

CYBER SECURITY IN POWER SYSTEMS

PE-III: EPS								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
BPSC17	Elective	3	0	0	3	30	70	100
		Contact Classes: 45			Total Tutorials: Nil		Total Practical Classes: Nil	
I. COURSE OVERVIEW:								
<p>In this course will the following topics are dealt with: cyber security; power systems; industrial control system safety; next generation smart grid solution security; complex network protection; critical environment remote access; supply chain security; IT-operational technology integration; cyber-attacks; network advanced persistent threat attacker discovery; and cyber security in energy sector.</p>								
II. COURSE OBJECTIVES:								
The students will try to learn:								
<ol style="list-style-type: none"> I. The basic evolution of cyber threats. II. Learn the cyber security requirements. III. Understand the components of cyber security strategy and five step methodology. IV. Evaluate privacy parameters of smart grid, research and development themes. 								
III. COURSE OUTCOMES:								
After successful completion of the course, students will be able to:								
CO 1	Relate the need for cyber security and exploring of IT security background for power system						Understand	
CO 2	Demonstrate the solutions for strengthening of the cyber security system in power generation, transmission, and distribution sectors against attackers, threats						Understand	
CO 3	Illustrate the vulnerabilities in power system like attack on the computer monitoring and controlling devices, and attack on the SCADA network						Apply	
CO 4	Identify the solutions, standards and guidelines, where to look further						Apply	
CO 5	Develop a frame work for a cyber-security program to facilitate the development of Cyber Security Standards						Analyze	
IV. SYLLABUS								
MODULE –IINTRODUCTION TO CYBER SECURITY (Classes: 09)								
Introduction to Cyber Security, Threats Harm, Risk Management, Vulnerabilities, Controls, Authentication, Information assurance: confidentiality, integrity and Access Control, Cryptography, Malware, Device and Network security, balancing cost, functionality, and security. Hands-on device security, Application of cyber security in power system								
MODULE -IINTRODUCTION TO SMART GRID(Classes: 09)								
Need of computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions, system monitoring, Introduction to smart grid, evolution of electric grid, concept of smart grid, definitions, need of smart grid								
MODULE -IISMART GRID SYSTEM PERFORMANCE EVALUATION(Classes: 10)								
Smart grid risks versus benefits , smart grid standards, laws, and industry guidance , Hands on relay threats and transient stability impact, smart grid operations, cost of maintenance and support , real time monitoring, analysis, visualization and evaluation of cyber-attacks, consumer’s role in smart								

grid, Measures for mitigation

MODULE -IVSMART GRID CYBERSECURITY(Classess: 09)

Advanced metering infrastructure security electric grid cyber-physical system: modeling, risk management and analysis, evaluation of cyber security threats, home area network, gateway, and neighborhood area network security, supervisory control and data acquisition system security, Modelling needs for cyber-physical security studies.

MODULE -VCYBER SECURITY IN THE ENERGY SECTOR (Classes: 09)

Overview on strategic priorities, areas and recommended actions, Cyber Response Framework, Reflection of Strategic Areas to the Energy Subsectors, Reflection of Strategic Areas to the Energy Subsectors

V. Text Books:

1. Eric D. Knapp, Raj Samani .Applied Cyber Security and the Smart Grid: Implementing Security Controls into the Modern Power Infrastructure,2013.
2. Cyber Security for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS, Tyson Mcculay, Bryan.L. Singer,Auerbach Publications; 1st Edition, 2012.

VI. Reference Books:

- 1.Blaabjerg, Sahoo &Dragicevic , Cyber Security for Microgrids, IET, ISBN: 978-1-83953-331-0
2. Salman, Digital Protection for Power Systems. 2ndEdition, IET Powersystem.

VII Web References:

1. <https://cip.gmu.edu/2016/06/07/cyber-security-energy-systems-institutional-challenges>
2. https://ec.europa.eu/energy/sites/ener/files/documents/eecsp_report_final.pdf
3. <https://www.slideshare.net/jishnupradeep/cyber-security-of-power-grids>
4. IET Cyber Security in Modern Power Systems

VIII E-Text Books:

1. https://ec.europa.eu/energy/sites/ener/files/documents/eecsp_report_final.pdf
Cyber security in modern power systems defending the grid, IET