

Electrical Technology

EEC - 5 - 885

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Faculty of Engineering, Science and the Built Environment

Academic year 2012/13

Level 5

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1. MODULE DETAILS

Module Title:	Electrical Technology
Module Level:	5
Module Reference Number:	EEC - 5 - 885
Credit Value:	30
Student Study Hours:	300
Contact Hours:	96
Private Study Hours:	204
Pre-requisite Learning (If applicable):	Electrical Principles
Co-requisite Modules (If applicable):	None
Course(s):	BTEC HND in Electrical & Electronic Engineering
	BTEC HNC in Electrical & Electronic Engineering
	FOUNDATION DEGREE in Power Distribution(FT)
	FOUNDATION DEGREE in Power Distribution(PT)
Year and Semester	2011/2012 S 1&2
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(If applicable):	Workshop Supervisor: Maz Shirkoohi/Mike Potter
()	Workshop Technician: Mike Potter
	Tel: 0207 815 7508
Subject Area:	Electrical Engineering
Summary of Assessment Method:	The unit is assessed by four multiple choice /
-	phase test examination carrying 80% (20% each)
	and assessed laboratory logbook 20%

2. SHORT DESCRIPTION

This unit provides a sound understanding of the important building blocks in electrical systems and apparatus such as transformers and machines as well as the important building blocks in power electronics. Electrical machines, will be studied and also some of their typical electronic control apparatus such as PLC's so that the students are able to understand their chief characteristics and the areas in which they find application. In the laboratory workshop they will study the systems in operation and have an opportunity to examine their characteristics.

3. AIMS OF THE MODULE

This unit covers the analysis, behaviour, control and applications of transformers and basic electrical machines which provide electrical and mechanical power and also some aspects of industrial controllers. This unit will also cover the analysis, behaviour and applications of Power Electronics devices and circuits. One of the main aims of the unit is to teach the technician engineers the basic techniques and tools used in modern power electronics apparatus.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

Description of application of electromagnetism in industrial transformers and motors. Description of performance of dc and induction machines, and derivation and analysis of simple mathematical models for their performance. Understand device tolerance features and use them to select a suitable device to match a particular requirement and then design and produce a simple driver circuit. Understand and become familiar with the latest technological developments

in power electronics apparatus and modern device behaviour and application. Understand quantitatively the operating principles and performance characteristics of the major classes of power electronic apparatus and how and where they find application.

4.2 Intellectual Skills

Mathematical analysis of alternating current power circuits for use in engineering services design. Analysis of power requirements of a load and selection of suitable form of power factor correction in relation to likely energy tariffs.

4.3 Practical Skills

Recording and maintaining detail of experimental data in logbooks. Effective usage of complex test equipment. Building and observation of experimental systems.

4.4 Transferable Skills

Safety awareness in laboratories. Communication of observed results in technical format. Application of mathematical methods to solve problems. Mathematical manipulation and analysis of data.

5. ASSESSMENT OF THE MODULE

This unit will be assessed by four multiple choice/phase test examinations held after each consecutive six weeks of teaching carrying 20% each, and the assessed laboratory logbook carrying 20%.

6. FEEDBACK

Extensive efforts will be made in order to provide feedback within 15 days of the assessments made within the unit, where appropriate.

7. INTRODUCTION TO STUDYING THE MODULE

7.1 Overview of the Main Content

Ideal and real transformers with hysteresis, eddy currents, winding resistance, magnetising current, reactance and equivalent circuits - transformer equation. Transformer phasor diagrams for no-load, and load conditions - transformer efficiency. Revision of electrical fundamentals of voltage, current and impedance. Calculations of active, reactive and apparent components of current and power. DC and induction machines. Development of simple mathematical models for motor action and operating characteristics of the rotating machines. Performance of electrical Machines. Device characteristics and operation of BJT, MOSFET and SCR, Safe Operating Area, Principles and characteristics of ac. and dc. Power conditioning and control circuits, ac. phase control, electrical machine drives, SMPS, PWM inverters, choppers.

7.2 Overview of Types of Classes

Teaching is based on weekly two-hour lectures/tutorials and two-hour laboratory sessions. Students will be required to keep a detailed logbook. The logbook will be formally assessed.

7.3 Importance of Student Self-Managed Learning Time

You should spend a minimum of eight to nine additional hours per week in private study to compliment your notes, to finish off your laboratory reports, solving tutorial questions, and revising.

7.4 Employability

Students will gain experience with the practical use of laboratory equipment and also an understanding of the operation and performance of electrical machines.

8. <u>THE PROGRAMME OF TEACHING, LEARNING</u> <u>AND ASSESSMENT</u>

Teaching is based on weekly two-hour lectures/tutorials and two-hour laboratory sessions. Students will be required to keep a detailed logbook. The logbook will be formally assessed.

9. STUDENT EVALUATION

This is a new module running for the first time. The unit evaluation for the constituent units making up this unit were very well recieved by students last year. An evaluation of this module will be carried out at the end of the module.

10. LEARNING RESOURCES

10.1 Core Materials

- 1. Notes provided in four in MS Word / pdf format(s) and a dedicated Blackboard site.
- 2. Higher Electrical Engineering



J. SHEPHERD, A.H. MORTON AND L.F. SPENCE, PEARSON, 896 PAGES

ISBN 10: 0582988888 / 0-582-98888-8 ISBN 13: 9780582988880

Publication Date: 1986 10/e 2008

3. Electrical and Electronic Technology



Authors:Edward Hughes / John Hiley / Keith Brown / Ian McKenzie-SmithPub.Prentice Hall1032 pagesDate2008ISBN13:9780132060110ISBN10:0-13-206011-6

4. Principles of Power Electronics



Author: John G. Kassakian, Martin F. Schlecht, George C. Verghese

ISBN: 8131733203

ISBN-13: 9788131733202, 978-8131733202

Binding: Paperback Publishing Date: 01/01/2010 Publisher: Pearson Education Edition: 0th Number of Pages: 740 5. Modern Power Electronics and AC Drives



Author: Bimal Bose Paperback: 736 pages Publisher: Prentice Hall Language English ISBN-10: 0130167436 ISBN-13: 978-0130167439

10.2 Optional Materials

6 . Electrical Engineering: Principles and Applications, Allan R. Hambley, Michigan Technological University, ISBN 0-13-061070-4

7. Foundations of Electric Circuits, 1/e, J.R. Cogdell, University of Texas, Austin, ISBN 0-13-907742-1

- 8. Electric Circuit Fundamentals (7th Edition), Thomas L. Floyd, Prentice Hall, ISBN:0132197103
- 9. Power Electronics, B W Williams, McGraw-Hill



Author: B W Williams Paperback: 558 pages Publisher: Palgrave Macmillan Language English ISBN-10: 033357351X ISBN-13: 978-0333573518

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