

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

SCADA SYSTEM AND APPLICATIONS

III Semester: EPS								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
BPSD26	Elective	L	Т	Р	С	CIA	SEE	Total
		3	-	-	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 48		
Prerequisite: Power systems								

I. COURSE OVERVIEW:

This course provides an exposure to technology of automation and control as widely seen across a typical power system network. It contains a wide range of topics from typical SCADA system Architecture, Communication requirements, Desirable Properties of SCADA system, features and other devices used for interfacing with real time systems. The course also includes the applications of SCADA systems in monitoring, control and management of energy in transmission and distribution networks of a power system and other industries.

II. COURSES OBJECTIVES:

The students will try to learn

- I. The fundamentals of SCADA systems including its architecture, components and communication protocols.
- II. The control aspects of power system network and energy management using automation.
- III. The substantial applications of SCADA systems and analyze industrial problems from an automation perspective.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Demonstrate the basic functionality, merits and demerits of PLC and SCADA systems for supervisory control of an industrial system.
- CO2 Develop the ladder diagram and functional block diagrams for interfacing PLC with SCADA system.
- CO3 Identify the typical components of SCADA systems used for interfacing with real time systems
- CO4 Analyze the different types of architectures and communication technologies of a typical SCADA system
- CO5 Make use of SCADA systems for controlling, security and energy management of a power system networks
- CO6 Appraise the superiority of SCADA systems in operation, controlling, and monitoring of oil, gas, water and power industries.

IV. COURSE CONTENT:

MODULE - I: INTRODUCTION TO SCADA AND PLC (10)

Data acquisition system, evaluation of SCADA, communication technologies, moni toring and supervisory functions; PLC: Block diagram, programming languages, ladder diagram, functional block diagram, applications, interfacing of PLC with SCADA

MODULE-II: SCADA SYSTEM COMPONENTS (10)

Industries SCADA system components: Schemes, remote terminal unit (RTU), intelligent electronic devices (IED), communication network, SCADA server, SCADA / HMI systems.

MODULE -III: INTRODUCTION TO SCADA AND PLC (10)

SCADA architecture: Types, advantages and disadvantages of each system, single unified standard architecture IEC 61850.

SCADA Communication: Various industrial communication technologies, wired and wireless methods, fiber optics, open standard communication protocols.

MODULE -IV: OPERATION AND CONTROL (10)

SCADA Operation and Control: Operation and control of interconnected power system, automatic substation control, SCADA configuration, energy management system, system operating states, system security, state estimation unit.

MODULE -V: SCADA APPLICATIONS (09)

SCADA Applications: Utility applications, transmission and distribution sector operations, monitoring, analysis and improvement, industries, oil, gas and water, case studies, implementation, simulation exercises.

V. TEXTBOOKS:

- 1. AG Phadke and J S Thorp, "Computer Relaying for Power Systems", Wiley/Research studies Press, 1st Edition, 2009.
- 2. AT Johns and S K Salman, "Digital Protection of Power Systems", IEEE Press, 1st Edition, 1999.

VI. REFERENCE BOOKS:

- 1. Gerhard Zeigler, "Numerical Distance Protection", Siemens Public is Corporate Publishing, 1st edition, 2006.
- 2. SRB hide "Digital Power System Protection" PHI Learning Pvt.Ltd. 3rd edition, 2014.

VII. ELECTRONICS RESOURCES:

- 1. https://www.as.wiley.com/WileyCDA/WileyTitle/productCd-1118634039.html.
- 2. https://www.academia.edu/3409546/Power_Electronics_Application_in_Renewable_Energy_Sy stem.
- 3. https://www.springer.com/us/book/9788132221180.
- 4. https://www.springer.com/us/book/9781447151036.

VIII. MATERIALS ONLINE

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