**Minoufiya University,**

**Faculty of Engineering,**

**Electrical Eng. Dept.,**

**Post Graduate Studies and Research.**

**Course Specification**

**Minoufiya University**

Faculty of Engineering

***Title: High Voltage Cables***

***Code Symbol: ELE 621***

***Department offering the course: Electrical Eng. Dept***

***Date of specification approval: / / 2012***

***A- COURSE IDENTIFICATION AND INFORMATION:***

***B - Professional Information***

***B.1 Course Aims:***

The aims of this course are to provide the Student, with the skills of selecting the high voltage

(HV) cable insulation. This course will also provide students with the ability to design the high

voltage cable. The skill of testing and maintaining the high voltage cable is also provided.

***B.2 Course Objectives***

1. Realizing of the different types of high voltage cables.

2. Demonstration of design features of the high voltage cable cable.

3. Definition of the requirements of diagnosing and maintaining of the HV cable.

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| Field | Programme ILOs that the coursecontribute in achieving | Course ILOs |
| Knowledge&Understanding | A2. The exchange effect among theengineering practices and reflectionon the environment. | a2.1) Describe the behaviour of theHV cable insulation. |
| A3. The scientific developments inelectrical     power     and     machinesengineering. | a3.1) Identify the different types ofHV cables.a3.2) Identify the components of aninsulated power cable system. |
| Intellectual Skills | B2. Produce solutions to power andmachines    problems    through    theapplication of specific engineeringdiscipline     knowledge     based     onlimited and possible information. | b2.1) Calculate the power loss in thecable. |
| B6. Plan to develop performance ofpower and machines systems. | b6.1)     Evaluate    the    HV    cableperformance. |
| B7. Take the suitable decision fordifferent professional situations. | b7.1) Select the HV cable insulation. |
| Professional andPractical Skills | C1. Use efficiently the available toolsas computer programs and measuringinstruments as well as building ideasin     the     laboratory     or     throughsimulation and apply engineeringtechniques. | c1.1) Apply design features of theHV cables.c1.2) Perform testing techniques tothe HV cables.c1.3) Apply diagnosing techniquesto the HV cables.c1.4) Apply maintaining process tothe HV cable. |
| General andTransferable Skills | D4. Use different resources to obtainknowledge and information. | d4.1) Use specialized books andrelated internet websites to preparereports and presentations. |
| D6. Work with a group and managethe team. | d6.1) Cooperate with the colleaguesto present collaborative work. |
| D8. Self and continuous learning. | d8.1) Providing the student withresearching attitude. |

2/ELE 621

***B.4  Course Intended Learning Outcomes (ILOs)***

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| ***Week******No.*** | ***Sub. Topics*** | ***Total******Hours*** | ***Contact hrs*** | ***Course ILOs******Covered (By No.)*** |
| **Lec.** | **Tut.** | **Lab.** |
| *Week-1* | Introduction: AC power cable, HVDCcable, Submarine cable, X-Ray cable. | 3 | 3 | - | - | a3.1, d4.1, d6.1,d8.1 |
| *Week-2* | The components of an insulated powercable system. | 3 | 3 | - | - | a3.2, d4.1, d6.1,d8.1 |
| *Week-3* | Power loss in the cable: Dielectric loss andconductor loss. | 3 | 3 | - | - | b2.1, d4.1, d6.1,d8.1 |
| *Week-4* | Power loss in the cable continue:Intersheath loss, cross-bonding of cable. | 3 | 3 | - | - | b2.1, d4.1, d6.1,d8.1 |
| *Week-5* | Design features: Rating and thermal designmainly referring to super-tension cables. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-6* | Design features continue: Medium voltagedistribution cables and conductors. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-7* | Design features continue: Insulation system,Containment. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-8* | Design features cont.: Thermal andmechanical environment. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-9* | Manufacturing processes and materials:Cables. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-**10* | Manufacturing processes and materialscontinue: Accessories. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-**11* | Manufacturing processes and materialscontinue: Environmental issues. | 3 | 3 | - | - | b7.1, c1.1, d4.1,d6.1, d8.1 |
| *Week-**12* | Testing: Routine, Type testing. | 3 | 3 | - | - | a2.1, b6.1, c1.2,d4.1, d6.1, d8.1 |
| *Week-**13* | Testing continue: Special testing, Sitetesting. | 3 | 3 | - | - | a2.1, b6.1, c1.2,d4.1, d6.1, d8.1 |
| *Week-**14* | Diagnostics: Impregnated paper insulation,Polymeric insulation. | 3 | 3 | - | - | c1.3, c1.4, d4.1,d6.1, d8.1 |
| *Week-**15* | Diagnostics      continue:      Case      studies-Maintenance. | 3 | 3 | - | - | c1.4, d4.1, d6.1,d8.1 |

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| TopicNo. | General Topics | Weeks |
| 1st | The components of an insulated power cable system | 2 |
| 2nd | Design features of the cables | 3-8 |
| 3rd | Manufacturing processes and materials | 9-11 |
| 4th | Testing, Diagnostics and maintenance of high voltage cables | 12-15 |



3/ELE 621

***B.5  Course Topics.***

***B.6  Course Topics/hours/ILOS***

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| **Course Intended****learning outcomes****(ILOs)** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Knowledge &****understanding** | **a2.1** | **x** |  | **x** |  |  |  |  |  | **x** | **x** |  |  |  |
| **a3.1** | **x** |  | **x** |  |  |  |  |  | **x** |  |  |  |  |
| **a3.2** | **x** |  | **x** |  |  |  |  |  |  |  |  |  |  |
| **Intellectual****Skills** | **b2.1** | **x** |  | **x** |  | **x** |  |  |  |  |  |  |  |  |
| **b6.1** |  | **x** | **x** |  |  |  |  |  | **x** | **x** |  |  |  |
| **b7.1** | **x** | **x** | **x** |  | **x** |  |  |  | **x** | **x** |  |  |  |
| **Professional****and Practical****Skills** | **c1.1** |  | **x** | **x** |  |  |  |  |  | **x** | **x** |  |  |  |
| **c1.2** |  | **x** | **x** |  |  |  |  |  | **x** | **x** |  |  |  |
| **c1.3** | **x** |  | **x** |  |  |  |  |  | **x** | **x** |  |  |  |
| **c1.4** | **x** |  | **x** |  |  |  |  |  | **x** | **x** |  |  |  |
| **General and****Transferable****Skills** | **d4.1** |  | **x** |  |  |  |  |  |  | **x** | **x** |  |  |  |
| **d6.1** |  | **x** |  |  |  |  |  |  | **x** | **x** |  |  |  |
| **d8.1** |  | **x** |  |  |  |  |  |  | **x** | **x** |  |  |  |

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| **Assessment Method** | **Mark** | **Percentage** |
| **Final Examination (*written*)** | **100** | **100%** |
| **Total** | **100** | **100%** |



**B. 8*Assessments:***

**Selflearning**

**Presentation**

**andMovies**

**Cooperative**

**Discovering**

**Discussion**

**Modelling**

**Sitevisits**

**Problem**

**solving**

**Brain**

**storming**

**Tutorial**

**Projects**

**Lecture**

**Playing**

**B.7*Teaching and Learning Method:***

***B.9 Facilities required for teaching and learning:***

***Weighting of assessments:***

1.**Library Usage:** Students should be encouraged to use library technical resources in the

preparation of reports. So, the computers with sufficient electronic resources should be

available.

2.**Class room** facilitated by computer, white board and datashow.

***B.10 List of references:***

1. H. M. Ryan “High Voltage Engineering and Testing”, Institution of Electrical Engineers, 2001.

2. J. R. Lucas “High Voltage Engineering”, 2001.

3. J. Attwood, “Overall Design of Supertension Cables”, Supertension, IEE Two Day Colloquium

on, 1995.

4. “High Voltage Cable Selection Guide”, Engineering standard-NSW, PDS 14.

5. “High Voltage XLPE Cable Systems, Technical User Guide”, Available Online :

http://www.nepa ru.com/brugg\_files/02\_hv\_cable\_xlpe/03\_web\_xlpe\_guide\_en.pdf.

4/ELE 621

6. “XLPE Cable Systems, User’s Guid”, Available Online:

http://www05.abb.com/global/scot/scot245.nsf/veritydisplay/62523d62797878abc125720a00

285e3a/$File/XLPE%20Cable%20Systems%20Users%20Guide%20-%20US.pdf.

7. Recent published journal and international conference papers.

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**Course Coordinators:** **Head of Department**

**Prof. Dr. Mohamed Izzularab** **Prof. Dr. Gamal Morsi**

**Dr. Nehmdoh A. Sabiha**

**Date:**