No	Course Information	
1	Unit name:	Power System Reliability
2	Code:	EP 61012
3	Classification:	Engineering subject
4	Credit value:	1
5	Semester/ Year Offered:	1/6
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture, Tutorial, Presentation
8	Assessment system and breakdown of marks:	
	Tutorial and Assignment	40%
	Attendance	30%
	Classwork	30%
9	Academic staff teaching unit:	Department of Electrical Power Engineering
10	Course outcome of unit: In this course students will be able • To describe the various concepts and evaluation techniques that can be used to assess operational risk • To analyze the evaluation techniques of distribution system reliability • To analyze of reliability improvement by adding protective device • To analyze the principles associated with the reliability assessment of distribution systems containing embedded generation	
11	Synopsis of unit: The course covers the fundamental of reliability evaluation, Concepts and Techniques. Topics covered to provide reliability evaluation and application of probability techniques to power system problems. The course explains the fundamental principles of electric power system. Firstly, the course introduces students to know the hierarchical levels in electrical power system. And then, it describes step by step what constitutes an electric power system, how it works, and typical criteria in reliability analysis. The course also describes the reliability cost and reliability worth. Its components and their applications in transmission and distribution are also described. The important of distribution system reliability and	

	reliability evaluation techniques of power systems are described. The course introduces students to evaluate the basic indices for each load point and reliability indices. Moreover, the course explains about the protection systems in the analysis of reliability improvement. Then, the reliability indices for each load point were evaluated by the effect of lateral protection, disconnection switches and protection failure. Finally, the course explains about the embedded generation systems in the analysis of reliability improvement, three case studies in the embedded generation and evaluates the reliability indices with distributed generation (DG).
	Topic: **Chapter Title** 1. Power System Reliability 1.1 Introduction 1.2 Functional Zones and Hierarchical Levels 1.3 Basic Consideration 1.4 Reliability Cost and Reliability Worth 1.5 Concepts of Data 2. Analysis of Distribution System Reliability 2.1 Introduction 2.2 Evaluation Techniques 2.3 Application to Radial System 3. Reliability Improvement by Protection System 3.1 Introduction 3.2 Effect of Lateral Distributor Protection 3.3 Effect of Lateral Protection and Disconnecting Switches 3.4 Effect of Protection Failure 4. Reliability Improvement by Distributed Generation 4.1 Introduction 4.2 Reliability Analysis with Dispersed Generation
14	Main references: Reliability Evaluation of Power Systems , Second Edition
15	Additional references: Billinton, R., *Power System Reliability Evaluation*, Gordon and Breach, New-York (1970).

No	Course Information	
1	Unit name:	Electrical Safety of Low-Voltage Systems
2	Code:	EP 61014
3	Classification:	Engineering subject
4	Credit value:	1
5	Semester/ Year Offered:	1/6
6	Pre-requisite:	Power System Protection
7	Mode of delivery:	Lecture
8	Assessment system and breakdown of marks:	
	Tutorial	40%
	Attendance	30%
	Presentation	30%
9	Academic staff teaching unit:	
10	Course outcome of unit: In this course students will be able ➢ To define basic definitions and nomenclature ➢ To explain the fundamentals of electrical safety ➢ To explain mathematical principles of electrical safety ➢ To discuss the theory of ground potentials and ground resistances of electrodes ➢ To illustrate the effects of electric currents passing through the human body, and safety requirements ➢ To assess the methodologies of measurement	
11	Synopsis of unit: The course consist of electrical engineering students who need to know the principles of electrical safety. Background requirements include a knowledge of a.c. electric circuits, algebra, complex numbers, and basic calculus.. Topic: **Chapter Title**	
	1. Basic Definitions and Nomenclature -Introduction - Basic Definitions and Nomenclature	

2. Fundamentals of Electrical Safety
- Introduction
-Protection Against Direct Contact
-Protection Against Indirect Contact

3. Mathematical Principles of Electrical Safety
- Introduction
- Mathematical Definition of Safety
- Risk of Indirect and Direct Contact
- The Acceptable Residual Risk
- Safety and Risk of Basic Insulation
- Safety and Risk of Class 0 Equipment
- Safety and Risk of Class I Equipment
- Safety and Risk of Class II Equipment
- Safety and Risk of Electrical Separation

4. The Earth
- Introduction
- The Earth Resistance
- The Earth Potential
- Independent and Interacting Earth Electrodes
- Spherical Electrodes
- Voltage Exposure Upon Ground Faults
- Voltage or Current

5. Effects of Electric Currents Passing Through the Human Body, and Safety Requirements
- Introduction
- The Human Body as an Electrical System
- Influence of Frequency on the Effects of Current
- Physiological Response to Electrical Currents
- Permissible Body Current and Person's Body Mass
- Permissible Body Current Independent of Human Size
- Human Body Impedance
- Current Paths
- Permissible Prospective Touch Voltage
- Effects of Direct Currents

14. Testing the Electrical Safety
- Introduction
- Soil Resistivity Measurement
- Earth Resistance Measurement
- Earth Resistance Measurements in Industrial Facilities
- Earth Resistance Measurement in TT Systems
- Measurement of the Fault-Loop Impedance in TN Systems
- Touch Voltage Measurement in TN Systems (Low-Voltage Earth Faults)
- Step and Touch Voltage Measurements in TN Systems
- Fundamental Measurements in IT Systems
- Protective Conductor Continuity Test

	- Insulation Resistance
14	Electrical Safety of Low-Voltage Systems, *Dr. Massimo A. G. Mitolo* *Professional Engineer*
15	Additional references: -

No	Course Information	
1	Unit name:	Computer Aided Electrical Engineering
2	Code:	EP-61033
3	Classification:	Engineering subject
4	Credit value:	1.5
5	Semester/ Year Offered:	1/6
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture, Practical
8	Assessment system and breakdown of marks:	Tutorial, Practical, Attendence, Classwork
	Tutorial, Practical	40
	Attendence	30
	Classwork	30
9	Academic staff teaching unit:	
10	Course outcome of unit: In this course students will be able • Solve the mathematical problems including matrix algebra, complex arithmetic, linear systems and non-linear differential equations, etc by aiding computer. • Compute the power flow solution of an interconnected power system. • Estimate the real and reactive power scheduling of power plant in such a way to minimize the operating cost. • Predict bus voltages and line currents during various types of faults. • Create simulation block diagrams and graphics.	
11	Synopsis of unit: The course covers computer software package for high performance numerical computation and visualization. These functions provide solulions to a broad range of mathematical problems including matrix algebra, complex arithmetic, linear systems, differential equations, signal processing, optimization, non-linear systems, and many other types of scientific computations. The most important feature of computer aiding is its programming capability which is very easy to learn and to use, and which	

	allows user-developed functions. Topic: **Chapter Title**
	Appendix A Introduction to MATLAB. Installing the text toolbox Running matlab Variables Output format Character string Vector operations Elementary matrix operations Complex numbers Polynomial roots and characteristic polynomial Graphics Loops and logical statement Solution of differential equations Nonlinear Systems Simulation diagram Chapter 6 Power Flow Analysis Introduction Bus admittance matrix Solution of nonlinear algebraic equations Power flow solution Gauss-Seidel power flow solution Line flows and losses Tap changing transformers Power flow programs Data preparation Newton-Raphson power flow solution Fast decoupled power flow solution Chapter 7 Optimal dispatch of generation Nonlinear function optimization

	Operation cost of a thermal plant Economic dispatch neglecting losses and no generator limit Economic dispatch neglecting losses and including generator limit Economic dispatch including losses Derivation of loss formula Chapter 9 Balanced Fault Balanced three-phase fault Short-Circuit capacity Systematic fault analysis using bus impedance matrix Algorithm for formation of the bus impedance matrix Zbuild and symfault program Chapter 10 Symmetrical Components and Unbalanced Fault Fundamentals of symmetrical components Sequence impedances Sequence networks of a loaded generator Single line-to-ground fault line-to-line fault Double line-to-ground fault Unbalanced fault analysis using bus impedance matrix Unbalanced fault programs Chapter 11 Stability Swing equation Synchronous machine models for stability studies Steady-state stability small disturbances Transient stability equal area criterion Application to three-phase fault Numerical solution of nonlinear equation Numerical solution of the swing equation Multimachine systems Multimachine transient stability
14	Main references: Power System Analysis, Hadi Saada Essential Matlab for Engineers and Scientists, Third Edition, Brian Hahn &

	Daniel T. Valentine
15	Additional references: Matlab for Engineers, Third Edition, Holly Moore. MATLAB for Beginners, Revised Edition, Peter I. Kattan.

Information on Lab Practical

JOB-1 Elementary Matrix Operation

Objective:

To solve the elementary operation by using Matlab software

Required Equipment

Computer installed with Matlab software

Job-2 Graphics

Objective:

- To create two dimensional plots

Required Equipment

Computer installed with Matlab software

Job-3 Simulation Block Diagram

Objective:

- To create simulink block diagram
- To see the simulink result in the computer screen

Required Equipment

Computer installed with Matlab software

Job-4 Power Flow Solution

Objective:

- To solve the power flow problems of an interconnected power system

Required Equipment

Computer installed with Matlab software

Job-5 Fault Calculation

Objective:

- To become familiar with modelling and analysis of power systems under faulted condition and to compute the fault level, post-fault voltages and currents for different types of faults, both

	symmetric and unsymmetric. **Required Equipment** • Computer installed with Matlab software

No	Information of HSS 61011 (SEM-I)	
1	Unit name:	Humanities & Social Sciences
2	Code:	HSS61011
3	Classification:	Social Sciences subject
4	Credit value:	4
5	Semester/ Year Offered:	1/6
6	Pre-requisite:	
7	Mode of delivery:	Lecture, Presentation
8	Assessment system and breakdown of marks:	
	Test	60%
	Mid-term	40%
9	Academic staff teaching unit:	
10	Course outcome of unit: In this course students will be able to • Explain the characteristics of the social science (methods used to research social science) and consider the benefits to society and to humanity of social science and humanities subjects • Explain the ideas about what knowledge is and how it is gained from the philosophy and ethics • Explain the relationships between people and the environment (cause and effect) • Apply economic concepts to real life and recognize the two interconnected areas of microeconomics and macroeconomics • Explain themeaning of development, measures of poverty and consider the problems that some types of development can cause • Identify causes and effects of diseases and evaluate the effectiveness of public health programmes Explain the value of skills in engineering ethics	
11	Synopsis of unit: Topic: The course covers the essential fundamental of Humanities & Social sciencessuch as the characteristics of the social science (methods used to research social science), the value of skills in social science,the ideas about what knowledge is	

	and how it is gained from the philosophy and ethics, the relationships between people and the environment (cause and effect) , Development and measures of poverty and Public health policy **Chapter Title**
	1.Social Science and the Humanities -Society -What Is Social Science? - What Are the Humanities? **2. Philosophy and Ethics** - Philosophy - Epistemology - Ethics - Philosophies from around the World **3.The Environment** -What Is the Environment? - Maintaining a Balance in Nature - Resources - Human Impacts on the Environment **4.Economics** - What is Economics? - Microeconomics - Macroeconomics -Economic Indicators - Taxes and Fiscal Policy - International Trade **5.Development**

	- Whatis development? - A History of Development - Economic Development - Criticisms of 'Economic Development' Models - Measuring Development - Measuring Poverty - Social and Community Development - Sustainable Development and the SDGs - Impacts of Development **6. Public Health** - Health - Public Health - Public Health Policy **Engineering Ethics**
14	Main references: Mote Oo Education (Teacher Book) Social Sciences & Humanities
15	Additional references:

Approved By:

ဒေါက်တာနေကြည်ထွေး
ပါမောက္ခဌာနမှူး
လျှပ်စစ်စွမ်းအားအင်ဂျင်နီယာဌာန
နည်းပညာတက္ကသိုလ်(ကျောက်ဆည်)

Prepared By:

ဒေါ်နီလာအောင်
လ/ထကထိက
လျှပ်စစ်စွမ်းအားအင်ဂျင်နီယာဌာန
နည်းပညာတက္ကသိုလ်(ကျောက်ဆည်)