



FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Electrical Engineering)

Semester: VII

Course Code: 202050711

Course Title: Smart Grid

Course Group: Professional Elective Course-IV

Course Objectives: Enabling students to learn about the smart grid specially the smart system, smart transmissions, distribution system, distribution generation, smart consumption and other components such as cyber security, regulations, market model of the smart grid for the operation of the power systems.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)					
Lecture	Tutorial	Practical		Theory		J/V/P*		Total	
				Internal	External	Internal	External		
3	0	0	3	50 / 18	50/17	0 / 0	0/0	100 /35	

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to Smart Grid: Basics of Load and Generation, Grid operation, Definition and Need of smart grid, conceptual model of smart grid, smart grid architectures, Interoperability, communication technologies, role of smart grids standards, national smart grid mission by Govt. of India	06
2	Smart Technologies for Transmission System: Automation of Substation, Supervisory control and data acquisition (SCADA), Energy management system, phasor measurement units , Wide area measurement systems	07



3	Smart Technologies for Distribution Systems: Basics of Distributed Generation resources, Advantages and disadvantages of DG, Challenges to Distribution Generations, DG's Integration to power grid, Smart Grid technologies, Energy Storage.	08
4	Distributed Generation and Smart Consumption: Distributed energy resources, smart appliances, low voltage DC distribution in homes-buildings, home energy management system, Net Metering, Building to Grid	08
5	Smart Grid Communication System and Cyber Security : Classification of power system communication, wired and wireless communication systems, Standards for information exchange, Fiber optical Networks, WAN through fiber optical Network, Bluetooth, Zigbee, GPS, Wi-Fi Wi-Max based communication.	08
6	Smart Grid Market Models and Regulations : Demand Response, Tariff Design, Time of the day pricing, Time of use pricing, Consumer privacy and data protection, consumer engagement etc. Cost benefit analysis of smart grid projects.	06

List of Practicals / Tutorials: NA

Reference Books: NA

Supplementary learning Material:	
1	https://electrical-engineering-portal.com/
2	https://www.electrical4u.com/
3	https://onlinecourses.nptel.ac.in/noc21_ee68/preview

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation

Internal Evaluation: The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %	R: Remembering; U: Understanding; A: Applying;
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R	U	A	N	E	C	N: Analyzing; E: Evaluating; C: Creating
20%	25%	25%	15%	15%	0%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO): NA

Curriculum Revision:

Version:	2.0
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025