



CRITERION 1
Curricular Aspects

1.1 Curriculum Design and Development

1.1.3 Number of courses focusing on Employability/Entrepreneurship/ Skill Development offered by the Institution

Syllabus framed by the Industries

MoU Signed by the Company / Industry	Syllabus framed by the concerned Company/ Industry
National Institute of Wind Energy, Chennai	19UEE861 - Wind farm Development and Operation 19UEE862 - Design of Towers and Blades Structures 19UEE863 - Wind Turbine Blades Fabrication Technology
Jothi Electricals, Madurai	19UEE869 - Electrical Rewinding Laboratory
Singai Coir Clusters (P) Ltd.	19UME862 - Smart Materials
HiTech ARAI Pvt. Ltd.	19UME864 - Work Study
Infosys	14UCS703 / 15UCS702 – Insight into Cloud Computing 15UCS501 – Internet and Web Technology

19UEE861	WIND FARM DEVELOPMENT AND OPERATION	L	T	P	C
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Objectives		1	0	0	1
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- To impart knowledge on wind farm development and operation

UNIT I	INTRODUCTION				4
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Introduction to Wind farm Development and Operation: General Principles and Basic Concepts, Techno economic feasibility considerations. Government and Private Utilities, Rules and regulations, Guidelines, Constraints.

UNIT II	INSTALLATION AND COMMISSIONING OF WIND TURBINES				5
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Land selection, Topography and Survey details, Micrositing and layouts: – Methods and procedures, selection of equipment, Transportation, installation and commissioning Local infrastructure and Power evacuation; Grid quality and reliability.

UNIT III	OPERATION AND MAINTENANCE OF WECS				6
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Wind electric conversion systems, Operation efficiency of wind turbine, and Preventive, and Breakdown and Predictive maintenances of WECS subsystems, Failure analysis, aging and rehabilitation. Effective operation of wind farms: Concept of central monitoring system, Modern developments and improvements, Systems and Practices followed in other countries. Estimation of energy production, capacity factor, capacity credit and energy credit. Offshore wind farm development and special considerations. Operation and supervision of wind farm.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Define the Rules and regulations for the selection of ideal location of WECS
- Explain the Methods and procedures for installation and commissioning of wind turbines
- Analyze the operation of WECS using various indices

REFERENCES:

1. www.windpower.dk
2. T. Burton, Handbook of Wind Energy, John Wiley and Sons

19UEE862

DESIGN OF TOWERS AND BLADES STRUCTURES

L T P C

1 0 0 1

OBJECTIVE:

- To impart knowledge on design of towers and blades structures

UNIT I INTRODUCTION

3

Introduction to Loads: Extreme loads, fatigue loads, earthquake loads, characteristic loads, partial co-efficients, design loads. Types of Towers: Lattice, Tubular (self supporting the guyed) and concrete.

UNIT II STRUCTURAL DESIGN OF TOWERS / BLADES AND CHARACTERISTIC

6

Characteristic material properties, design properties, partial co-efficients, comparison of loads and strength. Design of Lattice Towers: Design of members subjected to lateral and axial loads. Stress/strain calculations. Blades: Geometry, webs and spars, design loads, extreme and fatigue stress/strain calculations, materials, deflations.

UNIT III TYPES AND DESIGN OF CONNECTIONS

6

Types of connections (welded and fastened), design of framed beam connection, seated beam connections, un stiffened, stiffened seat connections, continuous beam-to-beam connections, continuous beam-to-column connections. Blades: Geometry, webs and spars, design loads, extreme and fatigue stress/strain calculations, materials, deflations.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Explain the various types of towers and loads of wind turbine
- Design the structure of towers and blades for wind turbine
- Explain the types of connections of towers and blades

REFERENCES:

1. Saloman C. G., and Johnson J. E., " Steel Structures – Design and behavior" Harper and Row 1980
2. Dayarathnam p., "Design of Steel Structures", A. H. Wheeler, 1990
3. " Guidelines for Design of Wind Turbines" second edition, DNV- RISO, Denmark

19UEE863	WIND TURBINE BLADES FABRICATION TECHNOLOGY	L	T	P	C
		1	0	0	1

OBJECTIVE:

- To impart knowledge on wind turbine blades fabrication technology

UNIT I ENGINEERING MATERIALS FOR WIND TURBINE BLADES 3

Basic Structural design of rotor blades. Materials of construction of Rotor Blades - composite materials and properties, Fibreglass and carbon fibre reinforcements, Technology of Polymer Matrices- Polyesters, vinyl esters and epoxies.

UNIT II FABRICATION OF WIND TURBINE BLADES 9

Moulds and Tooling for the fabrication of rotor blades. Molding process of composite rotor blades for wind turbines: hand lay up process; resin transfer, resin injection and vacuum infusion process; Prepreg and vacuum bag process. Finishing and assembly aspects of rotor blades.

UNIT III TESTING OF WIND TURBINE BLADES 3

Inspection and quality control methods. Repair and servicing of wind turbine blades.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Explain the various materials for wind turbine blades fabrication technology
- Explain the fabrication process of wind turbine blades
- Analyze the testing of wind turbine blades

REFERENCES:

1. Saloman C. G., and Johnson J. E., " Steel Structures – Design and behavior" Harper and Row 1980
2. Dayarathnam p., "Design of Steel Structures", A. H. Wheeler, 1990
3. " Guidelines for Design of Wind Turbines" second edition, DNV- RISO, Denmar

19UEE869

ELECTRICAL REWINDING LABORATORY

L	T	P	C
0	0	2	1

LIST OF EXPERIMENTS:

1. To rewind a single phase Induction motor used for water pump
2. To rewind a single phase Induction motor used for ceiling fan
3. To perform various test in a single phase induction motor after completion of rewinding

TOTAL: 30 PERIODS

MATERIALS RQUIRED:

Manual Rewinding machine

Copper coil

Tools

OBJECTIVES :

- The aim of this course is presents the latest on a variety of smart materials, smart structures, and propertiesand recent applications as well as the family grouping of materials.

UNIT I INTRODUCTION TO SMART MATERIALS**5**

Smart materials - Definition, Concept and classifications of smart materials - Advanced composite materials, Ceramics, Pure Glass, Gallium arsenide, Superconductors and Intelligent materials.

UNIT II SMART STRUCTURES AND PROPERTIES**7**

Components of a Smart Structure.Properties - Optical (optical bandgap engineering, nonlinear optical effects, electrochromic, photochromic and thermochromic effects). Electrical properties (piezoelectric effect). Thermo-mechanical properties (shape memory effect, self-healing).Magnetic properties (magnetoresistance). Active surface properties (photocatalytic effect, biocompatibility).

UNIT III APPLICATIONS OF SMART MATERIALS**3**

Sensors (gas, vapors, temperature, strain, stress, adaptive structures). Energy (solar cells, solar absorbers, smart windows).Environment (self-cleaning surfaces).Biomedical (artificial lungs, DNA chips, smart hydrogels).Aerospace and outer space (self-healing protective surfaces, thermal radiators). Electronics and consumer products (displays, illumination, printed electronics).

TOTAL : 15 PERIODS**COURSE OUTCOMES:**

After successful completion of this course the students will be able to:

1. Explain the definition and types of smart materials.
2. Utilize the components of smart structures and unique properties of smart materials.
3. Categorize the applications of smart materials in various engineering field.

REFERENCE BOOKS:

1. Mel Schwartz, "Smart Materials", CRC Press, 2009.
2. A. V. Srinivasan, D. Michael McFarland, "Smart Structures, Analysis and Design", Cambridge University Press, 2001.
3. M.V. Gandhi, B.D. Thompson, "Smart Materials and Structures", Springer Science & Business Media, 1992.

OBJECTIVES :

- To impart knowledge about work study and dealing with work related issues in the work place.
- To familiarize the usage of standard time and allowances.

UNIT I WORK STUDY, MOTION STUDY & ERGONOMICS**7**

Work study definition; Role of work study in improving productivity; Work study procedure: Selection of jobs; Information collection and recording; Recording techniques-charts and diagrams. Motion study; Therbligs; Cycle graph and Chrono Cycle graph; Simo chart and Principles of Motion economy. Ergonomics; Work environment and Human factors.

UNIT II WORK MEASUREMENT & FACILITIES DESIGN**8**

Definition; Procedure; Performance rating; Concept of normal time; allowances. Work sampling technique. Introduction to pre - determined motion time system. Computing Standard Time. Site Selection: Factors influencing the selection of rural and urban locations of sites, Optimum decision on choice of site and analysis. Plant Layout: Types of production, Types of layouts, Advantages and Disadvantages of layout, Factors affecting layout. Design of work place layout.

TOTAL : 15 PERIODS**COURSE OUTCOMES:**

After successful completion of this course the students will be able to:

1. Produce a model using ergonomic principles that suitable for specified work environment.
2. Design of work place plant Layout.

REFERENCE BOOKS:

1. O.P.Khanna, "Industrial Engineering and Management" Dhanpat Rai & Sons, 2010.
2. Suresh Dalela and Saurabh Dalela "Text Book of Work Study and Ergonomics" Standard Publishers Distributors, New Delhi, 2013.

15UCS501	INTERNET AND WEB TECHNOLOGY (COMMON TO CSE & IT)	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES :					
<ul style="list-style-type: none"> To introduce the various protocols and technologies behind internet To impart designing web sites To develop interactive web pages To write programs for server side 					
UNIT I	INTERNETWORKING AND HTML	9			
Working with TCP/IP - IP address – URL - WWW –HTTP – MIME - HTML Basics: Basic HTML – Headers - Linking - Images - Ordered and Unordered Lists - HTML Tables - HTML Frames - Basic HTML Forms.					
UNIT II	CSS AND HTML5	9			
Basic CSS - CSS Properties - More CSS Syntax - Page Layout - Styling Page Sections - Introduction To Layout - Floating Elements - Sizing And Positioning. HTML5 Basics: Basic HTML5 New Elements–HTML5 Graphics – Canvas – SVG - CSS For Styling.					
UNIT III	JAVASCRIPT AND DOM	9			
JavaScript: JavaScript Syntax - Program Logic - Arrays–Strings – Functions - The Document Object Model (DOM): Global DOM Objects - DOM Element Objects - The DOM Tree.					
UNIT IV	PHP	9			
PHP: Server-Side Basics - PHP Basic Syntax - Arrays - Strings–Functions - Forms: Form Basics - Form Controls - Submitting Data - Processing Form Data In PHP - Querying a database in PHP: connecting to a database performing queries.					
UNIT V	AJAX AND XML	9			
AJAX: AJAX concepts - using XML HttpRequest to fetch data - Integrating PHP and AJAX - XML: What is XML - XML Document structure, Schemas and DTDs - Processing XML data – XSLT.					
COURSE OUTCOMES:					
After the successful completion of this course, the student will be able to					
<ul style="list-style-type: none"> Design web pages using HTML. Make stylistic decisions with CSS and HTML5. Create interactive websites with JavaScript and DOM. Use PHP for server side programming. Enhance interactive websites with AJAX and XML. 					

TEXT BOOKS:

1. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Prentice Hall, 2007
2. Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”, Prentice Hall, 5th Edition, 2011.

REFERENCE BOOKS:

1. Marty Stepp, Jessica Miller, and Victoria Kirst , “Web Programming”, Step by Step Publication, 2nd edition, 2009
2. Robin Nixon, “Learning PHP, MySQL, JavaScript, CSS & HTML5 - A Step-by-Step Guide to Creating Dynamic Websites”, O'Reilly Media, 3rd Edition , 2014
3. Douglas E Comer, “Internet Book, The: Everything You Need to Know About Computer Networking and How the Internet Works”, 4/E, Prentice Hall, 2007
4. Kogent Learning Solutions Inc. , “Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book”, Dreamtech Press.

14UCS703	INSIGHT INTO CLOUD COMPUTING (COMMON TO CSE & IT)	L	T	P	C
		3	0	0	3
PRE-REQUISITES : COMPUTER COMMUNICATION AND NETWORKS					
COURSE OBJECTIVES:					
<ul style="list-style-type: none"> To introduce the essentials of building fully featured applications on various cloud models. To familiarize the concepts of designing and developing various service models (IaaS, PaaS and SaaS) and deployment models (Public, Private and Hybrid clouds). To impart the knowledge of Multi-cloud management systems and business clouds. 					
UNIT I	OVERVIEW OF CLOUD COMPUTING	8			
Introduction to Cloud Computing - Cloud Computing in a Nut Shell, Roots of Cloud Computing, Desired Features of a Cloud, Cloud service models (IaaS, PaaS&SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.					
UNIT II	INFRASTRUCTURE AS A SERVICE	9			
Basics of Virtualization, Virtualization technologies, Server Virtualization, VM migration techniques, Role of virtualization in Cloud Computing. Anatomy of Cloud infrastructures, Distributed Management of Virtual Infrastructures, Scheduling Techniques for advance reservation of Capacity.					
UNIT III	PLATFORM AS A SERVICE/SOFTWARE AS A SERVICE	10			
Aneka – Technologies and Tools for Cloud Computing, Aneka Cloud Platform, Aneka Resource Provisioning Service, Hybrid Cloud implementation, Workflow engine for clouds – Workflow management Systems and Cloud, Architecture, Utilizing Cloud for workflow execution, The MapReduce Programming model and Implementation – MapReduce Programming model, Major MapReduce implementation for the cloud, Case Studies					
UNIT IV	CLOUD SECURITY	9			
Security concerns in Traditional IT, Challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing, Insecure Interfaces and APIs, Malicious Insiders, Shared Technology Issues, Data Loss or Leakage, Account or Service Hijacking, Unknown Risk Profile, Different vendors offering Cloud Security for public and private clouds.					
UNIT V	MULTI-CLOUD MANAGEMENT SYSTEMS AND BUSINESS CLOUDS	9			
Concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social networking, Telecom, Education).					
TOTAL :45 Periods					
COURSE OUTCOMES:					
After the successful completion of this course, the student will be able to					
<ul style="list-style-type: none"> Explain the concepts of Cloud Computing and the various deployment and service models of Cloud Computing. Apply the virtualization techniques to provide IaaS. Apply Aneka tools and other techniques to provide PaaS and SaaS. Identify issues of security concerns in Cloud Computing. Describe Multi-Cloud management System for various applications. 					

15UCS702	INSIGHT INTO CLOUD COMPUTING (COMMON TO CSE & IT)	L	T	P	C
		3	0	0	3
PRE-REQUISITES : COMPUTER COMMUNICATION AND NETWORKS					
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<ul style="list-style-type: none"> To introduce the essentials of building fully featured applications on various cloud models. To familiarize the concepts of designing and developing various service models (IaaS, PaaS and SaaS) and deployment models (Public, Private and Hybrid clouds). To impart the knowledge of Multi-cloud management systems and business clouds. 					
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