**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 course  contribute in achieving | Course ILOs |
| Knowledge&  Understanding | A2. The exchange effect among the  engineering practices and reflection  on the environment. | a2.1) Describe the behaviour of the  HV cable insulation. |
| A3. The scientific developments in  electrical     power     and     machines  engineering. | a3.1) Identify the different types of  HV cables.  a3.2) Identify the components of an  insulated power cable system. |
| Intellectual Skills | B2. Produce solutions to power and  machines    problems    through    the  application of specific engineering  discipline     knowledge     based     on  limited and possible information. | b2.1) Calculate the power loss in the  cable. |
| B6. Plan to develop performance of  power and machines systems. | b6.1)     Evaluate    the    HV    cable  performance. |
| B7. Take the suitable decision for  different professional situations. | b7.1) Select the HV cable insulation. |
| Professional and  Practical Skills | C1. Use efficiently the available tools  as computer programs and measuring  instruments as well as building ideas  in     the     laboratory     or     through  simulation and apply engineering  techniques. | c1.1) Apply design features of the  HV cables.  c1.2) Perform testing techniques to  the HV cables.  c1.3) Apply diagnosing techniques  to the HV cables.  c1.4) Apply maintaining process to  the HV cable. |
| General and  Transferable Skills | D4. Use different resources to obtain  knowledge and information. | d4.1) Use specialized books and  related internet websites to prepare  reports and presentations. |
| D6. Work with a group and manage  the team. | d6.1) Cooperate with the colleagues  to present collaborative work. |
| D8. Self and continuous learning. | d8.1) Providing the student with  researching attitude. |

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***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, HVDC  cable, Submarine cable, X-Ray cable. | 3 | 3 | - | - | a3.1, d4.1, d6.1,  d8.1 |
| *Week-2* | The components of an insulated power  cable system. | 3 | 3 | - | - | a3.2, d4.1, d6.1,  d8.1 |
| *Week-3* | Power loss in the cable: Dielectric loss and  conductor 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 design  mainly referring to super-tension cables. | 3 | 3 | - | - | b7.1, c1.1, d4.1,  d6.1, d8.1 |
| *Week-6* | Design features continue: Medium voltage  distribution 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 and  mechanical 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 materials  continue: Accessories. | 3 | 3 | - | - | b7.1, c1.1, d4.1,  d6.1, d8.1 |
| *Week-*  *11* | Manufacturing processes and materials  continue: 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, Site  testing. | 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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| Topic  No. | 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 |



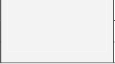
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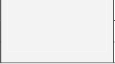
***B.5  Course Topics.***

***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.

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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:**