

AEN2211 ELECTRICAL ENGINEERING II

Lecturer(s) Dr. Lugujo E. B.Sc. (Eng), M.Sc. (Eng), PhD
Ms. Ovon Carol B.Sc.(Elec. Eng)

Course Type: CORE (AGE. II)

1. COURSE DESCRIPTION

Course Credits (CU): 4 CU i.e. 60 Contact Hours per semester

Course Duration: 15 weeks (60 hours) i.e. 45 LH, 30 PH/TH

The course introduces students to more advanced electrical engineering aspects applicable to agricultural/mechanical engineers. It covers: key concepts in Instrumentation and measurement. Electrical machines. Fundamentals of energy conversion, transmission and distribution. Switching and protective gear. Electronic control circuits and devices.

2. COURSE OBJECTIVE

To enable students learn the principles of AC and DC motors and generators, AC transformers and other electrical equipment and how they work.

3. RECOMMENDED REFERENCES FOR READING

1. El-Hawary M.E., (2002). Principles of Electrical machines with power electronics applications. John Wiley and Sons.
2. Hamby Allan, (2010). Electrical Engineering. Principles and Applications. 5th Edition. Longman
3. Karady George G. and Holbert Keith E. (2005). Electrical Engineering conversion and Transport. John Wiley and Sons.
4. Mulukutla Sarma (2001). Introduction to Electrical Engineering. Oxford University Press

4. COURSE CONTENT, METHODS OF INSTRUCTION, TOOLS AND EQUIPMENT REQUIRED

TOPIC	CONTENT	METHOD OF INSTRUCTION / Time allocated	TOOLS / EQUIPMENT NEEDED
1. Instrumentation and measurement	<ul style="list-style-type: none">● Review of circuit concepts and RC transient responses● Frequency response and non ideal instruments● Introduction to Op Amps● Instrumentation amplifiers● Introduction to Filters● D/A and A/D conversion● Data acquisition channel● Error analysis	(4hrs)	Course notes, course reader materials, student scratch book

2. Magnetic circuits and transformers	<ul style="list-style-type: none"> ● Magnetic fields ● Magnetic circuits ● Inductance and mutual inductance ● Magnetic materials ● Ideal transformers ● Real transformers ● Single phase transformers ● Three phase transformers 	(4hrs)	Course notes, course reader materials, student scratch book
3. DC machines	<ul style="list-style-type: none"> ● Overview of motors ● Principles of DC machines ● Rotating DC machines ● Shunt connected & separately excited DC motors ● Series connected DC motors ● Speed control of DC motors ● DC generators 	(4hrs)	Course notes, course reader materials, student scratch book
4. AC machines	<ul style="list-style-type: none"> ● Three phase induction motors ● Equivalent circuits & performance calculations for induction motors ● Synchronous Machines ● Single phase motors ● Stepper motors and brushless DC motors 	(4hrs) Individual Written assignment (2hrs)	Course notes, course reader materials, student scratch book Assignment sheets
5. Induction Motors	<ul style="list-style-type: none"> ● Introduction ● Construction ● Three phase induction motors ● Single phase induction motors 	(4hrs)	Course notes, course reader materials, student scratch book
6. Electric power system	<ul style="list-style-type: none"> ● Electrical network ● Electric generation stations ● Fossil power plants ● Nuclear power plants ● Hydroelectric power plants ● Distribution system 	(4hrs)	Course notes, course reader materials, student scratch book
7. Transmission lines and cables	<ul style="list-style-type: none"> ● Construction ● Components of transmission lines ● Cables ● Transmission lines electric parameters 	(8hrs)	Course notes, course reader materials, student scratch book

8. Electro-mechanics	<ul style="list-style-type: none"> • Basic principles of electromechanical energy conversion • EMF produced by windings • Rotating magnetic fields • Forces and torque in magnetic field systems • Basic aspects of electromechanical energy converters. 	(4hrs)	Course notes, course reader materials, student scratch book
9. Switching and protective gear	<ul style="list-style-type: none"> • Switches • Protective gear • Other safety issues 	(4hrs)	Course notes, course reader materials, student scratch book
10. Electronic control circuits and devices	<ul style="list-style-type: none"> • Circuit analysis • Semiconductor materials • Diodes and diode circuits • Power supply circuits • Transistors • Amplifiers • Switched mode power supply 	(5hrs)	Course notes, course reader materials, student scratch book

Practicals – 30hrs

5. OVERALL COURSE EVALUATION

Continuous Assessment Test		30%
Individual and Group Based Assignments	10%	
Final examination	60%.	