	-	-	1	3	2	3
3	3	3	2	3	-	-	-	-	-	-	-	1	3	3	3
4	3	3	3	3	-	-	-	-	-	-	-	1	3	2	3
5	3	3	3	2	-	-	-	-	-	-	-	1	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Course Objectives

- To study and Identify hardware and software components to build an embedded system.
- To demonstrate the interfacing of peripherals with ARM7 Processor.
- To understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.
- To gain knowledge and design of microcontroller based embedded system.
- To create a real-time system for particular applications.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Explain the working of ARM Processor, FPGA and raspberry pi **(K3)**

CO2 - Interface ARM7 Processor, FPGA and raspberry pi Microcontrollers with external Peripheral devices.**(K4)**

CO3 - Handle interrupts for real time control applications using ARM Processor.**(K4)**

CO4 - Generate PWM signals for motor control applications. **(K4)**

CO5 - Design and develop interface between controller and device.**(K4)**

LIST OF EXPERIMENTS

1. Study on ARM processor starter kit
Conduction of following experiments using ARM processor
 2. Interfacing ADC and DAC
 3. Interfacing real time clock
 4. Interfacing Keyboard and LCD
 5. Interfacing SPI and interrupt
 6. Interfacing stepper motor
 7. Interfacing temperature sensor
 8. Interfacing of PWM based LED lighting board
 9. Zig Bee RF module with sensor, I2C and UART interfacing
 10. Interfacing audio card
11. Study on FPGA developer board for PWM generation
12. Study on Raspberry pi for IoT application
13. Study on Real Time Operating Systems

Reference Books

1. Tim Wilmshurst, "An introduction to the design of small-scale embedded systems", Palgrave Macmillian, 2001.
2. Venkateswaran Sreekrishnan, "Essential Linux Device Drivers", Prentice Hall, 2nd Edition, 2008.
3. Raj Kamal, "Embedded Systems-Architecture, Programming and Design", Tata McGraw Hill, 3rd Edition, 2017.
4. Lyla B. Das, "Embedded Systems-an integrated approach", Pearson Education, 1st Edition, 2013.
5. K.V. Shibu, "Introduction to Embedded Systems", Tata McGraw Hill, 2nd Edition, 2016.
6. Michael J. Pont, "Embedded C", Addison Wesley, 1st Edition, 2002.
7. Laplante, Phillip, "Real-Time Systems Design and Analysis: An Engineer's Handbook", IEEE Press, 4th Edition, 2012.
8. David E. Simon, "An Embedded Software Primer", Pearson Education, 1st Edition, 2012.

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1. <https://nptel.ac.in/courses/108/102/108102045/>
2. <https://nptel.ac.in/courses/106/105/106105193/>
3. <https://nptel.ac.in/courses/108/105/108105057/>
4. <https://nptel.ac.in/courses/117/106/117106112/>
5. <https://nptel.ac.in/courses/106/103/106103182/>
6. <https://developer.arm.com/architectures/learn-the-architecture/introducing-the-arm-architecture/single-page>
7. <https://www.eeweb.com/app-notes/tags/arm>
8. https://www.tutorialspoint.com/embedded_systems/es_overview.htm

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
2	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
3	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
4	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
5	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U19EEP62
/U20EEP510

POWER ELECTRONICS AND DRIVES LAB

L	T	P	C	Hrs
0	0	2	1	30

Course Objectives

- To introduce the concepts involved in power semiconductor devices and its characteristics and to understand the basics of triggering circuits.
- To analyze the basic Power electronic circuit topologies including AC-DC, DC-DC, DC-AC and AC-AC converters.
- To enable the students to do simulation of Converter circuits and experimentally verify the results.
- To study and analyze the operation of the DC and AC drives.
- To introduce the industrial control of power electronic circuits as well as safe electrical connection and measurement practices.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Analyze the fundamental operations of power semiconductor devices and its characteristics. **(K3)**

CO2 – Demonstrate the operation of various power converters circuits. **(K4)**

CO3 – Illustrate the operating characteristics of AC and DC Drives. **(K4)**

CO4 – Acquire knowledge on design and implementation of Microcontroller based control schemes for electrical drives. **(K5)**

CO5 – Design and implement the closed loop controllers for converters. **(K5)**

List of Experiments

1. Characteristics of SCR, TRIAC, MOSFET and IGBT.
2. Analyzing frequency spectra of periodic and non-periodic signals using Spectrum analyzer.
3. Single phase half and fully controlled converter
4. Three phase half and fully controlled converter.
5. Step Down chopper, Step up Chopper and Multi-quadrant chopper
6. Single phase AC voltage controller
7. Single phase step up and step down cycloconverter
8. Single phase and three phase IGBT based PWM inverter
9. Converter/ Chopper fed DC motor.
10. Speed control of Inverter fed Induction motor.
11. Microcontroller based control schemes for Stepper Motor.
12. Study of microcontroller based BLDC Motor Drive.
13. Study of voltage regulation of DC buck converter

Reference Books

1. G. K. Dubey, "Fundamentals of Electrical Drives", Narosa Publishing House, 2nd Edition, 2010.
2. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, PHI, New Delhi, 4th Edition, 2017
3. P. S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 6th Edition, 2018.
4. M. D. Singh and K. B. Khachandani, "Power Electronics", McGraw-Hill Education, 2nd Edition, 2017.
5. R .Krishnan, "Electric Motor Drives - Modeling, Analysis, and Control", Pearson Education India, 1st Edition, 2015.
6. John F. Wakerly, "Digital Design Principles and Practices", Pearson prentice hall, 4th Edition, 2009.

Web References

1. <https://nptel.ac.in/courses/108/105/108105066/>
2. <http://www.smpstech.com/websites.htm>
3. <http://www.electronics-tutorials.ws/>
4. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-334-power-electronics-spring-2007/>
5. <https://ndl.iitkgp.ac.in/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
2	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
3	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
4	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3
5	3	3	2	2	3	-	-	-	2	1	-	1	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Course Objectives

- To analyze the electrical power system using per unit analysis.
- To apply iterative techniques for power flow analysis of power system.
- To carry out short circuit studies and Economic load dispatch on power system.
- To analyze Load curve and Load duration curve.
- To model and analyze the voltage and frequency control loops in power system.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Calculate the reactance values of power system components

CO2 - Formulate Bus Admittance and Impedance matrices, used in power flow analysis.

CO3 - Analyze the voltage and power flow condition of power system using Gauss Seidal and Newton Raphson methods.

CO4 - Analyze Symmetrical and Unsymmetrical faults in power system used to design relays and circuit breakers.

CO5 - Develop the load and load duration curves for calculating average load, unit generated load factor, etc.

LIST OF EXPERIMENTS

1. Computation of power system components in per units.
2. Modeling and Computation of Transmission Line Parameters
3. Formulation of a bus impedance matrix and admittance Matrix
4. Symmetrical components for different case studies
5. Short circuit studies of Power System.
6. Analysis of power-flow problem using Gauss-Seidel method.
7. Analysis of power-flow problem using Newton Raphson method.
8. Analysis of Economic load dispatch in power system.
9. Load curve and load duration curve
10. Numerical Integration of Swing equation
11. Modeling and Analysis of Load frequency control
12. Modeling and Analysis of Automatic Voltage Regulator system
13. Stability analysis of SMIB System

Reference Books

1. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st Reprint, 2010.
2. M. A. Pai, "Computer Techniques in Power System Analysis", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2nd Edition, 2012.
3. P. Kundur, "Power System Stability and Control", Tata McGraw Hill Education Pvt.Ltd., New Delhi, 10th Reprint, 2010

Web References

1. <https://nptel.ac.in/courses/108/105/108105067/>
2. <https://nptel.ac.in/courses/108/107/108107127/>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
2	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
3	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
4	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
5	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Course Objectives

- To provide awareness on Renewable Energy Sources and recent technologies.
- To provide adequate knowledge on the issues in harnessing Renewable Energy.
- To provide knowledge about various power converters used for Renewable energy sources.
- To provide exposure and hands-on-practice on various aspects of renewable energy Technologies.
- To study about the types of intelligent controllers.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Familiarize with the parameters that affect the performance of renewable energy systems. **(K2)**

CO2 - Analyze the variety of issues in harnessing Renewable Energy. **(K2)**

CO3 - Simulate and predict the performance of various energy utilities. **(K3)**

CO4 - Model and simulate the various generators used in renewable energy conversion. **(K3)**

CO5 - Design the Intelligent Controllers for the various renewable energy conversion systems. **(K3)**

LIST OF EXPERIMENTS

1. Simulation and analysis of Solar PV Energy System
 - (i) Modeling of batteries
 - (ii) Modeling of PV panel
2. Simulation and analysis of PV system with different MPPT algorithms
3. Modeling and analysis of DC-DC converters for voltage regulation / current regulation
4. Modeling and analysis of DFIG
5. Modeling and analysis of PMSG
6. Experiment on V-I characteristics and efficiency of Solar PV system.
7. Experiment on Shadowing effect and diode based solution in Solar PV System..
8. Simulation and analysis of induction generation based wind energy conversion system.
9. Experiment on Performance assessment of micro Wind Energy Generator.
10. Simulation and analysis of Hybrid (Solar-Wind) Power System.
11. Simulation study on Hydel Power.
12. Experiment on Performance Assessment of Fuel Cell.
13. Simulation study on Intelligent Controllers for Hybrid Systems.

Reference Books

1. Chuck Ammond, Albert F. Cutter, "The Complete Lab Manual for Renewable Energy", Cengage Learning, 1st Edition, 2015.
2. Lindsay Porter, "The Renewable Energy Home Manual", Veloce Publishing Ltd, 1st Edition, 2015.
3. Ali Keyhani, "Design of Smart Power Grid Renewable Energy Systems: Solutions Manual", Willey-Blackwell, 1st Edition, 2012.
4. Franzis Verlag GmbH, "50 Experiments with Renewable Energy Kit & Manual", Franziz, 1st Edition, 2014.
5. I. Dincer, C. Zamfirescu, "Sustainable Energy Systems and Applications", Springer, 1st Edition, 2012.
6. D. P. Kothari, D. K. Sharma, "Energy Engineering: Theory and Practice", S. Chand Publisher, 1st Edition, 2000.
7. William. J. Palm III, "Introduction to MATLAB for Engineers", McGraw-Hill Education, 3rd Edition, 2010

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1. http://www.ee.iitkgp.ac.in/faci_es.php
2. <http://www.ee.iitkgp.ac.in/TeachingLabs/EnergySys/es1.pdf>
3. <http://www.ee.iitkgp.ac.in/TeachingLabs/EnergySys/es6.pdf>
4. http://www.ee.iitkgp.ac.in/TeachingLabs/EnergySys/solar_sim.pdf
5. <http://www.ee.iitkgp.ac.in/TeachingLabs/EnergySys/es8.pdf>
6. http://www.ee.iitkgp.ac.in/TeachingLabs/EnergySys/solar_pv_plant.pdf
7. <http://downloads.hindawi.com/journals/ijp/2014/895271.pdf>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
2	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
3	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
4	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2
5	1	3	2	-	1	-	-	-	3	-	1	2	3	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U19EEC6X /	CERTIFICATION COURSE - IV /	L	T	P	C	Hrs
U20EEC6XX	CERTIFICATION COURSE – VI	0	0	4	-	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

**U19EES61 /
U20EES606**

SKILL DEVELOPMENT COURSE 7 /

SKILL DEVELOPMENT COURSE 6

(Foreign Language / IELTS – II)

L T P C Hrs

0 0 2 - 30

Student should choose the Foreign Language/IELTS course like Japanese/French/ Germany/IELTS, etc. approved by the Department committee comprising of HoD, Programme Academic Coordinator, Class advisor and language Experts. The courses are to be approved by Academic Council on the recommendation of HoD at the beginning of the semester if necessary, subject to ratification in the next Academic council meeting. Students have to complete the courses successfully. The Committee will monitor the progress of the student and recommend the grade (100% Continuous Assessment pattern) based on the completion of course. The marks attained for this course is not considered for CGPA calculation

U19EES62 /	SKILL DEVELOPMENT COURSE 8/	L	T	P	C	Hrs
U20EES607	SKILL DEVELOPMENT COURSE 7	0	0	2	-	30
	(Technical Seminar)					

Course Objectives

- To encourage the students to study advanced engineering developments
- To prepare and present technical reports.
- To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Review, prepare and present technological developments.

CO2 - Face the placement interviews.

Method of Evaluation:

- During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 20 minutes.
- In a session of three periods per week, 8 to 10 students are expected to present the seminar.
- Each student is expected to present atleast twice during the semester and the student is evaluated based on that.
- At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report.
- A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.
- Evaluation is 100% internal. The marks attained for this course is not considered for CGPA calculation.

U19EES63 /	SKILL DEVELOPMENT COURSE 9 /	L	T	P	C	Hrs
U20EES608	SKILL DEVELOPMENT COURSE 8	0	0	2	-	30
	(NPTEL / MOOC - I)					

Student should register online courses like MOOC / SWAYAM / NPTEL etc. approved by the Department committee comprising of HoD, Programme Academic Coordinator, Class advisor and Subject Experts. Students have to complete the relevant online courses successfully. The list of online courses is to be approved by Academic Council on the recommendation of HoD at the beginning of the semester if necessary, subject to ratification in the next Academic council meeting. The Committee will monitor the progress of the student and recommend the grade (100% Continuous Assessment pattern) based on the completion of course / marks secured in online examinations. The marks attained for this course is not considered for CGPA calculation.

U19EEE61 /
U20EEE611

SMART GRID

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To familiarize with the fundamentals of smart grids technologies.
- To get exposure on Communication infrastructure and protocols.
- To study about the Wide Area Measurement Systems, Energy storage technologies for smart grid.
- To know about the various stability assessment tools in smart grid.
- To familiarize with the Power Quality issues of Grid connected Renewable Energy Sources.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Compare the conventional electrical grid concepts with smart grid.[K1]

CO2 – Outline about the protocols and networks used in Smart grid.[K2]

CO3 – Explain the importance of WAM and energy storage technologies used in smart grid.[K2]

CO4 – Acquire knowledge on distributed generation and micro grids in smart grid.[K3]

CO5 – Analyze the power quality issues in smart grid.[K3].

UNIT I INTRODUCTION

(09 Hrs)

Overview of Electrical Grid – Smart Grid - Characteristics - Inventory Technologies - Operating Principles - Models of Components, Implementation - Early initiatives - Overview of technologies - Key Challenges - Self-Healing Grid - Opportunities and Barriers - Recent Research technology.

UNIT II SMART METERING AND COMMUNICATION

(09 Hrs)

Smart meters - Communications infrastructure, protocols and hardware - Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) drivers - benefits – Power line communication (PLC) - Machine to-machine communication models - Home Area Networks (HAN), Wide Area Networks (WAN) and Neighborhood Area Networks (NAN) - Wired and Wireless communication technologies – Cryptosystem - Internet of things (IOT).

UNIT III WAMS AND ENERGY STORAGE TECHNOLOGIES

(9 Hrs)

Synchro-Phasor Measurement Units (PMUs) – Wide Area Measurement Systems (WAMS) - Geographic Information system (GIS) and Google Mapping Tools, Multiagent Systems (MAS) Technology - Sensor Networks, Fault Detection - Phasor Data Concentrator (PDC) – Road Map for synchro-phasor technology – Operational experience and Blackout analysis using PMU.

Batteries, Fuel cell, Flywheels, SMES systems and Super capacitors.

UNIT IV INTEGRATION, CONTROL AND OPERATION OF DISTRIBUTED GENERATION (09 Hrs)

Distributed Generation Technologies - benefits - Utilization Barriers –integration to power grid - Renewable Energy Technologies – Micro grids – Storage Technologies - Advantages and disadvantages of DG – Vehicle to Grid technology and Grid to vehicle technology - Performance and stability analysis in smart grid.

UNIT V POWER QUALITY MANAGEMENT IN SMART GRID

(09 Hrs)

Power Quality - issues - Conditioners - Web based monitoring - Audit - Cyber Security- Power Quality Improvement methods – Introduction to EMC in smart grid.

Text Books

1. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, Nick Jenkins, “Smart Grid Technology and Applications”, John Wiley and Sons Publication, 1st Edition, 2015.
2. Stuart Borlase, “Smart Grids: Infra structure, Technology and Solutions”, CRC Press, 1st Edition, 2013.
3. James A. Momoh, “Smart Grid: Fundamentals of Design and Analysis”, Wiley-IEEE Press, 1st Edition, 2012.

Reference Books

1. Jean Claude Sabonnadiere, NouredineHadsaid, “Smart Grids”, Wiley Blackwell, 1st Edition, 2012
2. Fereidoon. P. sioshansi, “Smart grid – integrating renewable, distributed and efficient energy”, Academic Press, 1st Edition, 2011.
3. Tony Flick, Justin Morehouse, “Securing the Smart Grid: Next Generation Power Grid Security”, Academic Press, 1st Edition, 2011.
4. Krzysztof Iniewski, “Smart Grid Infrastructure and Networking”, Tata McGraw Hill, 1st Edition, 2012.

- SawanSen, Samarjit Sengupta, Abhijit Chakrabarti, "Electricity pricing- regulated, deregulated and smart grid systems", CRC press, 1st Edition, 2018.

Web References

- <https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ee42/>
- https://onlinecourses.nptel.ac.in/noc19_ee64/preview
- <https://www.classcentral.com/course/swayam-introduction-to-smart-grid-14165>
- <https://npti.gov.in/smart-grid-technologies>
- <http://www.infocobuild.com/education/audio-video-courses/electronics/IntroductionToSmartGrid-IIT-Roorkee/lecture-04.html>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	3	2	-	-	-	-	-	-	2	2	1	2
2	3	2	2	3	2	-	-	-	-	-	-	2	2	1	2
3	3	2	2	3	2	-	-	-	-	-	-	2	2	1	2
4	3	2	2	3	2	-	-	-	-	-	-	2	2	1	2
5	3	2	2	3	2	-	-	-	-	-	-	2	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EEE62 /
U20EEE612

HIGH VOLTAGE ENGINEERING

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To understand the causes of over voltages and their effects on power system
- To familiarize the Breakdown phenomenon in Gas, Liquid, Solid Dielectrics.
- To analyze the characteristics of high voltage, current and impulse voltage generator.
- To apply suitable methods to measure high voltage, current and impulse voltage
- To test the power apparatus as per Indian Standard Specification.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Demonstrate the causes and effects of over voltages, currents on power system and also discuss the insulation coordination. **(K2)**

CO2 - Analyze the various breakdown processes in solid, liquid and gaseous insulating materials. **(K4)**

CO3 - Explain the different methods for generation of high voltages and currents. **(K2)**

CO4 - Apply the methods of measurement for high voltages and currents in electrical apparatus. **(K3)**

CO5 - Test and evaluate the performance of high voltage equipment. **(K4)**

UNIT I OVER VOLTAGE PHENOMENON AND INSULATION COORDINATION **(9 Hrs)**

Causes of over voltages and their effects on power system Lightning, switching and temporary over voltages - Protection against over voltages - Bewley lattice diagram - Insulation Coordination: estimation and control of electric stress, Coordination between insulation and protection level.

UNIT II ELECTRICAL BREAKDOWN OF SOLID, LIQUID AND GAS **(9 Hrs)**

Solids dielectrics: Intrinsic, electromechanical and thermal breakdown composite dielectrics – Liquids dielectrics: Conduction and breakdown in pure and commercial liquids, suspended particle theory, cavitations and bubble theory, stressed oil volume theory. Gases dielectrics: Ionization process, Townsend's current growth equations and criterion for breakdown. Streamer theory of breakdown, Paschen's law, breakdown in non-uniform fields and corona discharges.

UNIT III GENERATION OF HIGH VOLTAGES AND CURRENTS **(9 Hrs)**

Generation of high DC voltages: Rectifier and Voltage doubler circuits, Cockroft Walton voltage multiplier, Vande - Graff Generator. Generation of high AC voltages: cascaded transformers, Resonant Transformer, Tesla coils. Generation of impulse and switching surges: Marx circuit - Generation of high impulse current - Tripping and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND CURRENTS **(9 Hrs)**

HVDC measurement: Series resistance micro-ammeter, Resistance Potential divider, Generating Voltmeter. Power frequency A.C voltage measurement: Series Impedance Ammeter, Potential divider, Potential transformer, Electrostatic Voltmeters. Impulse voltage measurements: sphere gaps, Digital techniques in high voltage measurement. Impulse current measurement: current transformer, Rogowski coil, pure resistive shunt method.

UNIT V HIGH VOLTAGE TESTING **(9 Hrs)**

Indian Standards / IEC specification for testing - correction factor - testing of insulators, isolators, bushing, circuit breakers, cables, power transformers and surge arresters - radio interference measurement - High voltage laboratory testing facility - safety precautions in H. V. Labs.

Text Books

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering", Tata McGraw Hill Private Limited, 5th Edition, 2013.
2. E. Kuffel, W. S. Zaengl and J. Kuffel, "High Voltage Engineering: Fundamentals", Elsevier, 2nd Edition, 2000.
3. C. L. Wadhwa, "High Voltage Engineering", New age international, 3rd Edition, 2014.

Reference Books

1. RavindraArora, Wolfgang Mosch, "High Voltage and Electrical Insulation Engineering", John Wiley and Sons, 2011.
2. L. L. Alston, "High Voltage Technology", Oxford University Press, New Delhi, 1st Indian Edition, 2008.
3. E. Kuffel and M. Abdullah, "High Voltage Engineering", Pergamon Press, 2013.

4. D. V. Razevig and M. P. Chourasia, "High Voltage Engineering", Khanna Publishers, 2nd Edition, 2011.

Web References

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2. <https://digital-library.theiet.org/content/journals/hve>
3. <https://mtcsuk.com/mtcs-online/high-voltage/>
4. <https://electrical-engineering-portal.com/download-center/books-and-guides/electricity-generation-t-d/lecture-notes-hv-engineering>
5. http://www.gcebargur.ac.in/sites/gcebargur.ac.in/files/lectures_desk/FALLSEM2013-14_CP1489_TB02_High-Voltage-Engineering-Kamaraju-and-Naidu_0.PDF

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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2	3	3	2	1	-	-	-	-	-	-	-	1	2	1	2
3	3	3	3	1	-	-	-	-	-	-	-	1	2	1	2
4	3	3	3	1	-	-	-	-	-	-	-	1	3	2	2
5	3	3	3	1	-	-	-	-	-	-	-	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

U19EEE63
/U20EEE720

SPECIAL ELECTRICAL MACHINES

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To understand the construction, operating modes and characteristics of stepper motors.
- To learn about the construction, principle of operation and characteristics of synchronous reluctance motors.
- To get familiar with construction, characteristics and various controllers for switched reluctance motors.
- To equip the students on the construction, principle of operation and characteristics of brushless D.C. motor.
- To learn the construction, characteristics and different controllers for permanent magnet synchronous motors.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Analyze the performance characteristics of stepper motors in various operating modes. **(K4)**

CO2 - Examine performance characteristics of synchronous reluctance motors and select appropriate controllers for any industrial applications. **(K4)**

CO3 - Compare the performance characteristics of different types of controllers used in switched reluctance motors. **(K4)**

CO4 - Interpret the performance of permanent magnet brushless D.C. motor. **(K4)**

CO5 - Analyze the performance characteristics of permanent magnet synchronous motors and to analyze the vector control schemes. **(K4)**

UNIT I STEPPER MOTORS

(09 Hrs)

Constructional features and principle of operation: Variable reluctance, Permanent and Hybrid Stepper motor - Torque production in Variable Reluctance (VR) stepper motor – Static and Dynamic Characteristics – Microprocessor based control of stepper motors – Closed loop control – Applications.

UNIT II SYNCHRONOUS RELUCTANCE MOTORS

(09 Hrs)

Constructional features of axial and radial air gap Motors - operating principle – Phasor diagram - Derivation of reluctance torque from phasor diagram- motor characteristics – Controller for Synchronous Reluctance motor - Vernier motor – Applications.

UNIT III SWITCHED RELUCTANCE MOTORS

(09 Hrs)

Constructional features - principle of operation - Torque equation - Torque Speed Characteristics – Converters for SRM – Current control schemes: Hysteresis and PWM – Microprocessor based controller and Sensorless Controller - Closed loop control of SRM – Applications.

UNIT IV BRUSHLESS DC MOTORS

(09 Hrs)

Construction and Principle of operation - Torque and EMF equation - Torque-Speed characteristics - Permanent Magnet materials - electronic commutator - Difference between mechanical and electronic Commutator – Rotor Position sensors: Hall effect sensors – Optical sensor - Microprocessor based controller - Sensorless control – Applications.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS

(09 Hrs)

Construction – Principle of operation – EMF and Torque equations - Phasor diagram – Torque-speed characteristics – Self control– Vector control schemes - Microprocessor based control – Comparison of BLDC and PMSM – Applications.

Text Books

1. E.G.Janardanan, “Special electrical machines”, PHI learning Pvt.Ltd ,2nd Edition, 2014
2. T. J. E. Miller, “Brushless permanent magnet and reluctance motor drives”, Clarendon Press, Oxford, 2nd Edition, 1993.
3. K. Venkataratnam, “Special Electrical Machines”, Universities Press Private Limited, 1st Edition, 2009.

Reference Books

1. P. P. Acarnely, “Stepping Motors – A Guide to Motor Theory and Practice”, Peter Perengrinus, London, IFT Publishers, 4th Edition, 2007.
2. R.Srinivasan, ‘Special Electrical Machines’, Lakshmi Publications, 2013.
3. T. Kenjo and S. Nagamori, “Permanent Magnet and brushless DC motors”, Clarendon Press, Oxford, 1989.
4. J. Gnanavadiel, J. Karthikeyan and S. Albert Alexander, “Special Electrical Machines”, Anuradha publications, 3rd Edition, 2009.

Web References

1. <https://ndl.iitkgp.ac.in>.
2. <http://ess.inflibnet.ac.in>.
3. <https://nptel.ac.in/courses/108/102/108102156>.
4. <http://www.electrical4u.com>.
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COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	2	-	-	-	-	-	-	-	1	1	2	1
2	3	3	2	3	-	-	-	-	-	-	-	1	2	1	1
3	3	2	2	3	-	-	-	-	-	-	-	1	3	3	3
4	2	3	3	2	-	-	-	-	-	-	-	1	3	2	3
5	3	2	3	2	-	-	-	-	-	-	-	1	2	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EEE64 /
U20EEE614

DIGITAL SIGNAL PROCESSING

L	T	P	C	Hrs
2	2	0	3	60

Course Objectives

- To introduce the idea of signals and systems in time and frequency domain.
- To introduce fundamental principles and applications of signals and filters.
- To provide applications of signal processing.
- To make understand the basic concepts of signal filter techniques.
- To give basic ideas on implementation of DFT and FFT.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Analyze the classifications of signals and systems in the time and frequency domains. **[K3]**

CO2 - Perform the stability analysis of discrete time system. **[K3]**

CO3 - Acquire knowledge on spectral analysis of signals. **[K3]**

CO4 - Design, analyze and compare digital filters for processing of discrete time signals. **[K3]**

CO5 - Acquire knowledge on DSP architecture and implement DFT and FFT Algorithms in DSP. **[K4]**

UNIT I SIGNALS AND SYSTEM

(12 Hrs)

Need and benefits of Digital Signal Processing – Analog signal - Digital signal representation - classification of signals: continuous and discrete - energy and power; mathematical representation of signals – spectral density; Classification of systems: linear- causal – stable – dynamic – recursive - time variance; sampling techniques – quantization - quantization error - Nyquist rate - aliasing effect - Analog to digital conversion.

UNIT II DISCRETE TIME SYSTEM ANALYSIS

(12 Hrs)

Z-transform and its properties - inverse z-transforms - methods; difference equation – Solution by z transform - application to discrete systems - Stability analysis - frequency response – Convolution linear - circular – Discrete Time Fourier transform - magnitude and phase representation.

UNIT III DISCRETE FOURIER TRANSFORM

(12 Hrs)

Discrete Fourier Transform - properties - relationship between z- transform - DTFT and DFT Frequency analysis of signal using DFT. FFT algorithms - advantages over discrete computation of DFT – radix-2 algorithms - Decimation In Time-Decimation In Frequency - Computation of IDFT using FFT.

UNIT IV DESIGN OF DIGITAL FILTER

(12 Hrs)

FIR and IIR filter realization – Parallel and cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. IIR Filters -Analog filter design – Butterworth and Chebyshev approximations; digital filter design using impulse invariant and bilinear transformation Warping- pre-warping – Structures for IIR systems - direct form – parallel - cascade and ladder structures .

UNIT V PROGRAMMABLE DSP CHIPS

(12 Hrs)

Architecture and features of signal processor - Representation of Basic signals- Linear and circular convolution of two sequences - Implementation of DFT and FFT.

Text Books

1. J. G. Proakis and D.G. Manolakis, “Digital Signal Processing Principles, Algorithms and Applications”, Pearson Education, New Delhi, 4th Edition, 2007.
2. Ramesh Babu, “Digital Signal Processing”, SciTech Publications (India) Pvt. Ltd., 7th Edition, 2018.
3. A. V. Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, PHI, 3rd Edition, 2014.
4. Umesh Gupta R.S. Kaler, M. Kulkarni, A Textbook of Digital Signal Processing, Dreamtech Press, 1st Edition, 2019.

Reference Books

1. Sanjit K. Mitra, “Digital Signal Processing, A Computer based Approach”, Tata McGraw-Hill, 4th Edition, 2017.
2. Rafel Gonzales and Richard Woods, “Digital Image Processing”, Pearson Education, 4th Edition, 2018.
3. Richard Woods, “Digital Image Processing with MATLAB”, Pearson Education, 3rd Edition, 2020.
4. Li Tan, “Digital Signal Processing – Fundamentals and Applications”, Academic Press, 2nd Edition, 2013.

Web References

1. <https://nptel.ac.in/courses/117/102/117102060/>
2. <https://nptel.ac.in/courses/108/105/108105055/>
3. <https://nptel.ac.in/courses/117/104/117104070/>

4. <https://nptel.ac.in/courses/108/106/108106151/>
5. <http://www.nptelvideos.in/2012/12/digital-signal-processing.html>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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4	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
5	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

U19EET65 /
U20EEE613

ELECTRIC DRIVES

L	T	P	C	Hrs
2	2	0	3	60

Course Objectives

- To have a knowledge about types of drives and its characteristics.
- To design and analyze the operation of controlled rectifier fed dc drives
- To provide knowledge on chopper fed dc drives.
- To Comprehend the control techniques applied for inverter fed induction motor drives
- To impart knowledge on design and operations of synchronous motor drives.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Describe the component of electrical drives and its operating characteristics in various quadrants **(K2)**

CO2 – Design driver, firing circuits and analyze the performance of controlled converter fed drives **(K3)**

CO3 – Implement the closed loop control for chopper fed drives. **(K3)**

CO4 – Model and analyze the behavior of Inverter fed induction Motor drives. **(K3)**

CO5 – Apply the concept of vector control to Synchronous motor drives. **(K2)**

UNIT I DRIVE CHARACTERISTICS

(12 Hrs)

Electric Drives - Drive classifications - Advantage of Electric Drives – components of Electrical drives - Equations governing motor load dynamics – Speed-torque characteristics and multi quadrant operations - Components of Load Torques – Classes of duty, heating and cooling – Control of Electric Drives: Current limit, closed loop torque and speed control - Selection of Motor rating - constant HP and constant torque operations.

UNIT II CONVERTER FED DC DRIVE

(12 Hrs)

Steady state analysis of the single and three phase converter fed separately excited DC motor drive – Single quadrant, Two quadrant and Four quadrant operation. Design of single phase converter for the Motor load – selection of switching devices – Design of Driver circuits – firing circuits – power supply for the driver circuits – closed loop control - design of speed and current controller.

UNIT III CHOPPER FED DC DRIVE

(12 Hrs)

Performance analysis of chopper fed separately excited dc motor drive – Class A, B, C, D and E – Design of two quadrant chopper circuit – Selection of switching devices – Design of Driver circuit – Triggering circuits – Power supply for the driver circuits – Closed loop control – Design of speed and current controller.

UNIT IV INDUCTION MOTOR DRIVE

(12 Hrs)

Stator voltage control – V/F control – Rotor Resistance control – Slip power recovery schemes: kramer and scherbuis drive – Vector Control. Design of single phase/ three phase inverter circuit – selection of switching devices – Design of driver circuit – triggering circuit – PWM generator and SPWM generator – Design of Power supply for the driver circuits.

UNIT V SYNCHRONOUS MOTOR DRIVE

(12 Hrs)

V/f control and self-control of synchronous motor: Margin angle control and power factor control- Three phase voltage/current source fed synchronous motor Drives – Vector control. Design of power converter for synchronous motor drive – Selection of switching devices – Design of triggering circuit – controller design.

Text Books

1. R. Krishnan, "Electric Motor Drives - Modeling, Analysis, and Control", Pearson Education India, 1st Edition, 2015.
2. Bimal K. Bose "Modern power electronics and AC drives" Pearson Education, Asia 2003
3. Dubey G. K. "Power semiconductor control drives" Prentice Hall, Englewood Cliffs, New Jersey, 1989

Reference Books

1. Dewan S.B. , G. R. Slemon, A. Strauvhen, "Power semiconductor drives", John Wiley and sons
2. Dr. P. S. Bimbra "Power electronics", Khanna publishers
3. J. M. D. Murphy "Thyristor control of AC drives"
4. N. K. De, P. K. Sen "Electric drives" Prentice Hall of India 2002
5. Pillai S. K. "A first course on electric drives", Wileey Eastern Ltd, New Delhi
6. Vedam Subrahmanyam, "Electric Drives", MC Graw Hill Education, New Delhi
7. W. Shepherd, L. N. Hulley and D. T. Liang, "Power Electronics and motor control", Second Edition, Cambridge University Press, 1995.

Web References

1. <https://nptel.ac.in/courses/108/105/108105066/>
2. <http://www.smpstech.com/websites.htm>
3. <http://www.electronics-tutorials.ws/>
4. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-334-power-electronics-spring-2007/>
5. <https://ndl.iitkgp.ac.in/>

COs/POs/PSOs Mapping

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4	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
5	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Course Objectives

- To understand the basic mathematical concepts of fuzzy sets.
- To provide adequate knowledge on real time application using fuzzy logic control.
- To learn the basics of Biological and Artificial Neural network.
- To understand the architecture, learning methodologies of perceptron and back propagation algorithm.
- To understand the network model of associative memory, adaptive resonance theory.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Apply the mathematical concept of fuzziness. **(K3)**

CO2 - Develop an application of fuzzy logic control to real time systems. **(K4)**

CO3 - Classify the concepts of feed forward neural networks and its learning methods. **(K2)**

CO4 - Model the multi-layer feed-forward neural networks and analyze its performance. **(K4)**

CO5 - Design neuro-fuzzy controller for different applications. **(K4)**

UNIT I FUZZY SET THEORY

(09 Hrs)

Classical sets – Fuzzy sets – Properties – Operations - Convexity of fuzzy sets-lambda cuts on fuzzy sets.- Cartesian Product, fuzzy relation - composition -Fuzzy Tolerance and Equivalence-Fuzzy membership functions- Fuzzification methods

UNIT II FUZZY LOGIC CONTROL

(09 Hrs)

Linguistic hedges - Fuzzy IF-THEN Rules, Canonical Form, Inference methods - Mamdani, Sugeno and TSK models - Defuzzification methods -.Control of DC Motor using FLC.

UNIT III ARTIFICIAL NEURAL NETWORKS

(09 Hrs)

Biological neuron, Artificial neuron - Single and Multi-input neurons- Activation function-Transfer function - Network architectures: single layer, multilayer, competitive layer. Learning rule -Supervised, Unsupervised and reinforced. McCulloch-Pitts neuron model - Single-layer Perceptron, Limitations, Linear separability - Multi-Layer Perceptrons (MLP).

UNIT IV NEURAL NETWORK CONTROL

(09 Hrs)

Back-Propagation Algorithm – Advantages –Drawbacks -learning with momentum - Adaptive Resonance Theory model - Kohonen's self-organizing maps - Bi-directional Associative Memories-Hopfield Networks.

UNIT V HYBRID CONTROL SCHEMES

(09 Hrs)

Adaptive Neuro-fuzzy inference systems (ANFIS), hybrid learning algorithm– Applications - Modelling of DC Motor using ANN – Generation of training data – Optimal architecture– Model validation – Control of DC motor using ANN – Direct and indirect neuro control schemes – Adaptive neuro controller.

Text Books

1. Timothy J. Ross, "Fuzzy logic with engineering applications", John Wiley and Sons Edition, 3rd Edition, 2011.
2. Laurene Fausett, "Fundamental of Neural networks", Pearson Education India, 2006.

Reference Books

1. G. J. Klirn and T. A. Folger, "Fuzzy sets Uncertainty and information", Prentice Hall, 1996.
2. J. M. Zurada, "Introduction to Artificial neural systems", Jaico Publication house, Delhi, 2001.
3. S. V. Kartalopoulos, "Neural Networks and Fuzzy Logic: Basic Concepts and Applications", IEEE Press Edition PHI, 2014.
4. Raja sekharanand G. A. Vijayalakshmpai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2nd Edition, 2017.
5. S. N. Sivanandam, S. Sumathi, S. N. Deepa, "Introduction to Neural Networks using MATLAB 6.0", Tata McGraw Hill Education, 1st Edition, 2017.

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1. http://www.scholarpedia.org/article/Fuzzy_neural_network
2. https://www.tutorialspoint.com/fuzzy_logic/fuzziness_in_neural_networks.htm
3. <http://fuzzy.cs.ovgu.de/nfdef.html>
4. <https://www.geeksforgeeks.org/difference-between-fuzzification-and-defuzzification/>

5. <https://www.cs.princeton.edu/courses/archive/fall07/cos436/HIDDEN/Knapp/fuzzy004.htm>
6. <https://www.smartsheet.com/neural-network-applications>
7. https://cs.stanford.edu/people/eroberts/courses/soco/projects/neural_networks/Applications/index.html
8. <https://towardsdatascience.com/understanding-neural-networks-19020b758230>

COs/POs/PSOs Mapping

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3	2	3	3	1	3	-	-	-	-	-	-	2	2	3	3
4	2	3	3	1	3	-	-	-	-	-	-	2	2	3	3
5	2	3	3	1	3	-	-	-	-	-	-	2	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Course Objectives

- To enable the students to create an awareness on Engineering Ethics and Human Values,
- To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
- To develop a firm ethical base.
- To make the students to realize the significance of ethics in professional environment.
- To acquaint students with latest intellectual property rights

Course Outcomes

After completion of the course, the students will be able to

CO1 - Apply ethics in society

CO2 - Discuss the ethical issues related to engineering

CO3 – Act as a responsible Experimenter and to follow the codes of Ethics

CO4 – Realize the responsibilities and rights in the society

CO5 – Familiarize with the Multinational Corporations and its Social Responsibility

UNIT I HUMAN VALUES

(06 Hrs)

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS

(06 Hrs)

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION

(06 Hrs)

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS SAFETY

(06

Hrs)

and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES

(06 Hrs)

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development– Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

Reference Books

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
3. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
4. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics –Concepts and Cases", Cengage Learning, 2009
5. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
6. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001
7. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi2013.
8. World Community Service Centre, " Value Education", Vethathiri publications, Erode,2011

Web References

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

Open Elective Courses offered to other Department students

U19EE053		L	T	P	C	Hrs
/U19EE063 /	CONVENTIONAL AND NON-CONVENTIONAL					
U20EE0503	ENERGY SOURCES	3	0	0	3	45
/U20EE0603						

Course Objectives

- To get knowledge on the status of conventional and non-conventional energy resources in world.
- To have a clear idea about the operation of conventional power plant and its associated equipment's.
- To learn about the concept of energy harvesting of solar through thermal and PV module
- To understand the technological basis for harnessing wind energy.
- To get a clear knowledge on power generation using Ocean, Tidal Energy and Bio-Energy

Course Outcomes

After completion of the course, the students will be able to

CO1 – Identify the world and Indian energy scenario and the necessity of renewable energy sources (**K1**)

CO2 – Gain knowledge for the generation of electrical power from various power plants (**K1**)

CO3 – Analyze and compare the various solar harvesting techniques (**K3**)

CO4 – Describe the aerodynamics of wind turbines and calculate their power, energy production(**K1**)

CO5 – Describe the construction and working principle of various equipment's used in Ocean, Tidal Energy and Bio-Energy power plants(**K2**)

UNIT I ENERGY RESOURCES (09 Hrs)

Perspective of energy resources – Forms of Energy – Conventional and non-conventional sources of energy– World's energy status - Energy reserves in India. Limitations of Conventional sources of energy efficiency – Renewable Energy Sources – Energy parameters – Energy Intensity - Gross Domestic product.

UNIT II POWER PLANTS (09 Hrs)

Thermal power plant – layout, working principle. Gas turbine power plant – layout, working principle. Nuclear power plants: fuels, nuclear fuel cycle, reactors and nuclear waste management. Hydro Electric plants – Types, energy conversion schemes, environmental aspects.

UNIT III SOLAR ENERGY SYSTEMS (09 Hrs)

Solar radiation - Principles of solar energy collection –Types of collector – working principles - Characteristics - efficiency - Solar Energy applications – water heaters, air heaters, solar cooling; solar drying and power generation – solar tower concept – solar pump. Photovoltaic (PV) technology – photovoltaic effect – modelling - Characteristics – efficiency of solar cells.

UNIT IV WIND ENERGY SYSTEMS (09 Hrs)

General theory of wind mills – Types of wind mills – performance of wind machines–wind power – efficiency. Merits and Limitations of Wind energy system – Modes of wind power generation.

UNIT V ALTERNATE ENERGY SYSTEMS (09 Hrs)

Ocean and Tidal energy conversion - working principle of OTEC – Anderson closed cycle OTEC System. Tidal power – tides - tidal range - types of tidal power plants, single basin and double basins schemes. Bio-mass Energy – Biogas plants.

Text Books

1. S.Rao and Dr.B.B.parulekar, "Energy Technology", KhannaPub.,Third edition, 1999.
2. B.H.Khan, "Non-conventional energy resources"TMH, 2006.
3. D.P.Kothari, K.C.Singal, RakeshRanjan."Renewable Energy Sources and Emerging Technologies", PHI, 2011

Reference Books

1. G.D.Rai, "Non-conventional energy sources", Khanna pub. Fourth Edition, 2002.
2. Pulfrey,D.L., Photo voltaic Power Generation, Van Nostr and Co., 1983.
3. Abbasik"Renewable Energy Sources and their Environment", PHI, 2008.
4. Energy Management Handbook, JohnWiley&Sons, Wayne C.Turner.

5. S.A.Abbasi and N.Abbasi, Renewable Energy Sources and Their Environmental Impact, PHI, 2001.

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2. <https://nptel.ac.in/courses/112/107/112107291/>
3. <https://byjus.com/physics/conventional-and-nonconventional-sources-of-energy/>
4. <https://www.jagranjosh.com/general-knowledge/nonconventional-sources-of-energy-1448698715-1>
5. <https://wb.gov.in/departments-power-and-non-conventional-energy-sources.aspx>

COs / POs and PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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3	3	1	1	2	-	3	3	1	-	-	2	-	2	2	1
4	3	1	1	2	-	3	3	1	-	-	2	-	2	2	1
5	3	1	1	2	-	3	3	1	-	-	2	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

U19EE054/ U19EE064 / U20EE0504/ U20EE0604	INDUSTRIAL DRIVES AND CONTROL	L T P C Hrs
		3 0 0 3 45

Course Objectives

- To introduce the concept of selection and Utilization of Electric drives.
- To understand power flow diagram for industrial process and drives.
- To introduce effect of heating and cooling characteristics of drives.
- To introduce the various speed control techniques for DC drives.
- To introduce the various speed control techniques for AC drives

Course Outcomes

After completion of the course, the students will be able to

CO1 – Select the appropriate motors to meet the load requirements.(K3)

CO2 – Explain the industrial process and selection of drives for various applications .(K2)

CO3 – Describe the thermal characteristics of electric motors.(K1)

CO4 – Analyze the speed torque characteristics of converter and chopper fed DC drives. (K3)

CO5 – Apply the various speed control methods for Induction and synchronous motor.(K3)

UNIT I INTRODUCTION TO ELECTRIC DRIVES

(9 Hrs)

Need for Drive – Concept of electric drives – Motors used in drives – Types of loads – Choices – Classification – Multi quadrant operation – Fundamental torque equation – Nature and classification of load torques.

UNIT II INDUSTRIAL PROCESS AND DRIVES

(9 Hrs)

Process flow diagram of paper mill – Cement mill – Sugar mill – Steel mill –Textile mills – Hoists and cranes – Centrifugal pumps and compressors – Solar powered pump drives –Selection of drives.

UNIT III THERMAL CHARACTERISTICS OF ELECTRIC MOTORS

(9 Hrs)

Effect of heating – Heating and cooling characteristics – Loading condition and classes of duty – Determination of rating of motors – Effect of load inertia – Load equalization – Environmental factors.

UNIT IV SPEED CONTROL OF DC DRIVES

(9 Hrs)

Controlled rectifier fed separately excited DC drives – Single phase drives – Three phase drives – Four quadrant operation fully controlled rectifier – Rectifier control of DC series motor – Chopper control of separately excited and series DC motor.

UNIT V SPEED CONTROL OF AC DRIVES

(9 Hrs)

VSI and CSI driven induction motor – Closed loop speed control - static rotor resistance control – Slip power recovery schemes – performance comparison of CSI and VSI fed drives – Variable frequency control of multiple synchronous motors.

Text Books

1. B.N.Sarkar, "Fundamentals of industrial drives", PHI Learning Pvt Ltd Education, 2011.
2. GobalK.Dubey, "Fundamentals of Electrical Drives", Alpha Science Int. Ltd., Pangbourne, 2nd Edition, 2002.
3. R. Krishnan, "Electric Motor Drives–Modelling, Analysis and Control", Pearson Education, 1st Edition, 2002.

Reference Books

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Web References

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COs / POs and PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	-	-	-	-	-	-	-	-	-	3	2	3
2	3	2	2	-	-	-	-	-	-	-	-	-	3	2	3
3	3	3	3	1	-	-	-	-	-	-	-	-	3	2	3
4	3	3	3	1	-	-	-	-	-	-	-	-	3	2	3
5	3	3	3	1	-	-	-	-	-	-	-	-	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Annexure- V

(Revised Department Vision, Mission, PEOs and PSOs)



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DEPARTMENT VISION AND MISSION

DEPARTMENT VISION

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship.

DEPARTMENT MISSION

M1: Quality Education: To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

M2: Industrial and Societal needs: To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

M3: Research and Innovation: To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

M4: Placement and Entrepreneurship: To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Professional Knowledge

To possess strong educational foundation in Electrical and Electronics Engineering to attain successful career with professional responsibility

PEO2: Innovative Skills

To enrich the skills to design and develop innovative solutions for engineering problems in a multidisciplinary environment

PEO3: Ethics

To actively embrace leadership qualities for achieving professional goals with ethical values

PEO4: Adaptability

To enhance intellectual competency along with technical skills by adapting to the current trends through eternal learning

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Core Proficiency

Utilize the engineering core knowledge to identify, formulate, design, and investigate the complex engineering problems of power electronics, electrical machines and power systems.

PSO2: Cutting Edge Technologies

Explore the new cutting edge technologies in the field of Electric vehicle, Automation, Artificial Intelligence, Robotics and Renewable Energy to compete in global market.

PSO3: Design and Evolution

Capability to comprehend the technological advancements with the usage of modern design tools for analysing and designing systems to confront the rapid pace of industrial innovations.

Annexure – VI

Academic Calendars (B.Tech –I, II, III and IV years)

Use of Cell Phones

It has been decided **not to permit cell phones inside the college campus**. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pinned. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working hours

I hr	8.45	to	9.35
II hr	9.35	to	10.25
III hr	10.25	to	11.15
Break	11.15	to	11.30
IV hr	11.30	to	12.20
V hr	12.20	to	1.10
VI hr	1.50	to	2.40
VII hr	2.40	to	3.30
VIII hr	3.30	to	4.20

Lunch break 1.10 p.m. to 1.50 p.m.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

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Madagadipet, Puducherry - 605 107



Academic Calendar

January 2021 to May 2021

Name :

Department :

Year / Sem : I year / I semester

நீங்கள்



அன்பு செய்துங்கள், யாருக்கும் அடிமையாகாதீர்கள்;
இரக்கம் காட்டுங்கள், எவரிடத்தும் ஏமாந்துவிடாதீர்கள்;
பணிவைப் போற்றுங்கள், எந்த நிலையிலும் கோழையாகாதீர்கள்;
கண்டிப்பாக இருங்கள், எப்போதும் கோபப்படாதீர்கள்;
சிக்கனமாக வாழ்வுங்கள், கருமியாக மாறாதீர்கள்;
வீரமாக இருங்கள், போக்கிரிகளாக மாறாதீர்கள்;
சுறுசுறுப்பாக இருங்கள், பதட்டம் அடையாதீர்கள்;
வாயுளைத் தேடுங்கள், பேராசைப் படாதீர்கள்;
உழைப்பை நம்புங்கள், உருப்படுவீர்கள்;
உண்மையை நம்புங்கள், உயர்வடைவீர்கள்!

என்றும் அன்புடன்,
ஆசிரியர்கள்.

About Autonomous

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020. The Pondicherry University Regulations R2013 will be followed for the students admitted in the Academic Year 2017 -18 (present Final year) and for the students admitted in the Academic Year 2018 -19 (present Third year). SMVEC Autonomous Regulations R2019, will be followed for the students admitted in the Academic Year 2019-20(present Second Year). SMVEC Autonomous Regulations R2020, will be followed for the students admitted in the Academic Year 2020-21(present first Year)

HIGHLIGHTS OF SMVEC AUTONOMOUS REGULATIONS 2020

- ❖ Industry 4.0 ready curriculum
- ❖ Updated towards skill development to create more job opportunities
- ❖ Multidisciplinary curriculum
- ❖ More entrepreneurship opportunities
- ❖ IELTS model curriculum / Foreign Languages learning opportunities
- ❖ Department wise Gold Medals
- ❖ Results will be declared within a month after completion of examinations

❖ EEC / Mandatory course

The Institute has Established 17 Center of Excellence to provide 75 International Certification courses from IBM, Google, Cisco, E Plan, Microsoft, Autodesk, Texas instruments, Festo, Bentley, Schneider Electric, Amazon web services, Siemens, Tally, DELL EMC², Harita Techserv, PTC, LN an Excellence in Technology & Didactic solutions. All students should enroll in one of the certification course in every semester

❖ Industrial Training / Internship

Students may undergo training or internship during summer / winter vacation at Industry/ Research organization. students are also permitted to undergo internships during their eighth semester after the theory classes are over

June 2021

Date	Day	Schedule	Working day/ Holiday
1	Tue		
2	Wed		
3	Thu		
4	Fri		
5	Sat		
6	Sun		Holiday
7	Mon		
8	Tue		
9	Wed		
10	Thu	College reopens (Even semester)	
11	Fri		
12	Sat		
13	Sun		Holiday
14	Mon		
15	Tue		
16	Wed		
17	Thu		
18	Fri		
19	Sat		
20	Sun		Holiday
21	Mon		
22	Tue		
23	Wed		
24	Thu		
25	Fri		
26	Sat		
27	Sun		Holiday
28	Mon		
29	Tue		
30	Wed		

Total number of working days :

Total number of holiday :

வெற்றி என்பது, லட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - ரைட்டிங்கேல்

May 2021

Date	Day	Schedule	Working day/ Holiday
1	Sat		Holiday
2	Sun		Holiday
3	Mon		79
4	Tue		80
5	Wed		81
6	Thu		82
7	Fri		83
8	Sat		Holiday
9	Sun		Holiday
10	Mon	Model exam (CAT-IV) starts (5 units)	
11	Tue		
12	Wed		
13	Thu		
14	Fri	Model exam (CAT-IV) ends	
15	Sat		
16	Sun		Holiday
17	Mon	ESE - Practical examination starts	
18	Tue		
19	Wed		
20	Thu	ESE - Practical examination ends	
21	Fri		
22	Sat		
23	Sun		Holiday
24	Mon		
25	Tue		
26	Wed		
27	Thu	ESE - Theory examination starts	
28	Fri		
29	Sat		
30	Sun		Holiday
31	Mon		

Total number of working days : 05

Total number of holiday : 02

வெற்றி என்பது, லட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - நைட்டிங்கேல்

❖ Supplementary Examinations

Supplementary examination is an additional examination conducted within a month of time after declaring the results of ESE. In order to complete the program within 4 years, only the student with maximum of two arrears will be permitted to appear for supplementary examination. The supplementary examination will be conducted in fifth and eighth semester only. For supplementary examination, the continuous assessment marks of the last attempt will be considered.

Benefits

- ❖ More number of students will receive the degree within the stipulated time
- ❖ The industries prefers to recruit students having nil arrears. If the supplementary examinations is conducted then more number of students will be eligible for the recruitment

Punctuality in Attendance

The students are requested to keep up punctuality in attending the college. The late comers will be losing their attendance and in turn the internal marks. Hence all the students are requested to attend the college in time. A student shall be permitted to appear for the End Semester Examination at the end of the semester only if he / she **secures not less than 75% of overall attendance.**

Repeating the Course

A student who secures overall attendance which is less than 60% has to repeat the course with the approval, when it is next offered.

Mentor - Mentee System

In the mentor - mentee system, 30 students are allotted to a tutor who will be taking care of these students. The students are requested to utilize the facility.

The internal marks will be provided fully based on the continuous assessment tests (CAT 1 to 4)

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)

Scheme for Continuous Assessment Test

S. No	Course Type	Continuous Assessment components									
		Test Marks	Average of marks for pre/post test/ viva for each experiment	Average of marks for marks for experiment report for each experiment	Model Exam / Report	Assignment	Review - 1	Review - 2	Review - 3	Attendance	Total Marks
1.	Theory	15	-	-	-	5	-	-	-	5	25
2.	Practical	-	10	15	15	-	-	-	-	10	50
3.	Project work	-	-	-	-	-	10	10	20	-	40

Question Paper Pattern

Question paper pattern for CAT and ESE will be based on the patterns shown in Table (a) and (b)

Table (a) Question Paper patterns for CAT

Test Type	2 Marks	5 Marks	10 Marks	Total Marks
CAT 1 to 3	5	4	2 (out of 3 questions)	50
CAT 4	End semester Examination Question Pattern			75

Table (b) Question paper patterns for End Semester Examination (ESE)

2 Marks	5 Marks	10 Marks	Total Marks
10	5 (one questions from each unit)	3 (out of 5 questions)	75

April 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu		55
2	Fri	Good Friday	Holiday
3	Sat		56
4	Sun		Holiday
5	Mon		57
6	Tue		58
7	Wed		59
8	Thu		60
9	Fri		61
10	Sat		62
11	Sun		Holiday
12	Mon		63
13	Tue		64
14	Wed	Tamil New Year / Dr. Ambedkar Jayanthi	Holiday
15	Thu		65
16	Fri		66
17	Sat		67
18	Sun		Holiday
19	Mon	Assignment 3 to be given	68
20	Tue	Feedback from the students & Analysis	69
21	Wed	QCM meeting 1 /IQC meeting / Report Submission	70
22	Thu	CAT - III starts (2 units)	71
23	Fri		72
24	Sat		73
25	Sun		Holiday
26	Mon		74
27	Tue	CAT - III ends	75
28	Wed		76
29	Thu		77
30	Fri		78

Total number of working days : 24

Total number of holiday : 6

அன்றாட வாழ்வின் சாதாரண விஷயங்களையும், அசாதாரண முறையில் செய்யும்போது உலகின் கவனத்தை உன் மீது திருப்ப முடியும். - ஜார்ஜ்வாஷிங்டன் கார்வெர்

March 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon		28
2	Tue	CAT - I ends	29
3	Wed		30
4	Thu		31
5	Fri		32
6	Sat		33
7	Sun		Holiday
8	Mon		34
9	Tue		35
10	Wed		36
11	Thu		37
12	Fri		38
13	Sat		39
14	Sun		Holiday
15	Mon		40
16	Tue		41
17	Wed		42
18	Thu	Assignment 2 to be given	43
19	Fri	Feedback from the students & Analysis,	44
20	Sat	QCM meeting 1 /IQAC meeting / Report Submission	45
21	Sun		Holiday
22	Mon	CAT - II starts (1½ units)	46
23	Tue		47
24	Wed		48
25	Thu		49
26	Fri	CAT - II ends	50
27	Sat		51
28	Sun		Holiday
29	Mon		52
30	Tue		53
31	Wed		54

Total number of working days : 27**Total number of holiday : 4**

உலகை வெல்வதற்கு, உலகை தெரிந்து கொள்வது முக்கியமல்ல,

உன்னை அறிந்து கொள்வதுதான் முக்கியம் . . .

Distribution of Attendance marks for theory : 5 marks

The distribution of 5 marks for theory class attendance is as follows :

5 marks for 95% attendance and above

4 marks for 90% attendance and above but below 95%

3 marks for 85% attendance and above but below 90%

2 marks for 80% attendance and above but below 85%

1 mark for 75% attendance and above but below 80%

Distribution of Attendance marks for practical : 10 marks

The distribution of 10 marks for practical class attendance is as follows :

10 marks for 95% attendance and above

8 marks for 90% attendance and above but below 95%

6 marks for 85% attendance and above but below 90%

4 marks for 80% attendance and above but below 85%

2 marks for 75% attendance and above but below 80%

Assignments

Out of 25 continuous assessment marks, 5 Marks will be awarded for the assignment. The students have to submit 3 assignments in each subject. The assignment questions will be different for each and every student.

Note :

Continuous assessment mark will be based on the performance of the students in the continuous assessment test. Assignment and attendance percentage.

January 2021

Date	Day	Schedule	Working day/ Holiday
1	Fri		Holiday
2	Sat		Holiday
3	Sun		Holiday
4	Mon		
5	Tue		
6	Wed		
7	Thu		
8	Fri		
9	Sat		
10	Sun		Holiday
11	Mon		
12	Tue		
13	Wed		
14	Thu		Holiday
15	Fri		Holiday
16	Sat		Holiday
17	Sun		Holiday
18	Mon		
19	Tue		
20	Wed		
21	Thu		
22	Fri		
23	Sat		
24	Sun		Holiday
25	Mon		
26	Tue	Republic day	Holiday
27	Wed	1 Year Induction Day	1
28	Thu	Induction programme starts	2
29	Fri		3
30	Sat		4
31	Sun		Holiday

Total number of working days : 4
Total number of holiday : 1

நீ வெற்றியடைவதை உன்னைத் தவிர, வேறு யாராலும் தடுக்க முடியாது - ப்ரெமர்

Placement and Training Division

The placement cell functions round the clock throughout the year to establish contact with reputed multinational companies, well established industrial organizations and plays an important role in locating various job opportunities and placing large number of the students every year at these organizations.

Activities of the Training Division

- ☆ Arranges trainings for personality and interpersonal skill development.
- ☆ Assists the students to get in-plant training
- ☆ Arranges industrial visits
- ☆ Creates awareness on the opportunities open for higher studies.
- ☆ Arranges coaching classes for GATE, GRE, TOFEL, IELTS, IAS, IES etc.

Placement Record

Academic Year	Students Placed
2012-13	75%
2013-14	85%
2014-15	95%
2015-16	95%
2016-17	93%
2017-18	95%
2018-19	95%
2019-20	95%

Details of Placed Students : 2020 - 21

1 Kaar	9	12 Makolet	3
2 TCS(Ninja and Digital)	210	13 O2Saver	4
3 Hexaware	15	14 OPPO Mobiles	3
4 Yellow Messenger	4	15 Infosys	1
5 Unisys	1	16 Sutherland	56
6 EmbedUr	1		
7 Virtusa	3		
8 ZOHO	8		
9 CTS	101		
10 Milekel Engineering	1		
11 Mantec Electronic	1	Total	*421

Wi-Fi Campus

* till 31st January 2021

Our campus has been enabled by high speed uninterrupted Wi-Fi connectivity. The Computer Centre is open till 8.00 p.m. on all the working days except on the dates of University examinations.

Library Working Hours

8.30 a.m. to 8.30 p.m. (On all the working days)
8.30 a.m. to 10.00 p.m. (During the examination days)

Women Cell

For the benefit of the girl students, a Women Cell has been constituted in the college. The girl students may approach the Chairperson / members for assistance.

Grievance Redressal Cell

























There is a Grievance Redressal Cell under the Chairmanship of the Director of the institution. Students are requested to approach the Chairman / members to redress their grievances. Mail ID : grievance@smvec.ac.in

Gold Medals and Top Ten Ranks

Your seniors were sincere, hard working and got the Gold medals of the Pondicherry University and the top ten ranks in all the branches. The details of the University Goldmedals and Top Ten Ranks won by the students are given below.

 Indicates the Gold medal and University First Rank.

The Management awards 3 sovereigns of gold to the 1st rank holder, 2 sovereigns to the 2nd rank holder, 1 sovereign to the 3rd rank holder, 4th and 5th rank holders shall receive a cash award of Rs. 10,000/- (Rupees ten thousand) each and 6th to 10th rank holders shall receive a cash award of Rs. 5,000/- (Rupees five thousand) each.

Name of the Course	Year		
	2017	2018	2019
B.Tech. EEE	2, 4, 6, 7		 2,3,4,6,7,8,9,10
B.Tech. ECE	2,3,4,5,6,7,8,9,10		 3,4,5,6,7,9,10
B.Tech. CSE	 ,2, 3, 4, 10		 ,2,4,6,7,8,10
B.Tech. IT	 ,2,3,4,5,6,7,8,9,10		 2,3,5,6,8
B.Tech. ICE	 ,2,3,4,5,6,7,8,9,10		 2,3,4,5,6,7,8,9,10
B.Tech. Mech	 ,4, 5, 7, 9, 10		3,7,8,10
B.Tech. Civil	2, 3, 10		2,3,4,6,7,10
MCA	3,4,7,9,10		 2,6,7,8,9,10,11
MBA	 3,4,6,7,8		 2,3,4,5,7,8,10
MTech. CSE	 2, 3,4,5,7,8,9		 ,7
MTech. ECE	2, 3, 6, 7, 8, 9		2,3,4,5
MTech. PED			 ,2,3
MTech. NW	 2, 3,4,5,7,8,9		 ,2,3
MTech(VLSI)			 ,2,3,4
MTech(MF)	 ,2		

Important points for the kind attention of the Parents

Dear Parent

The I semester classes commence on 27th January 2021. The above mentioned semester is a very short term, including working days meant for CAT-IV (Model). The students have to complete a lot of work within a short period. **Hence the parents are kindly requested not to permit their wards to avail frequent leave during this semester period for the following reasons.**

It is compulsory for all the students to complete Six Certificate Courses, Nine Skill Development Courses and Seven Mandatory Courses along with their Academic Courses. These courses will enhance the students to upgrade their required skills to cope up with the Industry.

Marks in the **continuous assessment test** decide the major part of the continuous assessment marks. So, availing leave for the continuous assessment test must be avoided at any cost as this would seriously affect the assessment marks.

Practicals are very important not only to score more marks but also it will help to understand the theory part of the subject, hence advice your ward not to cut the practical classes.

Please spare your **valuable time to talk to your son/daughter every day and try to understand what he/she is doing in respect of his/her studies.** Kindly extend all your support to your son/daughter which will help them to come out successfully. For any assistance from our side you may always feel free to contact the respective Coordinator / HOD any time during the working hours.

Use of Cell Phones

It has been decided **not to permit cell phones inside the college campus**. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pinned. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working hours

I hr	9.00	to	9.50
II hr	9.50	to	10.40
Break	10.40	to	10.55
III hr	10.55	to	11.45
IV hr	11.45	to	12.35
V hr	1.15	to	2.05
VI hr	2.05	to	2.55
Break	2.55	to	3.10
VII	3.10	to	4.00
VIII	4.00	to	4.50

Lunch break 12.35 p.m. to 1.15 p.m.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

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Madagadipet, Puducherry - 605 107



Academic Calendar

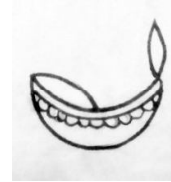
March 2021 to July 2021

Name :

Department :

Year / Sem : II Year / IV semester

நீங்கள்



அன்பு செய்துங்கள், யாருக்கும் அடிமையாகாதீர்கள்;
இரக்கம் காட்டுங்கள், எவரிடத்தும் ஏமாந்துவிடாதீர்கள்;
பணிவைப் போற்றுங்கள், எந்த நிலையிலும் கோழையாகாதீர்கள்;
கண்டிப்பாக இருங்கள், எப்போதும் கோபப்படாதீர்கள்;
சிக்கனமாக வாழ்வுங்கள், கருமியாக மாறாதீர்கள்;
வீரமாக இருங்கள், போக்கிரிகளாக மாறாதீர்கள்;
சுறுசுறுப்பாக இருங்கள், பதட்டம் அடையாதீர்கள்;
வாயுளைத் தேடுங்கள், பேராசைப் படாதீர்கள்;
உழைப்பை நம்புங்கள், உருப்படுவீர்கள்;
உண்மையை நம்புங்கள், உயர்வடைவீர்கள்!

என்றும் அன்புடன்,
ஆதித்யன்.

About Autonomous

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020. The Pondicherry University Regulations R2013 will be followed for the students admitted in the Academic Year 2017 -18 (present Final year) and for the students admitted in the Academic Year 2018 -19 (present Third year). SMVEC Autonomous Regulations R2019, will be followed for the students admitted in the Academic Year 2019-20(present Second Year). SMVEC Autonomous Regulations R2020, will be followed for the students admitted in the Academic Year 2020-21(present first Year)

HIGHLIGHTS OF SMVEC AUTONOMOUS REGULATIONS 2020

- ❖ Industry 4.0 ready curriculum
- ❖ Updated towards skill development to create more job opportunities
- ❖ Multidisciplinary curriculum
- ❖ More entrepreneurship opportunities
- ❖ IELTS model curriculum / Foreign Languages learning opportunities
- ❖ Department wise Gold Medals
- ❖ Results will be declared within a month after completion of examinations
- ❖ **EEC / Mandatory course**

The Institute has Established 17 Center of Excellence to provide 75 International Certification courses from IBM, Google, Cisco, E Plan, Microsoft, Autodesk, Texas instruments, Festo, Bentley, Schneider Electric, Amazon web services, Siemens, Tally, DELL EMC², Harita Techserv, PTC, LN an Excellence in Technology & Didactic solutions. All students should enroll in one of the certification course in every semester

- ❖ **Industrial Training / Internship**

Students may undergo training or internship during summer / winter vacation at Industry/ Research organization. students are also permitted to undergo internships during their eighth semester after the theory classes are over

July 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu		
2	Fri	ESE - Theory examination starts	
3	Sat		
4	Sun		Holiday
5	Mon		
6	Tue		
7	Wed		
8	Thu		
9	Fri		
10	Sat		
11	Sun		Holiday
12	Mon		
13	Tue		
14	Wed		
15	Thu		
16	Fri		
17	Sat		
18	Sun		Holiday
19	Mon		
20	Tue		
21	Wed		
22	Thu		
23	Fri		
24	Sat		
25	Sun		Holiday
26	Mon		
27	Tue		
28	Wed		
29	Thu		
30	Fri		

Total number of working days :

Total number of holiday :

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❖ Supplementary Examinations

Supplementary examination is an additional examination conducted within a month of time after declaring the results of ESE. In order to complete the program within 4 years, only the student with maximum of two arrears will be permitted to appear for supplementary examination. The supplementary examination will be conducted in fifth and eighth semester only. For supplementary examination, the continuous assessment marks of the last attempt will be considered.

Benefits

- ❖ More number of students will receive the degree within the stipulated time
- ❖ The industries prefers to recruit students having nil arrears. If the supplementary examinations is conducted then more number of students will be eligible for the recruitment

Punctuality in Attendance

The students are requested to keep up punctuality in attending the college. The late comers will be losing their attendance and in turn the internal marks. Hence all the students are requested to attend the college in time. A student shall be permitted to appear for the End Semester Examination at the end of the semester only if he / she **secures not less than 75% of overall attendance.**

Repeating the Course

A student who secures overall attendance which is less than 60% has to repeat the semester with the approval, when it is next offered.

Mentor - Mentee System

In the mentor - mentee system, 30 students are allotted to a tutor who will be taking care of these students. The students are requested to utilize the facility.

The internal marks will be provided fully based on the continuous assessment tests (CAT 1 to 3 & Model Exam)

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)

Scheme for Continuous Assessment Test

S. No	Course Type	Continuous Assessment components									
		Test Marks	Average of marks for pre/post test/ viva for each experiment	Average of marks for experiment report for each experiment	Model Exam / Report	Assignment	Review - 1	Review - 2	Review - 3	Attendance	Total Marks
1.	Theory	15	-	-	-	5	-	-	-	5	25
2.	Practical	-	10	15	15	-	-	-	-	10	50
3.	Project work	-	-	-	-	-	10	10	20	-	40

Question Paper Pattern

Question paper pattern for CAT and ESE will be based on the patterns shown in Table (a) and (b)

Table (a) Question Paper patterns for CAT

Test Type	2 Marks	5 Marks	10 Marks	Total Marks
CAT 1 to 3	5	4	2 (out of 3 questions)	50
Model Exam	End semester Examination Question Pattern			75

Table (b) Question paper patterns for End semester Examination (ESE)

2 Marks	5 Marks	10 Marks	Total Marks
10	5 (one questions from each unit)	3 (out of 5 questions)	75

June 2021

Date	Day	Schedule	Working day/ Holiday
1	Tue		65
2	Wed		66
3	Thu		67
4	Fri		68
5	Sat		69
6	Sun		Holiday
7	Mon	ESE - Practical examination starts	
8	Tue		
9	Wed		
10	Thu		
11	Fri		
12	Sat		
13	Sun		Holiday
14	Mon	ESE - Practical examination ends	
15	Tue		
16	Wed		
17	Thu		
18	Fri		
19	Sat		
20	Sun		Holiday
21	Mon		
22	Tue		
23	Wed		
24	Thu		
25	Fri		
26	Sat		
27	Sun		Holiday
28	Mon		
29	Tue		
30	Wed		

Total number of working days : 05

Total number of holiday : 02

வெற்றி என்பது, லட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - ரைட்டிங்கேல்

May 2021

Date	Day	Schedule	Working day/ Holiday
1	Sat		Holiday
2	Sun		Holiday
3	Mon		40
4	Tue		41
5	Wed		42
6	Thu	Assignment - III	43
7	Fri	Feedback from the students & Analysis	44
8	Sat	QCM meeting 3 /IQAC meeting / Report Submission	45
9	Sun		Holiday
10	Mon	CAT - III starts (2 units)	46
11	Tue		47
12	Wed		48
13	Thu		49
14	Fri		50
15	Sat	CAT - III ends	51
16	Sun		Holiday
17	Mon		52
18	Tue		53
19	Wed		54
20	Thu		55
21	Fri		56
22	Sat		57
23	Sun		Holiday
24	Mon	Model exam starts (5 units)	58
25	Tue		59
26	Wed		60
27	Thu		61
28	Fri		62
29	Sat		63
30	Sun		Holiday
31	Mon	Model exam ends	64

Total number of working days : 25

Total number of holiday : 6

வெற்றி என்பது, லட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - நைட்டிங்கேல்

Distribution of Attendance marks for theory : 5 marks

The distribution of 5 marks for theory class attendance is as follows :

5 marks for 95% attendance and above

4 marks for 90% attendance and above but below 95%

3 marks for 85% attendance and above but below 90%

2 marks for 80% attendance and above but below 85%

1 mark for 75% attendance and above but below 80%

Distribution of Attendance marks for practical : 10 marks

The distribution of 10 marks for practical class attendance is as follows :

10 marks for 95% attendance and above

8 marks for 90% attendance and above but below 95%

6 marks for 85% attendance and above but below 90%

4 marks for 80% attendance and above but below 85%

2 marks for 75% attendance and above but below 80%

Continuous Assessment Marks

Continuous assessment mark will be based on the performance of the students in the continuous assessment test, Assignment and attendance percentage.

Importance of Continuous Assessment marks

The continuous assessment marks once earned are carried over to the subsequent exams also. Hence the students are requested to work hard to get the maximum of the continuous assessment marks. If the continuous assessment marks are lower, it will pull down chances of getting the first class, distinction, gold medals and ranks.

Importance of CAT-I/CAT-II/CAT-III/Model Exam

Continuous assessment marks are awarded for the performance in the CAT-I, CAT-II, CAT-III & Model exam. Hence all the students are requested to prepare well for each test / examination to earn the maximum continuous assessment marks.

Participation in the Curricular/Co-curricular / Extra curricular Activities

All the students are encouraged to participate in the curricular / co-curricular / extra curricular activities. Involvement in these activities will improve their knowledge level in the subject. If a student or a team gets cash prize / award at the technical event organised by the recognised institutions, then the management of this institution will also sanction an amount equivalent to the award / cash prize as a token of appreciation.

Leave Account Record

For each student, leave account record has been provided. The students are instructed to show the leave record to their parents and strictly adhere to the instructions given for availing the leave. The leave account record should be maintained properly and prior approval must be obtained for availing the leave. In exceptional cases, the students are permitted to get the approval after availing the leave.

Transport Facility

56 buses have been arranged for the students to reach the college from Puducherry, Kanagachettikulam, Villupuram, Neyveli, Panruti, Cuddalore, Nellikuppam, Madukarai and Tindivanam covering almost all the areas. Separate transport facility has been arranged for the students who remain in the college after 5 p.m. for utilising computer lab, library and sports facilities. The students are requested to utilise the transport facility.

All the students are requested to avoid mobile phones and travel by two wheelers considering their safety and security.

April 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu		16
2	Fri	Good Friday	Holiday
3	Sat		17
4	Sun		Holiday
5	Mon		18
6	Tue		19
7	Wed	CAT - I ends	20
8	Thu		21
9	Fri		22
10	Sat		23
11	Sun		Holiday
12	Mon		24
13	Tue		25
14	Wed	Tamil New Year / Dr. Ambedkar Jayanthi	Holiday
15	Thu	Assignment - II	26
16	Fri	Feedback from the students & Analysis	27
17	Sat	QCM meeting 2 /IQAC meeting / Report Submission	28
18	Sun		Holiday
19	Mon	CAT - II starts (1½ units)	29
20	Tue		30
21	Wed		31
22	Thu		32
23	Fri		33
24	Sat	CAT - II ends	34
25	Sun		Holiday
26	Mon		35
27	Tue		36
28	Wed		37
29	Thu		38
30	Fri		39

Total number of working days : 24

Total number of holiday : 6

அன்றாட வாழ்வின் சாதாரண விஷயங்களையும், அசாதாரண முறையில் செய்யும்போது உலகின் கவனத்தை உன் மீது திருப்ப முடியும். - ஜார்ஜ்வாஷிங்டன் கார்வெர்

March 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon		
2	Tue		
3	Wed		
4	Thu		
5	Fri		
6	Sat		
7	Sun		Holiday
8	Mon		
9	Tue		
10	Wed		
11	Thu		
12	Fri		
13	Sat		
14	Sun		Holiday
15	Mon	II year classes begins	1
16	Tue		2
17	Wed		3
18	Thu		4
19	Fri		5
20	Sat		6
21	Sun		Holiday
22	Mon		7
23	Tue		8
24	Wed		9
25	Thu		10
26	Fri		11
27	Sat	Assignment - I	12
28	Sun		Holiday
29	Mon	Feedback from the students & Analysis	13
30	Tue	QCM meeting 1 /IQAC meeting / Report Submission	14
31	Wed	CAT - I starts (1½ units)	15

Total number of working days : 15

Total number of holiday : 2

உலகை வெல்வதற்கு, உலகை தெரிந்து கொள்வது முக்கியமல்ல,
உன்னை அறிந்து கொள்வதுதான் முக்கியம் . . .

Placement and Training Division

The placement cell functions round the clock throughout the year to establish contact with reputed multinational companies, well established industrial organizations and plays an important role in locating various job opportunities and placing large number of the students every year at these organizations.

Activities of the Training Division

- ☆ Arranges trainings for personality and interpersonal skill development.
- ☆ Assists the students to get in-plant training
- ☆ Arranges industrial visits
- ☆ Creates awareness on the opportunities open for higher studies.
- ☆ Arranges coaching classes for GATE, GRE, TOFEL, IELTS, IAS, IES etc.

Placement Record

Academic Year	Students Placed
2012-13	75%
2013-14	85%
2014-15	95%
2015-16	95%
2016-17	93%
2017-18	95%
2018-19	95%
2019-20	95%

Details of Placed Students : 2020 - 21

1 Kaar	9	12 Makolet	3
2 TCS(Ninja and Digital)	210	13 O2Saver	4
3 Hexaware	15	14 OPPO Mobiles	3
4 Yellow Messenger	4	15 Infosys	1
5 Unisys	1	16 Sutherland	56
6 EmbedUr	1		
7 Virtusa	3		
8 ZOHO	8		
9 CTS	101		
10 Milekel Engineering	1		
11 Mantec Electronic	1	Total	*421

Wi-Fi Campus

** till 31st January 2021*

Our campus has been enabled by high speed uninterrupted Wi-Fi connectivity. The Computer Centre is open till 8.00 p.m. on all the working days except on the dates of University examinations.

Library Working Hours

8.30 a.m. to 8.30 p.m. (On all the working days)
8.30 a.m. to 10.00 p.m. (During the examination days)

Women Cell

For the benefit of the girl students, a Women Cell has been constituted in the college. The girl students may approach the Chairperson / members for assistance.

Grievance Redressal Cell

























There is a Grievance Redressal Cell under the Chairmanship of the Director of the institution. Students are requested to approach the Chairman / members to redress their grievances. Mail ID : grievance@smvec.ac.in

Gold Medals and Top Ten Ranks

Your seniors were sincere, hard working and got the Gold medals of the Pondicherry University and the top ten ranks in all the branches. The details of the University Goldmedals and Top Ten Ranks won by the students are given below.

 Indicates the Gold medal and University First Rank.

The Management awards 3 sovereigns of gold to the 1st rank holder, 2 sovereigns to the 2nd rank holder, 1 sovereign to the 3rd rank holder, 4th and 5th rank holders shall receive a cash award of Rs. 10,000/- (Rupees ten thousand) each and 6th to 10th rank holders shall receive a cash award of Rs. 5,000/- (Rupees five thousand) each.

Name of the Course	Year		
	2017	2018	2019
B.Tech. EEE	2, 4, 6, 7		 2,3,4,6,7,8,9,10
B.Tech. ECE	2,3,4,5,6,7,8,9,10		 3,4,5,6,7,9,10
B.Tech. CSE	 ,2, 3, 4, 10		 ,2,4,6,7,8,10
B.Tech. IT	 ,2,3,4,5,6,7,8,9,10		 2,3,5,6,8
B.Tech. ICE	 ,2,3,4,5,6,7,8,9,10		 2,3,4,5,6,7,8,9,10
B.Tech. Mech	 ,4, 5, 7, 9, 10		3,7,8,10
B.Tech. Civil	2, 3, 10		2,3,4,6,7,10
MCA	3,4,7,9,10		 2,6,7,8,9,10,11
MBA	 3,4,6,7,8		 2,3,4,5,7,8,10
MTech. CSE	 2, 3,4,5,7,8,9		 ,7
MTech. ECE	2, 3, 6, 7, 8, 9		2,3,4,5
MTech. PED			 ,2,3
MTech. NW	 2, 3,4,5,7,8,9		 ,2,3
MTech(VLSI)			 ,2,3,4
MTech(MF)	 ,2		

Important points for the kind attention of the Parents

Dear Parent

The IV semester classes commence on 15th March 2021. The above mentioned semester is a very short term, including working days meant for CAT-IV. The students have to complete a lot of work within a short period. **Hence the parents are kindly requested not to permit their wards to avail frequent leave during this semester period for the following reasons.**

IV Semester (II Year): All the IV semester papers are considered as problematic (toughest) papers. Hence, regular attendance and more concentration are required to clear these IV semester papers.

Marks in the **continuous assessment test** decide the major part of the continuous assessment marks. So, availing leave for the continuous assessment test must be avoided at any cost as this would seriously affect the assessment marks.

Practicals are very important not only to score more marks but also it will help to understand the theory part of the subject, hence advice your ward not to cut the practical classes.

Please spare your **valuable time to talk to your son/daughter every day and try to understand what he/she is doing in respect of his/her studies.** Kindly extend all your support to your son/daughter which will help them to come out successfully. For any assistance from our side you may always feel free to contact the respective Coordinator / HOD any time during the working hours.

Use of Cell Phones

It has been decided **not to permit cell phones inside the college campus**. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pinned. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working hours

I hr	9.00	to	9.50
II hr	9.50	to	10.40
Break	10.40	to	10.55
III hr	10.55	to	11.45
IV hr	11.45	to	12.35
V hr	1.15	to	2.05
VI hr	2.05	to	2.55
Break	2.55	to	3.10
VII	3.10	to	4.00
VIII	4.00	to	4.50
Lunch break	12.35 p.m.	to	1.15 p.m.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Accredited by NBA-AICTE, New Delhi, NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



Academic Calendar

March 2021 to July 2021

Name :

Department :

Year / Sem : III Year / VI semester

நீங்கள்



அன்பு செய்யுங்கள், யாருக்கும் அடிமையாகாதீர்கள்;
இரக்கம் காட்டுங்கள், எவரிடத்தும் ஏமாந்துவிடாதீர்கள்;
பணிவைப் போற்றுங்கள், எந்த நிலையிலும் கோழையாகாதீர்கள்;
கண்டிப்பாக இருங்கள், எப்போதும் கோபப்படாதீர்கள்;
சிக்கனமாக வாழ்வுங்கள், கருமியாக மாறாதீர்கள்;
வீரமாக இருங்கள், போக்கிரிகளாக மாறாதீர்கள்;
சுறுசுறுப்பாக இருங்கள், பதட்டம் அடையாதீர்கள்;
வாயுளைத் தேடுங்கள், பேராசைப் படாதீர்கள்;
உழைப்பை நம்புங்கள், உருப்படுவீர்கள்;
உண்மையை நம்புங்கள், உயர்வடைவீர்கள்!

என்றும் அன்புடன்,
ஆதித்யன்.

About Autonomous

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HIGHLIGHTS OF SMVEC AUTONOMOUS REGULATIONS 2020

- ❖ Industry 4.0 ready curriculum
- ❖ Updated towards skill development to create more job opportunities
- ❖ Multidisciplinary curriculum
- ❖ More entrepreneurship opportunities
- ❖ IELTS model curriculum / Foreign Languages learning opportunities
- ❖ Department wise Gold Medals
- ❖ Results will be declared within a month after completion of examinations
- ❖ **EEC / Mandatory course**

The Institute has Established 17 Center of Excellence to provide 75 International Certification courses from IBM, Google, Cisco, E Plan, Microsoft, Autodesk, Texas instruments, Festo, Bentley, Schneider Electric, Amazon web services, Siemens, Tally, DELL EMC², Harita Techserv, PTC, LN an Excellence in Technology & Didactic solutions. All students should enroll in one of the certification course in every semester

❖ **Industrial Training / Internship**

Students may undergo training or internship during summer / winter vacation at Industry/ Research organization. students are also permitted to undergo internships during their eighth semester after the theory classes are over

July 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu		
2	Fri	ESE - Theory examination starts	
3	Sat		
4	Sun		Holiday
5	Mon		
6	Tue		
7	Wed		
8	Thu		
9	Fri		
10	Sat		
11	Sun		Holiday
12	Mon		
13	Tue		
14	Wed		
15	Thu		
16	Fri		
17	Sat		
18	Sun		Holiday
19	Mon		
20	Tue		
21	Wed		
22	Thu		
23	Fri		
24	Sat		
25	Sun		Holiday
26	Mon		
27	Tue		
28	Wed		
29	Thu		
30	Fri		

Total number of working days :

Total number of holiday :

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❖ Supplementary Examinations

Supplementary examination is an additional examination conducted within a month of time after declaring the results of ESE. In order to complete the program within 4 years, only the student with maximum of two arrears will be permitted to appear for supplementary examination. The supplementary examination will be conducted in fifth and eighth semester only. For supplementary examination, the continuous assessment marks of the last attempt will be considered.

Benefits

- ❖ More number of students will receive the degree within the stipulated time
- ❖ The industries prefers to recruit students having nil arrears. If the supplementary examinations is conducted then more number of students will be eligible for the recruitment

Punctuality in Attendance

The students are requested to keep up punctuality in attending the college. The late comers will be losing their attendance and in turn the internal marks. Hence all the students are requested to attend the college in time. A student shall be permitted to appear for the End Semester Examination at the end of the semester only if he / she **secures not less than 75% of overall attendance.**

Repeating the Course

A student who secures overall attendance which is less than 60% has to repeat the semester with the approval, when it is next offered.

Mentor - Mentee

In the mentor - mentee system, 30 students are allotted to a tutor who will be taking care of these students. The students are requested to utilize the facility.

The internal marks will be provided fully based on the continuous assessment tests (CAT 1 to 3 & Model Exam)

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)

Scheme for Continuous Assessment Test

S. No	Course Type	Continuous Assessment components					Total Marks
		Test Marks	Periodic practical works & record submitted	Internal practical examination	Viva voce	Attendance	
1.	Theory	20	-			5	25
2.	Practical	-	20	15	5	10	50

Question Paper Pattern

Question paper pattern for CAT and ESE will be based on the patterns shown in Table (a) and (b)

Table (a) Question Paper patterns for CAT

Test Type	2 Marks	10 Marks	Total Marks
CAT 1 to 3	10	3 (out of 4 questions)	50
Model Exam	End semester Examination Question Pattern		75

Table (b) Question paper patterns for End Semester Examination (ESE)

2 Marks	11 Marks	Total Marks
10	5 (either or type)	75

June 2021

Date	Day	Schedule	Working day/ Holiday
1	Tue		65
2	Wed		66
3	Thu		67
4	Fri		68
5	Sat		69
6	Sun		Holiday
7	Mon	ESE - Practical examination starts	
8	Tue		
9	Wed		
10	Thu		
11	Fri		
12	Sat		
13	Sun		Holiday
14	Mon	ESE - Practical examination ends	
15	Tue		
16	Wed		
17	Thu		
18	Fri		
19	Sat		
20	Sun		Holiday
21	Mon		
22	Tue		
23	Wed		
24	Thu		
25	Fri		
26	Sat		
27	Sun		Holiday
28	Mon		
29	Tue		
30	Wed		

Total number of working days : 05

Total number of holiday : 02

வெற்றி என்பது, வட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - நைட்டிங்கேல்

May 2021

Date	Day	Schedule	Working day/ Holiday
1	Sat		Holiday
2	Sun		Holiday
3	Mon		40
4	Tue		41
5	Wed		42
6	Thu		43
7	Fri	Feedback from the students & Analysis	44
8	Sat	QCM meeting 3 /IQAC meeting / Report Submission	45
9	Sun		Holiday
10	Mon	CAT - III starts (2 units)	46
11	Tue		47
12	Wed		48
13	Thu		49
14	Fri	CAT - III ends	50
15	Sat		51
16	Sun		Holiday
17	Mon		52
18	Tue		53
19	Wed		54
20	Thu		55
21	Fri		56
22	Sat		57
23	Sun		Holiday
24	Mon	Model exam starts (5 units)	58
25	Tue		59
26	Wed		60
27	Thu		61
28	Fri	Model exam ends	62
29	Sat		63
30	Sun		Holiday
31	Mon		64

Total number of working days : 25

Total number of holiday : 6

வெற்றி என்பது, ஸ்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - ரைட்டிங்கேல்

Distribution of Attendance marks for theory : 5 marks

The distribution of 5 marks for theory class attendance is as follows :

5 marks for 95% attendance and above

4 marks for 90% attendance and above but below 95%

3 marks for 85% attendance and above but below 90%

2 marks for 80% attendance and above but below 85%

1 mark for 75% attendance and above but below 80%

Distribution of Attendance marks for practical : 10 marks

The distribution of 10 marks for practical class attendance is as follows :

10 marks for 95% attendance and above

8 marks for 90% attendance and above but below 95%

6 marks for 85% attendance and above but below 90%

4 marks for 80% attendance and above but below 85%

2 marks for 75% attendance and above but below 80%

Continuous Assessment Mark

Continuous assessment mark will be based on the performance of the students in the continuous assessment test. Assignment and attendance percentage.

Importance of Continuous Assessment marks

The continuous assessment marks once earned are carried over to the subsequent exams also. Hence the students are requested to work hard to get the maximum of the continuous assessment marks. If the continuous assessment marks are lower, it will pull down chances of getting the first class, distinction, gold medals and ranks.

Importance of CAT-I/CAT-II/CAT-III/ Model Exam

Continuous assessment marks are awarded for the performance in the CAT-I, CAT-II, CAT-III & Model exam. Hence all the students are requested to prepare well for each test / examination to earn the maximum continuous assessment marks.

Undertaking Minor / Major Projects

Each student is advised to take atleast one minor project. Involving in the project will be helping to understand the basics of the subject. Some of the minor / major project will also be benefiting the society. Moreover, the Management awards cash prizes for the best projects in each department.

Participation in the Curricular / Co-curricular / Extra curricular Activities

All the students are encouraged to participate in the curricular / co-curricular / extra curricular activities. Involvement in these activities will improve their knowledge level in the subject. If a student or a team gets cash prize / award at the technical event organised by the recognised institutions, then the management of this institution will also sanction an amount equivalent to the award / cash prize as a token of appreciation.

Leave Account Record

For each student, leave account record has been provided. The students are instructed to show the leave record to their parents and strictly adhere to the instructions given for availing the leave. The leave account record should be maintained properly and prior approval must be obtained for availing the leave. In exceptional cases, the students are permitted to get the approval after availing the leave.

Transport Facility

56 buses have been arranged for the students to reach the college from Puducherry, Kanagachetikulam, Villupuram, Neyveli, Panruti, Cuddalore, Nellikuppam, Madukarai and Tindivanam covering almost all the areas. Separate transport facility has been arranged for the students who remain in the college after 5 p.m. for utilising computer lab, library and sports facilities. The students are requested to utilise the transport facility.

All the students are requested to avoid mobile phones and travel by two wheelers considering their safety and security.

April 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu		16
2	Fri	Good Friday	Holiday
3	Sat		17
4	Sun		Holiday
5	Mon		18
6	Tue	CAT - I ends	19
7	Wed		20
8	Thu		21
9	Fri		22
10	Sat		23
11	Sun		Holiday
12	Mon		24
13	Tue		25
14	Wed	Tamil New Year / Dr. Ambedkar Jayanthi	Holiday
15	Thu		26
16	Fri	Feedback from the students & Analysis	27
17	Sat	QCM meeting 2 / IQAC meeting / Report Submission	28
18	Sun		Holiday
19	Mon	CAT - II starts (1½ units)	29
20	Tue		30
21	Wed		31
22	Thu		32
23	Fri	CAT - II ends	33
24	Sat		34
25	Sun		Holiday
26	Mon		35
27	Tue		36
28	Wed		37
29	Thu		38
30	Fri		39

Total number of working days : 24

Total number of holiday : 6

அன்றாட வாழ்வின் சாதாரண விஷயங்களையும், அசாதாரண முறையில் செய்யும்போது உலகின் கவனத்தை உன் மீது திருப்ப முடியும். - ஜார்ஜ்வாஷிங்டன் கார்வொர்

March 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon		
2	Tue		
3	Wed		
4	Thu		
5	Fri		
6	Sat		
7	Sun		Holiday
8	Mon		
9	Tue		
10	Wed		
11	Thu		
12	Fri		
13	Sat		
14	Sun		Holiday
15	Mon	III year classes begins	1
16	Tue		2
17	Wed		3
18	Thu		4
19	Fri		5
20	Sat		6
21	Sun		Holiday
22	Mon		7
23	Tue		8
24	Wed		9
25	Thu		10
26	Fri		11
27	Sat		12
28	Sun		Holiday
29	Mon	Feedback from the students & Analysis	13
30	Tue	QCM meeting 1 /IQAC meeting / Report Submission	14
31	Wed	CAT - I starts (1½ units)	15

Total number of working days : 15

Total number of holiday : 2

உலகை வெல்வதற்கு, உலகை தெரிந்து கொள்வது முக்கியமல்ல,
உன்னை அறிந்து கொள்வதுதான் முக்கியம் . . .

Placement and Training Division

The placement cell functions round the clock throughout the year to establish contact with reputed multinational companies, well established industrial organizations and plays an important role in locating various job opportunities and placing large number of the students every year at these organizations.

Activities of the Training Division

- ☆ Arranges trainings for personality and interpersonal skill development.
- ☆ Assists the students to get in-plant training
- ☆ Arranges industrial visits
- ☆ Creates awareness on the opportunities open for higher studies.
- ☆ Arranges coaching classes for GATE, GRE, TOFEL, IELTS, IAS, IES etc.

Placement Record

Academic Year	Students Placed
2012-13	75%
2013-14	85%
2014-15	95%
2015-16	95%
2016-17	93%
2017-18	95%
2018-19	95%
2019-20	95%

Details of Placed Students : 2020 - 21

1 Kaar	9	12 Makolet	3
2 TCS(Ninja and Digital)	210	13 O2Saver	4
3 Hexaware	15	14 OPPO Mobiles	3
4 Yellow Messenger	4	15 Infosys	1
5 Unisys	1	16 Sutherland	56
6 EmbedUr	1		
7 Virtusa	3		
8 ZOHO	8		
9 CTS	101		
10 Milekel Engineering	1		
11 Mantec Electronic	1	Total	*421

Wi-Fi Campus

** till 31st January 2021*

Our campus has been enabled by high speed uninterrupted Wi-Fi connectivity. The Computer Centre is open till 8.00 p.m. on all the working days except on the dates of University examinations.

Library Working Hours

8.30 a.m. to 8.30 p.m. (On all the working days)
8.30 a.m. to 10.00 p.m. (During the examination days)

Women Cell

For the benefit of the girl students, a Women Cell has been constituted in the college. The girl students may approach the Chairperson / members for assistance.

Grievance Redressal Cell

























There is a Grievance Redressal Cell under the Chairmanship of the Director of the institution. Students are requested to approach the Chairman / members to redress their grievances. Mail ID : grievance@smvec.ac.in

Gold Medals and Top Ten Ranks

Your seniors were sincere, hard working and got the Gold medals of the Pondicherry University and the top ten ranks in all the branches. The details of the University Goldmedals and Top Ten Ranks won by the students are given below.

 Indicates the Gold medal and University First Rank.

The Management awards 3 sovereigns of gold to the 1st rank holder, 2 sovereigns to the 2nd rank holder, 1 sovereign to the 3rd rank holder, 4th and 5th rank holders shall receive a cash award of Rs. 10,000/- (Rupees ten thousand) each and 6th to 10th rank holders shall receive a cash award of Rs. 5,000/- (Rupees five thousand) each.

Name of the Course	Year		
	2017	2018	2019
B.Tech. EEE	2, 4, 6, 7		 2,3,4,6,7,8,9,10
B.Tech. ECE	2,3,4,5,6,7,8,9,10		 3,4,5,6,7,9,10
B.Tech. CSE	 ,2, 3, 4, 10		 ,2,4,6,7,8,10
B.Tech. IT	 ,2,3,4,5,6,7,8,9,10		 2,3,5,6,8
B.Tech. ICE	 ,2,3,4,5,6,7,8,9,10		 2,3,4,5,6,7,8,9,10
B.Tech. Mech	 ,4, 5, 7, 9, 10		3,7,8,10
B.Tech. Civil	2, 3, 10		2,3,4,6,7,10
MCA	3,4,7,9,10		 2,6,7,8,9,10,11
MBA	 3,4,6,7,8		 2,3,4,5,7,8,10
MTech. CSE	 2, 3,4,5,7,8,9		 ,7
MTech. ECE	2, 3, 6, 7, 8, 9		2,3,4,5
MTech. PED			 ,2,3
MTech. NW	 2, 3,4,5,7,8,9		 ,2,3
MTech(VLSI)			 ,2,3,4
MTech(MF)	 ,2		

Important points for the kind attention of the Parents

Dear Parent

The VI semester classes commence on 15th March 2021. The above mentioned semester is a very short term, including working days meant for CAT-IV. The students have to complete a lot of work within a short period. **Hence the parents are kindly requested not to permit their wards to avail frequent leave during this semester period for the following reasons.**

VI Semester (III year): More number of training programs are proposed to be offered to enable the students to face the **campus interviews with confidence.** Attending these training programs is most important for **getting campus placement.** Apart from attending these trainings, **the students have to devote their time and energy to prepare for the End Semester Examinations during this semester.**

Marks in the **continuous assessment test** decide the major part of the continuous assessment marks. So, availing leave for the continuous assessment test must be avoided at any cost as this would seriously affect the assessment marks.

Practicals are very important not only to score more marks but also it will help to understand the theory part of the subject, hence advice your ward not to cut the practical classes.

Please spare your **valuable time to talk to your son/daughter every day and try to understand what he/she is doing in respect of his/her studies.** Kindly extend all your support to your son/daughter which will help them to come out successfully. For any assistance from our side you may always feel free to contact the respective Coordinator / HOD any time during the working hours.

Use of Cell Phones

It has been decided **not to permit cell phones inside the college campus**. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pinned. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working hours

I hr	9.00	to	9.50
II hr	9.50	to	10.40
Break	10.40	to	10.55
III hr	10.55	to	11.45
IV hr	11.45	to	12.35
V hr	1.15	to	2.05
VI hr	2.05	to	2.55
Break	2.55	to	3.10
VII	3.10	to	4.00
VIII	4.00	to	4.50

Lunch break 12.35 p.m. to 1.15 p.m.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Accredited by NBA-AICTE, New Delhi, NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



Academic Calendar

February 2021 to May 2021

Name :

Department :

Year / Sem : IV year / VIII semester

நீங்கள்



அன்பு செய்யுங்கள், யாருக்கும் அடிமையாகாதீர்கள்;
இரக்கம் காட்டுங்கள், எவரிடத்தும் ஏமாந்துவிடாதீர்கள்;
பணிவைப் போற்றுங்கள், எந்த நிலையிலும் கோழையாகாதீர்கள்;
கண்டிப்பாக இருங்கள், எப்போதும் கோபப்படாதீர்கள்;
சிக்கனமாக வாழுங்கள், கருமியாக மாறாதீர்கள்;
வீரமாக இருங்கள், போக்கிரிகளாக மாறாதீர்கள்;
சுறுசுறுப்பாக இருங்கள், பதட்டம் அடையாதீர்கள்;
வயாருளைத் தேடுங்கள், பேராசைப் படாதீர்கள்;
உழைப்பை நம்புங்கள், உருப்படுவீர்கள்;
உண்மையை நம்புங்கள், உயர்வடைவீர்கள்!

என்றும் அன்புடன்,
ஆதிபாண்டி.

About Autonomous

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020. The Pondicherry University Regulations R2013 will be followed for the students admitted in the Academic Year 2017 -18 (present Final year) and for the students admitted in the Academic Year 2018 -19 (present Third year). SMVEC Autonomous Regulations R2019, will be followed for the students admitted in the Academic Year 2019-20(present Second Year). SMVEC Autonomous Regulations R2020, will be followed for the students admitted in the Academic Year 2020-21(present first Year)

HIGHLIGHTS OF SMVEC AUTONOMOUS REGULATIONS 2020

- ❖ Industry 4.0 ready curriculum
- ❖ Updated towards skill development to create more job opportunities
- ❖ Multidisciplinary curriculum
- ❖ More entrepreneurship opportunities
- ❖ IELTS model curriculum / Foreign Languages learning opportunities
- ❖ Department wise Gold Medals
- ❖ Results will be declared within a month after completion of examinations

❖ **Ethnotech / Mandatory course**

The Institute has Established 17 Center of Excellence to provide 75 International Certification courses from IBM, Google, Cisco, E Plan, Microsoft, Autodesk, Texas instruments, Festo, Bentley, Schneider Electric, Amazon web services, Siemens, Tally, DELL EMC², Harita Techserv, PTC, LN an Excellence in Technology & Didactic solutions. All students should enroll in one of the certification course in every semester

❖ **Industrial Training / Internship**

Students may undergo training or internship during summer / winter vacation at Industry/ Research organization. students are also permitted to undergo internships during their eighth semester after the theory classes are over

❖ **Supplementary Examinations**

Supplementary examination is an additional examination conducted within a month of time after declaring the results of ESE. In order to complete the program within 4 years, only the student with maximum of two arrears will be permitted to appear for supplementary examination. The supplementary examination will be conducted in fifth and eighth semester only. For supplementary examination, the continuous assessment marks of the last attempt will be considered.

Benefits

- ❖ More number of students will receive the degree within the stipulated time
- ❖ The industries prefers to recruit students having nil arrears. If the supplementary examinations is conducted then more number of students will be eligible for the recruitment

❖ **Photo copy of answer book**

After the publication of the result, photocopy of the answer books shall be provided to the student on request with stipulated fee fixed by the College from time to time

Punctuality in Attendance

The students are requested to keep up punctuality in attending the college. The late commers will be losing their attendance and in turn the internal marks. Hence all the students are requested to attend the college in time. A student shall be permitted to appear for the End Semester Examination at the end of the semester only if he / she **secures not less than 75% of overall attendance.**

Repeating the Course

A student who secures overall attendance which is less than 60% has to repeat the course with the approval, when it is next offered.

Mentor - Mentee System

In the mentor - mentee system, 30 students are allotted to a tutor who will be taking care of these students. The students are requested to utilize the facility.

The internal marks will be provided fully based on the continuous assessment tests (CAT 1 to 4)

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)

Scheme for Continuous Assessment Test

S. No	Course Type	Continuous Assessment components					Total Marks
		Test Marks	Periodic practical works & record submitted	Internal practical examination	Viva voce	Attendance	
1.	Theory	20	-			5	25
2.	Practical	-	20	15	5	10	50

Question Paper Pattern

Question paper pattern for CAT and ESE will be based on the patterns shown in Table (a) and (b)

Table (a) Question Paper patterns for CAT

Test Type	2 Marks	10 Marks	Total Marks
CAT 1 to 3	10	3 (out of 4 questions)	50
CAT 4	End semester Examination Question Pattern		75

Table (b) Question paper patterns for End Semester Examination (ESE)

2 Marks	11 Marks	Total Marks
10	5 (either or type)	75

May 2021

Date	Day	Schedule	Working day/ Holiday
1	Sat		Holiday
2	Sun		Holiday
3	Mon	Model exam starts (5 units)	64
4	Tue		65
5	Wed		66
6	Thu	Model exam ends	67
7	Fri		68
8	Sat		69
9	Sun		Holiday
10	Mon		
11	Tue		
12	Wed	ESE - Practical examination starts	
13	Thu		
14	Fri		
15	Sat	ESE - Practical examination ends	
16	Sun		Holiday
17	Mon	Study holiday starts	
18	Tue		
19	Wed		
20	Thu		
21	Fri		
22	Sat	Study holiday ends	
23	Sun		Holiday
24	Mon	ESE - Theory examination starts	
25	Tue		
26	Wed		
27	Thu		
28	Fri		
29	Sat		
30	Sun		
31	Mon	ESE - Theory examination ends	

Total number of working days : 6

Total number of holiday : 5

வெற்றி என்பது, லட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது - ரைட்டிங்கேல்

April 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu	Feedback from the students & Analysis	40
2	Fri	Good Friday	Holiday
3	Sat	Project work / QCM meeting 1 /IQAC meeting / Report Submission	41
4	Sun		Holiday
5	Mon	CAT - II starts (1½ units)	42
6	Tue		43
7	Wed		44
8	Thu	CAT - II ends	45
9	Fri	Project review -2 (Phase II)	46
10	Sat	Project review -2 (Phase II)	47
11	Sun		Holiday
12	Mon		48
13	Tue		49
14	Wed	Tamil New Year / Dr. Ambedkar Jayanthi	Holiday
15	Thu		50
16	Fri		51
17	Sat		52
18	Sun		Holiday
19	Mon	Feedback from the students & Analysis	53
20	Tue	QCM meeting 1 /IQAC meeting / Report Submission	54
21	Wed	CAT - III starts (2 units)	55
22	Thu		56
23	Fri	Project work	57
24	Sat	CAT - III ends / Project work	58
25	Sun		Holiday
26	Mon		59
27	Tue		60
28	Wed		61
29	Thu		62
30	Fri	Project review - 3 (Phase II)	63

Total number of working days : 24

Total number of holiday : 6

அன்றாட வாழ்வின் சாதாரண விஷயங்களையும், அசாதாரண முறையில் செய்யும்போது உலகின் கவனத்தை உன் மீது திருப்ப முடியும். - ஜார்ஜ்வாஷிங்டன் கார்வெர்

Distribution of Attendance marks for theory : 5 marks

The distribution of 5 marks for theory class attendance is as follows :

5 marks for 95% attendance and above

4 marks for 90% attendance and above but below 95%

3 marks for 85% attendance and above but below 90%

2 marks for 80% attendance and above but below 85%

1 mark for 75% attendance and above but below 80%

Distribution of Attendance marks for practical : 10 marks

The distribution of 10 marks for practical class attendance is as follows :

10 marks for 95% attendance and above

8 marks for 90% attendance and above but below 95%

6 marks for 85% attendance and above but below 90%

4 marks for 80% attendance and above but below 85%

2 marks for 75% attendance and above but below 80%

Note :

Continuous assessment mark will be based on the performance of the students in the continuous assessment test and attendance percentage.

Importance of Continuous Assessment marks

The continuous assessment marks once earned are carried over to the subsequent exams also. Hence the students are requested to work hard to get the maximum of the continuous assessment marks. If the continuous assessment marks are lower, it will pull down chances of getting the first class, distinction, gold medals and ranks.

Importance of CAT-I/CAT-II/CAT-III/CAT-IV

Continuous assessment marks are awarded for the performance in the CAT-I, CAT-II, CAT-III & CAT-IV (Model exam). Hence all the students are requested to prepare well for each test / examination to earn the maximum continuous assessment marks.

Undertaking Minor / Major Projects

Each student is advised to take atleast one minor project. Involving in the project will be helping to understand the basics of the subject. Some of the minor / major project will also be benefiting the society. Moreover, the Management awards cash prizes for the best projects in each department.

Participation in the Curricular / Co-curricular / Extra curricular Activities

All the students are encouraged to participate in the curricular / co-curricular / extra curricular activities. Involvement in these activities will improve their knowledge level in the subject. If a student or a team gets cash prize / award at the technical event organised by the recognised institutions, then the management of this institution will also sanction an amount equivalent to the award / cash prize as a token of appreciation.

Leave Account Record

For each student, leave account record has been provided. The students are instructed to show the leave record to their parents and strictly adhere to the instructions given for availing the leave. The leave account record should be maintained properly and prior approval must be obtained for availing the leave. In exceptional cases, the students are permitted to get the approval after availing the leave.

Transport Facility

56 buses have been arranged for the students to reach the college from Puducherry, Kanagachettikulam, Villupuram, Neyveli, Panruti, Cuddalore, Nellikuppam, Madukarai and Tindivanam covering almost all the areas. Separate transport facility has been arranged for the students who remain in the college after 5 p.m. for utilising computer lab, library and sports facilities. The students are requested to utilise the transport facility.

All the students are requested to avoid mobile phones and travel by two wheelers considering their safety and security.

March 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon		13
2	Tue		14
3	Wed		15
4	Thu		16
5	Fri		17
6	Sat		18
7	Sun		Holiday
8	Mon		19
9	Tue		20
10	Wed		21
10	Thu		22
12	Fri	Project review -1(Phase II) /Feedback from the students & Analysis	23
13	Sat	Project review -1(Phase II)/QCM meeting1/IQAC meeting/Report Submission	24
14	Sun		Holiday
15	Mon	CAT - I starts (1½ units)	25
16	Tue		26
17	Wed		27
18	Thu	CAT - I ends	28
19	Fri	Project work	29
20	Sat	Project work	30
21	Sun		Holiday
22	Mon		31
23	Tue		32
24	Wed		33
25	Thu		34
26	Fri	Project work	35
27	Sat	Project work	36
28	Sun		Holiday
29	Mon		37
30	Tue		38
31	Wed		39

Total number of working days : 27

Total number of holiday : 4

உலகை வெல்வதற்கு, உலகை தெரிந்து கொள்வது முக்கியமல்ல,
உன்னை அறிந்து கொள்வதுதான் முக்கியம் . . .

February 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon		
2	Tue		
3	Wed		
4	Thu		
5	Fri		
6	Sat		
7	Sun		Holiday
8	Mon		
9	Tue		
10	Wed		
10	Thu		
12	Fri		
13	Sat		
14	Sun		Holiday
15	Mon	College reopens	1
16	Tue		2
17	Wed		3
18	Thu		4
19	Fri		5
20	Sat		6
21	Sun		Holiday
22	Mon		7
23	Tue		8
24	Wed		9
25	Thu		10
26	Fri		11
27	Sat		12
28	Sun		Holiday

Total number of working days : 12

Total number of holiday : 2

தனராது இதுயம் உள்வனாக்கு, இவ்வலகில் முடியாதது என்று எதுவுமே இல்லை

- புக்கன்ஸ்

Placement and Training Division

The placement cell functions round the clock throughout the year to establish contact with reputed multinational companies, well established industrial organizations and plays an important role in locating various job opportunities and placing large number of the students every year at these organizations.

Activities of the Training Division

- ☆ Arranges trainings for personality and interpersonal skill development.
- ☆ Assists the students to get in-plant training
- ☆ Arranges industrial visits
- ☆ Creates awareness on the opportunities open for higher studies.
- ☆ Arranges coaching classes for GATE, GRE, TOFEL, IELTS, IAS, IES etc.

Placement Record

Academic Year	Students Placed
2012-13	75%
2013-14	85%
2014-15	95%
2015-16	95%
2016-17	93%
2017-18	95%
2018-19	95%
2019-20	95%

Details of Placed Students : 2020 - 21

1 Kaar	9	12 Makolet	3
2 TCS(Ninja and Digital)	210	13 O2Saver	4
3 Hexaware	15	14 OPPO Mobiles	3
4 Yellow Messenger	4	15 Infosys	1
5 Unisys	1	16 Sutherland	56
6 EmbedUr	1		
7 Virtusa	3		
8 ZOHO	8		
9 CTS	101		
10 Milekel Engineering	1		
11 Mantec Electronic	1	Total	*421

Wi-Fi Campus

** till 31st January 2021*

Our campus has been enabled by high speed uninterrupted Wi-Fi connectivity. The Computer Centre is open till 8.00 p.m. on all the working days except on the dates of University examinations.

Library Working Hours

8.30 a.m. to 8.30 p.m. (On all the working days)
8.30 a.m. to 10.00 p.m. (During the examination days)

Women Cell

For the benefit of the girl students, a Women Cell has been constituted in the college. The girl students may approach the Chairperson / members for assistance.

Grievance Redressal Cell

























There is a Grievance Redressal Cell under the Chairmanship of the Director of the institution. Students are requested to approach the Chairman / members to redress their grievances. Mail ID : grievance@smvec.ac.in

Gold Medals and Top Ten Ranks

Your seniors were sincere, hard working and got the Gold medals of the Pondicherry University and the top ten ranks in all the branches. The details of the University Goldmedals and Top Ten Ranks won by the students are given below.

 Indicates the Gold medal and University First Rank.

The Management awards 3 sovereigns of gold to the 1st rank holder, 2 sovereigns to the 2nd rank holder, 1 sovereign to the 3rd rank holder, 4th and 5th rank holders shall receive a cash award of Rs. 10,000/- (Rupees ten thousand) each and 6th to 10th rank holders shall receive a cash award of Rs. 5,000/- (Rupees five thousand) each.

Name of the Course	Year		
	2017	2018	2019
B.Tech. EEE	2, 4, 6, 7		 2,3,4,6,7,8,9,10
B.Tech. ECE	2,3,4,5,6,7,8,9,10		 3,4,5,6,7,9,10
B.Tech. CSE	 ,2, 3, 4, 10		 ,2,4,6,7,8,10
B.Tech. IT	 ,2,3,4,5,6,7,8,9,10		 2,3,5,6,8
B.Tech. ICE	 ,2,3,4,5,6,7,8,9,10		 2,3,4,5,6,7,8,9,10
B.Tech. Mech	 ,4, 5, 7, 9, 10		3,7,8,10
B.Tech. Civil	2, 3, 10		2,3,4,6,7,10
MCA	3,4,7,9,10		 2,6,7,8,9,10,11
MBA	 3,4,6,7,8		 2,3,4,5,7,8,10
M.Tech. CSE	 2, 3,4,5,7,8,9		 ,7
M.Tech. ECE	2, 3, 6, 7, 8, 9		2,3,4,5
M.Tech. PED			 ,2,3
M.Tech. NW	 2, 3,4,5,7, 8,9		 ,2,3
M.Tech(VLSI)			 ,2,3,4
M.Tech(MF)	 ,2		

Important points for the kind attention of the Parents

Dear Parent

The VIII semester classes commence on 15th February 2021. The above mentioned semester is a very short term, including working days meant for CAT-IV (Model exam). The students have to complete a lot of work within a short period. **Hence the parents are kindly requested not to permit their wards to avail frequent leave during this semester period for the following reasons.**

VIII Semester (IV year):The students have to complete their **Major Project in time.** Besides, they have to prepare for the End Semester theory examinations also. Hence, all the students are expected to devote their time to attend to the above work. **The students selected at the campus interview will be permitted to join by authorities of the companies, only if they qualify for the degree.**

Practicals are very important not only to score more marks but also it will help to understand the theory part of the subject, hence advice your ward not to cut the practical classes.

Please spare your **valuable time to talk to your son/daughter every day and try to understand what he/she is doing in respect of his/her studies.** Kindly extend all your support to your son/daughter which will help them to come out successfully. For any assistance from our side you may always feel free to contact the respective Coordinator / HOD any time during the working hours.

Annexure – VII



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



Department of ELECTRICAL AND ELECTRONICS ENGINEERING
DETAILS OF EXAMINERS FOR QUESTION PAPER SETTER AND EVALUATORS

Sl.No	Name of the Examiner	Specialization	Year of Experience	Designation, Department and Institution in which currently working	Contact number and mail id
1.	Dr.S.P.Mangaiyarkarasi	Power System	16	Asst.Professor , Department of EEE, University college of Engineering, Panruti.	mangaisowmeya@gmail.com 8903678363
2.	Dr.N.Shobanadevi	Power Electronics and Drives	20	Professor , University College of Engineering, Ariyalur.	shobanadevi1975@gmail.com 8778149535
3.	Dr.D.Zamrooth	Power Electronics	21	Asst.Professor, Department of EEE, University college of Engineering, Kanchipuram	zam.shireen@gmail.com 91767 73605
4.	Dr.S.A.Elankurisil	Power Electronics	15	Professor & Head, Department of EEE, Adhiparasakthi Engineering College, Melmaruvathur.	saelankurisil@gmail.com 9442936797
5.	Dr.A.Saraswathi	Power Electronics	18	Asst.Professor, Department of EEE, University college of Engineering - Villupuram	saraswathiask@gmail.com 9994549910
6.	Dr.S.Prabhu	Power Electronics and Drives	10	Associate Professor, Department of EEE, Sree Vidyanikethan Engineering College Sree Sainath Nagar, Tirupati.	prabhutajmahal6@gmail.com 9600646211
7.	Dr.R.Natarajan	Power Electronics and Drives	10	Associate Professor / EEE Fatima Michael College of Engineering and Technology, Madurai	natarajanrajavel369@gmail.com 9655986026

8.	Dr.A.Ragavendiran	Power system and control	11	Asst.Professor, Department of EEE, AVC College of Engineering, Mannampandal Mayiladudurai	ragavendiran.as@gmail.com 8248781797
9.	Dr.S.Senthikumar	Electrical Engineering	25	Associate Professor / EEE University College of Engineering, Ariyalur.	senthil21575@gmail.com 7810062427
10.	Dr.R.Karthikeyan	Power System	12	Asst.Professor, Department of EEE, University college of Engineering, Pattukottai.	kar_thamarai82@yahoo.com 9047656765
11.	Dr.V.Vasan Prabhu	Power Electronics and Drives	11	Assistant Professor / Department of Automotive Electronics, SRM Institute of Science and Technology, Chennai.	vasanprv@srmist.edu.in 7358682007
12.	Dr.C. Kumar	Power Electronics and Drives	14	Professor M Kumarasamy college of engineering, Thalavapalayam, Tamil Nadu 639113	ckumarme81@gmail.com 9994942022
13.	Dr. S. Karthick	Image Processing	19	Associate Professor Erode Sengunthar Engineering College Thudupathi Post, Perundurai Erode – 638 057	resumekarthick@gmail.com 9486937253
14.	Mr.C.Nanda kumar	Power Electronics and Drives	10	Assistant Professor, Arunai Engineering College, Velu Nagar, Mathur, Tiruvannamalai-606603 Tamilnadu.	nandha30electra@gmail.com 9865714571
15.	Dr.A.Venkadesan,	Electrical Drives and control	7	Assistant Professor National Institute of Technology , NH32, Karaikal, Puducherry 609609	venkadesan@nitpy.ac.in 7598566739
16.	Dr.S.Priyadharashni,	Power electronics & Drives	10	Assistant Professor Arunai Engineering College, Velu Nagar, Mathur, Tiruvannamalai-606603 Tamilnadu. INDIA.	priyamshanmugam@gmail.com 9994576791
17.	Dr.Arul Murugan	Power System	10	Professor & Head / EEE Excel Group of Institutions Erode, Tamil-Nadu	arulpvp@gmail.com 9842909393
18.	Dr. R .Gunabalan	Electrical Drives and Control	17	Associate Professor School of Electrical Engineering, VIT,Vandalur-Kelambakkam Road,	gunabalan.r@vit.ac.in 9894919269

				Chennai-600 127	
19.	Dr.Padmaja Sankala	Power Electronics and Drives	12	Asst. Professor All India Shri Shivaji memorial Society's College of Engineerng, Pune	pksankala@aissmscoe.com 9923669024
20.	Dr.T.Venishkunmar	VLSI	10	Associate Professor Sethu Institute of Technology, Pulloor, Kariapatti – 626 115, Virudhunagar – Tamilnadu	tvenishkumar@gmail.com 9095577477
21.	Dr.R.Thamaraiselvi	Power Electronics and Drives	12	Assistant Professor/EEE University College of Engineering, Villupuram	r.thamaraiselvi1@gmail.com 9487363388
22.	Dr.R.Murugesan	Power Electronics and Energy systems	14	Asst.Professor, Department of EEE, Annamacharya Institute of Technology and Sciences Thirupati	rmurugesandr@gmail.com 9944228455
23.	Dr.T Suresh Padmanabhan	Power Electronics and Drives		Associate Professor, Department of ECE, E.G.S Pillay Engineering College,Nagapattinam.	drtsp@egspec.org 9444025552
24.	Dr.P.Sathish Babu	Power System	12	Asst.Professor, Department of EEE, University college of Engineering, Panruti	psathishbabu@yahoo.co.in 8667313405
25.	Dr.V.Arun	Power system	11	Associate Professor, Department of EEE, SreeVidyanikethan Engineering College SreeSainath Nagar, Tirupati.	arunphd1986@gmail.com 8667244175
26.	Dr.S.Durai	Power System	11	Assistant Professor, Department of EEE, Annamalai University Deputed to Lecturer Department of Electrical Engineering 126 – Government polytechnic college, Kottur, Theni	abcdurair@gmail.com 8667264066
27.	Dr.S.Karthikeyan	Power System	13	Assistant Professor Department of EEE, Annamalai University Deputed to Lecturer Department of Electrical Engineering 126 – Government polytechnic college, Kottur, Theni	karthikaueee79@gmail.com 8825793371

28.	Dr.P.Velmurugan	Power Electronics and drives	10	Associate Professor, Department of EEE, St.Joseph's College of Engineering, Chennai	velupriya10@gmail.com 9976949243
29.	Dr.M.Sathya	Power system	16	Assistant Professor, Department of EEE, Government college of Engineering,Srirangam,Trichy	mrsathyaa@gces.edu.in 7010271378
30.	Dr.G.Ganesan @ Subramanian	Power Electronics and Drives	17	Associate Professor/EEE EGS Pillai Engineering College,Nagapattinam	ganesan@egspec.org 9566719011