**Minoufiya University,**

**Faculty of Engineering,**

**Electrical Eng. Dept.,**

**Post Graduate Studies and Research.**

**Course Specification**

**Minoufiya University**

Faculty of Engineering

***Title: Control of DC Machines***

***Code Symbol: ELE 524***

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

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

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

***B.1 Course Aims:***

***B - Professional Information***

This course aims to study the characteristics of dc motor control system and their

types, teach students the suitable control method for each application. Also, explain

modern closed loop controllers of dc motors.

***B.2 Course Objectives***

**1.** **Explores the types of dc motors, the construction and characteristics for each type.**

**2.** **Derive the mathematical model for each type of dc motors.**

**3.** **Determine the dynamic model for each type of dc motors.**

**4.** **Apply the suitable control method.**

**5.** **Evaluate the performance of the dc control system under modern closed loop controllers**

**of dc motors like PLL controllers.**

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| --- | --- | --- |
| Field | Programme ILOs that the coursecontribute in achieving | Course ILOs |
| Knowledge&Understanding | A4. Understand the moral and legalprinciples of professional practice inengineering. | a4-1) Exlain the principles ofresearch and work with other. |
| Intellectual skills | B1. Identify and analyze problems in thearea of electrical power specializationand rank the results according to theirpriorities. | b1-1)      Identify      and      analyzeproblems of speed and positioncontrol in dc machines |
| Professional andPractical Skills | C1. Apply the professional engineeringtechnologies in the field of electricalmachines specialization. | c1-1)            Apply            computerprogrammers to solve problems ofelectrical machines. |
| General andTransferrableSkills | D4.    Use    of    different    sources    forinformation knowledge | d4-1) Refer to textbooks, anddatabases information in lectures. |
| D7. Self- learning continuously speciallyin electrical machines branch. | d7-1) Apply statistical reports andweekly auctions. |

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| Field | Academic Reference Standards For Electrical EngineeringPostgraduates (ARSEP-ELE) |
| Knowledge &Understanding | IntellectualSkills | Professionaland PracticalSkills | General andTransferrableSkills |
| Programme AcademicStandards that the coursecontribute in achieving | A4 | B1 | C1 | D4, D7 |

|  |  |  |
| --- | --- | --- |
| TopicNo. | General Topics | Weeks |
| 1st | Characteristics of dc motors | 1-3 |
| 2nd | Mathematical models of dc motors | 4-6 |
| 3rd | Power electronic circuits | 7-8 |
| 4th | Control methos | 9-12 |
| 5th | Speed control of dc motors | 13-14 |

***B.3 Relationship between the course and the programme***

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

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***B.5 Course Topics.***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Week******No.*** | ***Sub. Topics*** | ***Total******Hours*** | ***Contact hrs*** | ***Course ILOs******Covered (By No.)*** |
| **Lec.** | **Tut.** | **Lab.** |
| *Week-1* | Characteristics of separately excited dcmotor | 3 | 3 | - | - | a4-1, b1-1, c1-1 |
| *Week-2* | Characteristics of shunt and series dcmotors | 3 | 3 | - | - | a4-1, b1-1, c1-1 |
| *Week-3* | Characteristics of cumulative compounddc motor | 3 | 3 | - | - | a4-1, b1-1, c1-1 |
| *Week-4* | Mathematical    model    of     separatelyexcited dc motor | 3 | 3 | - | - | a4-1, b1-1, c1-1 |
| *Week-5* | Mathematical model of shunt and seriesdc motor | 3 | 3 | - | - | a4-1, b1-1, c1-1 |
| *Week-6* | Mathematical model of cumulativecompound dc motor | 3 | 3 | - | - | a4-1, b1-1, c1-1 |
| *Week-7* | Single phase and three phase converters | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-8* | Chopper circuits | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-9* | Basic types of controllers | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-**10* | Characteristics    of    P,    PI    and    PIDcontrollers | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-**11* | Fuzzy logic controller | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-**12* | PLL (phase locked loop) controller | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-**13* | Speed control of dc motors | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-**14* | Speed and position control of dc motors | 3 | 3 | - | - | a4-1, b1-1, c1-1,d4-1, d7-1 |
| *Week-**15* | Course discussion | 3 | 3 | - | - | c1-1, d4-1, d7-1 |

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| **Course Intended****learning outcomes****(ILOs)** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Knowledge &****understanding** | **a1-1** | **x** |  | **x** |  | **x** | **x** |  |  | **x** |  |  | **x** |  |
| **Intellectual****Skills** | **b1-1** | **x** | **x** | **x** |  | **x** | **x** |  | **x** | **x** |  | **x** |  |  |
| **Professional****and Practical****Skills** | **c1-1** | **x** | **x** | **x** |  | **x** | **x** | **x** |  | **x** |  | **x** | **x** |  |



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**Selflearning**

**Presentation**

**andMovies**

**Cooperative**

**Discovering**

**Discussion**

**Modelling**

**Sitevisits**

**Problem**

**solving**

**Brain**

**storming**

**Tutorial**

**Projects**

**Lecture**

**Playing**

***B.6  Course Topics/hours/ILOS***

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

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

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| **General and****Transferrable****Skills** | **d4-1** | **x** | **x** |  |  |  | **x** | **x** |  | **x** |  |  |  |  |
| **d7-1** | **x** | **x** |  |  |  | **x** | **x** |  | **x** |  |  |  |  |



**B. 8*Assessments:***

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

***Weighting of assessments:***

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

preparation of reports.

***B.10 List of references:***

1-Richard Valentine,” Motor Control Electronics Handbook”, printed in May 1, 1998

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

**Prof. Dr. Sabry Abdellatif** **Prof. Dr. Gamal Morsi**

**Dr. Hady Elgendy**

**Date:**