



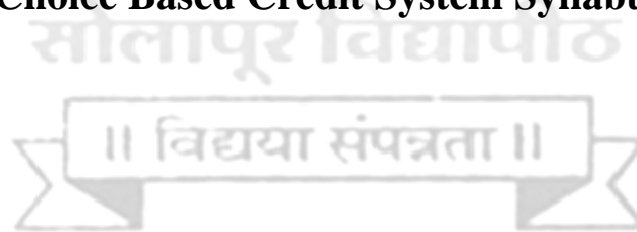
SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

ELECTRICAL ENGINEERING

Syllabus for

**M.E. (Electrical Engineering) PART-II, Semester III and
IV w.e.f. Academic Year 2016-17
Choice Based Credit System Syllabus**



SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY
CBCS structure of M.E Electrical Engineering W.E.F 2016-17
Semester III

Theory Course Name	HRS/Week			Credits	Examination Scheme				
	L	T	P		ISE	ESE	ICA	TOTAL	
Self Learning Subject	\$ (02 Hrs Self study / week)	1	-	3	30	70	-	100	
Sub total	-	1	-	3	30	70	-	100	
Laboratory									
						ESE			
						POE	OE		
Lab Practice	-	-	2	1	-	-	-	25	25
Dissertation Phase I : Synopsis Submission Seminar*	-	-	6@	3	-	-	-	75	75
Dissertation Phase II : Term Work*	-	-	6	3	-	-	-	100	100
Dissertation Phase II Progress Seminar*	-	-	12	6	-	200	-	-	200
Sub-Total	-	-	26	13	-	200		200	400
Grand Total	2(self study)	1	26	16	30	270		200	500

Note: Abbreviations: L- Lectures, P-Practicals, T-Tutorials, ISE –In Semester Exam, ESE- End semester Exam, ICA- Internal Continuous Assessment, ESE- University Examination (Theory/POE/OE Exam)

ISE-IN SEMESTER EVALUATION
ESE-END SEMESTER EVALUATION

Note –

- \$- Being a Self Learning Subject, student shall prepare for examination as per specified syllabus(02 Hrs self study / week)
- *- For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar) student must interact regularly every week with the advisor.
- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit Synopsis of the Dissertation Work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

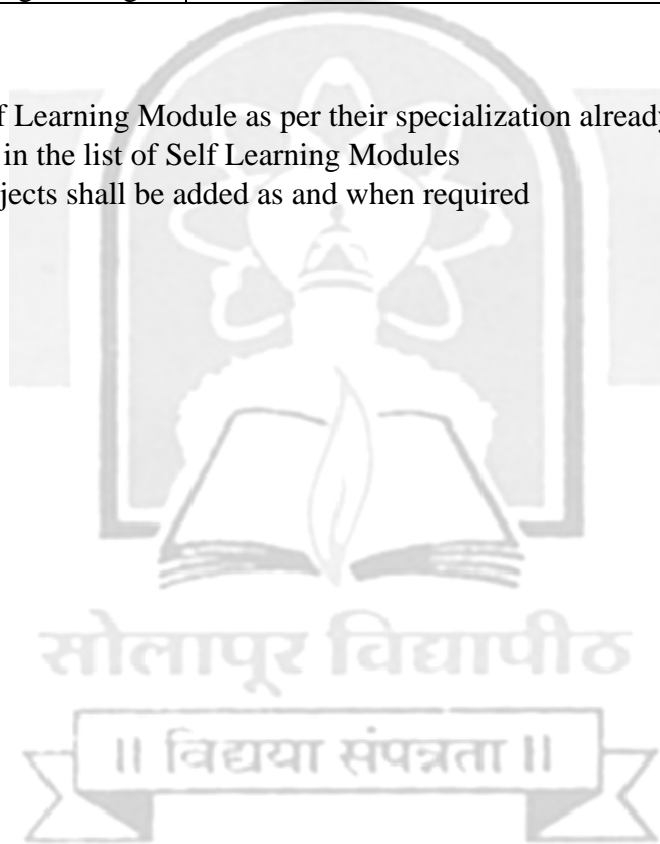
- Lab Practice shall include any of the below activities as recommended by Advisor and student shall submit a report after completion of the activity to Advisor–
Software / hardware assignments, learning new software, literature survey, filed work, industrial training etc. related to dissertation work
- @Indicates contact hours of student for interaction with advisor
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur

• **List Self Learning Subjects -**

<i>Sr.</i>	<i>Specialization</i>	<i>Self Learning Subjects</i>
1	Electrical Engineering	Smart Grid

Note –

- Student must select Self Learning Module as per their specialization already selected in Semester I and II
- Modules may be added in the list of Self Learning Modules
- New Self Learning Subjects shall be added as and when required



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FACULTY OF ENGINEERING & TECHNOLOGY
CBCS structure of M.E Electrical Engineering W.E.F 2016-17
Semester IV

Laboratory Course Name	HRS/Week			Credits	Examination Scheme				
	L	T	P		ISE	ESE		ICA	TOTAL
						ESE			
						POE	OE		
Dissertation Phase III : Progress Seminar# (ISE)	-	-	8@	4	-	-	-	100	100
Dissertation Phase IV: Term Work #(ISE)	-	-	12	6	-	-	-	200	200
Final Submission of the Dissertation and Viva –Voce (ESE)	-	-	12	6	-	200	-	-	200
Total	-	-	32	16	-	200		300	500

Note: Abbreviations: L- Lectures, P- Practicals, T- Tutorials, ISE –In Semester Exam, ESE- End semester Exam, ICA- Internal Continuous Assessment, ESE- University Examination (Theory/POE/OE Exam)

Note –

- #- For all activities related to dissertation Phase II student must interact regularly every week with the advisor.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.
- Student must submit a hard copy of Project Report to the department
- @Indicates contact hours of student for interaction with advisor
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur



Solapur University, Solapur
M.E. (Electrical)
Self Learning Subject
Smart Grid

Teaching Scheme
Tutorial – 1 Hr. /week

Examination Scheme
Theory Credits – 3.0
Tutorial Credits- 1.0

SECTION-I

Unit 1: Introduction to Smart Grid:

Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid. Case study of Smart Grid. CDM opportunities in Smart Grid

Unit 2: Smart Grid Technologies: Part 1:

Introduction to Smart Meters, Real Time Pricing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformer

Unit 3: Smart Grid Technologies: Part 2:

Smart Substations, Substation Automation, Feeder Automation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS), Phase Measurement Unit(PMU).

SECTION-II

Unit 4: Microgrids and Distributed Energy Resources:

Concept of microgrid, need & applications of microgrid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources.

Unit 5: Power Quality Management in Smart Grid:

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit

Unit 6: Information and Communication Technology for Smart Grid:

Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN). Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid. Broadband over Power line (BPL). IP based protocols

- **Text Books:**

1. Ali Keyhani, Mohammad N. Marwali, Min Dai “Integration of Green and Renewable Energy in Electric Power Systems”, Wiley
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press
3. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, “Smart Grid: Technology and Applications”, Wiley
4. Jean Claude Sabonnadière, Nouredine Hadjsaïd, “Smart Grids”, Wiley Blackwell
5. Peter S. Fox Penner, “Smart Power: Climate Changes, the Smart Grid, and the Future of Electric Utilities”, Island Press; 1 edition 8 Jun 2010
7. S. Chowdhury, S. P. Chowdhury, P. Crossley, “Microgrids and Active Distribution Networks.” Institution of Engineering and Technology, 30 Jun 2009
8. Stuart Borlase, “Smart Grids (Power Engineering)”, CRC Press

- **Reference Books/journal papers**

1. Andres Carvallo, John Cooper, “The Advanced Smart Grid: Edge Power Driving Sustainability: 1”, Artech House Publishers July 2011
2. James Northcote, Green, Robert G. Wilson “Control and Automation of Electric Power Distribution Systems (Power Engineering)”, CRC Press
3. Mladen Kezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert “Substation Automation (Power Electronics and Power Systems)”, Springer
4. R. C. Dugan, Mark F. McGranahan, Surya Santoso, H. Wayne Beaty, “Electrical Power System Quality”, 2nd Edition, McGraw Hill Publication
5. Yang Xiao, “Communication and Networking in Smart Grids”, CRC Press

