FACULTY OF ENGINEERING, SCIENCE AND THE BUILT ENVIRONMENT

Unit title:	Power Distribution Systems
Unit number:	DEG/M/403
Unit value:	1.0
Unit co-ordinator:	R Pettit
Contact time:	48 hours
Private study time:	102 hours
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Unit pre-requisites:	None

SHORT DESCRIPTION

This technical unit focuses on electricity distribution systems and the connection and effects of small scale embedded or dispersed generation thereon.

AIMS

To provide an understanding of the methods and standards of electricity distribution particularly the effect of small scale embedded generation and building-integrated generation systems on both the supplier and consumer.

LEARNING OUTCOMES

- Know methods of high-voltage distribution at 11kV and above particularly for connection of small scale generation.
- Understand aspects of systems operation such as power flow, voltage control, power factor, fault level, stability, power quality and protection.
- Understand the features and operational characteristics of various types of embedded generation, including renewables and hybrid systems.
- Know the statutory regulations for connection to the public supply of embedded generators, including renewables.
- Study the effect of embedded generation on power system operation.
- Be aware of contemporary economic and environmental issues.

TEACHING AND LEARNING PATTERN

Teaching will be by lectures, guest lectures, tutorials and workshops. Case studies will be used to introduce some topics and the workshop sessions will be feature use of a power systems simulation package.

INICATIVE CONTENT

Methods of electrical distribution, system structure, operation and control.

Power flow. Voltage stability. Short circuit performance. Protection and earthing. Two-way metering, energy storage, ups systems and rectification and inversion.

Embedded generation, types, including hybrid systems, technical aspects, location, impact on central generation. System studies. Accommodation and integration into the built environment.

Power quality. Reliability. Economic and environmental aspects.

ASSESSMENT

Dissertation/Case study	50%
Assignment	50%

INDICATIVE SOURCES

- Embedded Generation. Jenkins, N et el. IEE Power & Energy series No. 31, 2000
- Network protection & Automation guide, 4th edition, Alsthom, 2001
- G59/1 (1991) and G75 (1996), Recommendations for the connection of embedded generating plant to the Regional Electricity Companies Distribution Systems. Electricity Association.
- G77/1, Recommendations for the connection of inverter-connected single-phase photovoltaic (PV) generators up to 5kVA to public distribution networks. Electricity Association, 2000
- Electricity distribution network design, 2nd edition, Lakervi, E. & Holmes, EJ. IEE Power & Energy series No. 21, 1995
- Electric Power Systems 4th edition, Weedy, BM. & Cory, BJ. Wiley, 1998