

## Liverpool John Moores University

Title: POWER SUPPLIES TO BUILDINGS  
Status: Definitive  
Code: **5024BEFD** (114864)  
Version Start Date: 01-08-2011

Owning School/Faculty: Built Environment  
Teaching School/Faculty: Stockport College

Team	Leader
Derek King	Y

**Academic Level:** FHEQ5      **Credit Value:** 12.00      **Total Delivered Hours:** 61.00  
**Total Learning Hours:** 120      **Private Study:** 59

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42.000
Tutorial	19.000

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS2	Project based assignment	50.0	
Test	AS1	Controlled assignment under exam conditions	50.0	

### Aims

*To develop students understanding of the power requirements of industrial & commercial building and the methods by which the power can be supplied and distributed.*

*To provide an opportunity for the students to experience the process of carrying out a power supply design project.*

*To enable them to interpret the requirements of a building, develop practical schemes and evaluate the effectiveness of alternative schemes.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Investigate and categorise the power needs of large buildings and complexes.
- 2 Investigate the use of transformers in power transmission, distribution, measurements and protection.
- 3 Calculate fault currents in power supply networks and thereby analyse the rating of HV switchgear and protection equipment.
- 4 Design power supply and distribution networks to buildings and complexes with large power loads.
- 5 Evaluate the effects of abnormal loads on power supply systems.

## Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

REPORT	1	2	3	4	5
TEST	2	3	4	5	

## Outline Syllabus

*Power assessment: power demand and load factors, assessment of demand for large industrial & commercial buildings.*

*Supply Options: tariff arrangements and alternative supply options, comparison of alternative tariffs, choice of supply voltage, requirements of suppliers network.*

*Transformers: electromagnetic induction, transformer principles, phasor diagrams, equivalent circuits, referred values, transformer tests, efficiency and regulation, parallel operation and group references, protection transformers.*

*Fault currents: types of faults, percentage and p.u. values, fault levels, short circuit currents, network configurations, network analysis for fault levels.*

*Large Power equipment: space and installation requirements of large power transformers, electrical machines, large power consuming plant & switchgear up to 11kV, large power cables, protection systems, fire and explosion risk, health & safety, authorised operators.*

*Design of Power Installations: design of large power supply and distribution at up to 11kV for complex buildings, layout, specification and control of the main power distribution within buildings. Power distribution: networks, radial, rings, interconnected mesh, HV Switchgear types. (RMU, Oil, Vacuum, and SF6), protection systems, relay settings and grading, HV fuses, HV Switchgear ratings, protection systems and relays, power system earthing.*

*Abnormal loads: load assessment, maximum demand, load management, large motor loads, welding, voltage interference, harmonics, supply design constraints, effect of abnormal loads on HV tariffs and energy contracts.*

## Learning Activities

Lectures, tutorials, case studies, site visits.

## References

<b>Course Material</b>	Book
<b>Author</b>	Bayliss, C.
<b>Publishing Year</b>	1999
<b>Title</b>	Transmission and Distribution in Electrical Engineering
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	Butterworth-Heinemann
<b>ISBN</b>	0750640596

<b>Course Material</b>	Book
<b>Author</b>	Hiley, J. Hughes, E.
<b>Publishing Year</b>	2004
<b>Title</b>	Hughes Electrical and Electronic Technology
<b>Subtitle</b>	
<b>Edition</b>	9th Edition
<b>Publisher</b>	Prentice Hall
<b>ISBN</b>	0131143972

<b>Course Material</b>	Book
<b>Author</b>	CIBSE
<b>Publishing Year</b>	2005
<b>Title</b>	Guide K
<b>Subtitle</b>	Electricity in Buildings
<b>Edition</b>	
<b>Publisher</b>	CIBSE
<b>ISBN</b>	190328726X

<b>Course Material</b>	Book
<b>Author</b>	Franklin, A.C. & Franklin, D.P.
<b>Publishing Year</b>	1998
<b>Title</b>	The J & P Transformer Book
<b>Subtitle</b>	
<b>Edition</b>	12th Edition
<b>Publisher</b>	Newnes
<b>ISBN</b>	0750611588

<b>Course Material</b>	Book
<b>Author</b>	Warne, D.F.
<b>Publishing Year</b>	2005
<b>Title</b>	Newnes Electrical Power Engineers Handbook

<b>Subtitle</b>	
<b>Edition</b>	2nd Edition
<b>Publisher</b>	Butterworth-Heinemann
<b>ISBN</b>	0750662689

<b>Course Material</b>	Book
<b>Author</b>	Electricity Rating Association
<b>Publishing Year</b>	1995
<b>Title</b>	Power Systems Protection' Institution of Engineering and Technology
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	
<b>ISBN</b>	0852968477

## Notes

This module is a key component for those students wishing to complete the programme following a 'electrical' building services pathway. It develops an understanding of the technology associated with the provision of electrical power supply to and within large commercial/industrial buildings and complexes. The focus of the module is to increase the range and depth of understanding of power supplies for students from an electrical installations background by analysing some of the core concepts and exploring how these effect the design of power supplies to these types of buildings.