INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

CYBER SECURITY IN POWER SYSTEMS								
II Semester: EPS								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BPSC17	**Elective**	3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Cyber Security								

I. COURSE OVERVIEW:

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.

II. COURSES OBJECTIVES:

The students will try to learn:

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:

CO1: Relate the need for cyber security and exploring of IT securitybackground for power system

CO2: Demonstrate the solutions for strengthening of the cyber security system in power generation, transmission, and distribution sectors againstattackers, threats

CO3: Illustrate the vulnerabilities in power system like attack on the computermonitoring and controlling devices, and attack on the SCADA network

CO4: Identify the solutions, standards and guidelines, where to look further

CO5: Develop a frame work for a cyber-security program to facilitate thedevelopment of Cyber Security Standards

IV. COURSE CONTENT:

MODULE –IINTRODUCTION TO CYBER SECURITY (9)

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 –II INTRODUCTION TO SMART GRID (9)

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 –III SMART GRID SYSTEM PERFORMANCE EVALUATION (9)

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 – IV SMART GRID CYBERSECURITY (9)

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, Modeling needs for cyber-physical security studies.

MODULE – V CYBER SECURITY IN THE ENERGY SECTOR (9)

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: ImplementingSecurity Controls into the Modern Power Infrastructure, 2013.
2. Cyber Security for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS, TysonMcculay, 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

VII. ELECTRONICS RESOURCES:

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. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Definition and terminology
4. Assignments
5. Model question paper-I
6. Model question paper-II
7. Lecture notes
8. Power point presentations
9. Tech talk topics