**Lesson Plan**

Name of faculty : Er. Ruby Sathiala

Discipline : Electrical Engineering

Semester : 6th

Subject : Electric Drives & Traction

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Week | Theory | | **Date of Actual covered** | **Signatures** | | | | | |
| Lecture  Day | Topic (Including assignment / Test) | **Concerned teacher** | | | **HOD** | **DP** | |
| **Unit-I** | | | | | | | | | |
| 1st | 1 | Introduction to electric drives & traction |  | |  |  | | |  |
| 2 | Classification of different types of drives, components |
| 3 | Characteristics, advantages and disadvantages |
| 4 | Speed control methods of various AC drives |
| 2nd | 5 | Speed control methods of various DC drives |  | |  |  | | |  |
| 6 | Acceleration & retardation time |
| 7 | Energy considerations. Braking of AC drives |
| 8 | Braking of DC drives |
| 3rd | 9 | Automatic control arrangement |  | |  |  | | |  |
| 10 | Basic principle of induction motor drives |
| 11 | Three phase AC voltage controller fed IM drive |
| 12 | Voltage source inverter |
| 4th | 13 | Current source inverter |  | |  |  | | |  |
| 14 | Slip Power control and static rotor resistance control |
| 15 | Chopper control of 3 - slip ring induction motor |
| 16 | 1st Assignment |
| **Unit-II** | | | | | | | | | |
| 5th | 17 | Rectifier controlled circuits |  | |  |  | | |  |
| 18 | Single phase fully controlled rectifierfed separately excited DC motor |
| 19 | Single phase half controlled rectifierfed separately excited DC motor |
| 20 | 3- fully and half controlled fed separately excited DC Motor |
| 6th | 21 | Performance and characteristics of single phase rectifier controlled DC drives |  | |  |  | | |  |
| 22 | Performance and characteristics of 3- rectifier controlled DC drives |
| 23 | Control techniques of DC drives using chopper |
| 24 | Multi quadrant control of chopper fed motors |
| **7th** | **1st Minor Test** | | | | | | | | |
| **Unit-III** | | | | | | | | | |
| 8th | 25 | Components & classification of load torque |  | |  |  | | |  |
| 26 | Fundamental load torqueequation |
| 27 | Permissible frequency of starting and stopping |
| 28 | Definite time, speed torque conventions |
| 9th | 29 | Speed and current limit control |  | |  |  | | |  |
| 30 | Automatic starting and pulling operation of synchronous motors |
| 31 | Introduction to Digitally Controlled (Microprocessor control of Electric drives) |
| 32 | Application areas and functions of µP in drive technology |
| 10th | 33 | Block diagram of arrangement and comparison with other method |  | |  |  | | |  |
| 34 | Components for digital control |
| 35 | Vector control of IM drive using µP |
| 36 | 2nd Assignment |
| **Unit-IV** | | | | | | | | | |
| 11th | 37 | Nature of traction load and motors |  | |  |  | | |  |
| 38 | Conventional DC & AC traction drives |
| 39 | Their characteristics |
| 40 | DC traction using chopper controlled DC motors |
| 12th | 41 | Polyphase AC motors for traction drives |  | |  |  | | |  |
| 42 | Speed time relationship |
| 43 | Tractive effort for propelling a train |
| 44 | Power of a traction motor |
| 13th | 45 | Rating of motors |  | |  |  | | |  |
| 46 | Determination of motor rating |
| 47 | Nature of loads |
| 48 | Classes of motor duty |
| **14th** | **2nd Minor test** | | | | | | | | |
| 15th | 49 | Frequency of operation of motor subjected to intermittent loads |  | |  |  | | |  |
|  | 50 | Pulse loads etc |
|  | 51 | Thermal model of motor for heating |
|  | 52 | Thermal model of motor for cooling |

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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Week** | **Practical** | | | | **Date of Actual covered** | **Signature** | | |
|  |  |  | **Practical**  **Day** | **Topic** | **Concerned teacher** | **HOD** | **DP** |
| 1st | 1 |  | 1 | Study of industrial applications of various mills. |  |  |  |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 2nd | 5 |  | 2 | Study of different types of loading:   1. Intermediate loading 2. Continuous loading |  |  |  |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 3rd | 9 |  | 3 | Three phase fully controlled rectifier fed separately excited DC motor at different firing angle for obtaining speed-torque characteristics. |  |  |  |  |
| 10 |  |
| 11 |  |
| 12 |  |
| 4th | 13 |  | 4 | Single phase half controlled rectifier fed DC series motor at different firing angle for obtaining speed-torque characteristics. |  |  |  |  |
| 14 |  |
| 15 |  |
| 16 |  |
| 5th | 17 |  | 5 | Chopper control of a DC series motor for obtaining torque characteristics. |  |  |  |  |
| 18 |  |
| 19 |  |
| 20 |  |
| 6th | 21 |  | 6 | Chopper control of a separately excited DC motor for obtaining speed-torque characteristics. |  |  |  |  |
| 22 |  |
| 23 |  |
| 24 |  |
| **7th** | **1st Minor Test** | | | |  |  |  |  |
| 8th | 25 |  | 7 | 1. VSI controlled induction motor drives. 2. CSI controlled induction motor drives. |  |  |  |  |
| 26 |  |
| 27 |  |
| 28 |  |
| 9th | 29 |  | 8 | Half wave cycloconverter fed induction motor drive for obtaining speed-torque characteristics, torque frequency for constant V/f ratio. |  |  |  |  |
| 30 |  |
| 31 |  |
| 32 |  |
| 10th | 33 |  | 9 | 1. VSI controlled synchronous motor drives with load commutation. 2. CSI controlled synchronous motor drives with load commutation. |  |  |  |  |
| 34 |  |
| 35 |  |
| 36 |  |
| 11th | 37 |  | 10 | Self controlled synchronous motor drives employing a cycloconverter. |  |  |  |  |
| 38 |  |
| 39 |  |
| 40 |  |
| 12th | 41 |  | 11 | Regenerative braking of a separately excited DC motor. |  |  |  |  |
| 42 |  |
| 43 |  |
| 44 |  |
| 13th | 45 |  | 12 | AC dynamic breaking of a three phase induction motor. |  |  |  |  |
| 46 |  |
| 47 |  |
| 48 |  |
| **14th** | **2nd Minor test** | | | |  |  |  |  |
| 15th | 49 |  | 13 | Vector control of an induction motor using microprocessor.  Microcontroller based speed control of any motor. |  |  |  |  |
|  | 50 |  |
|  | 51 |  |
|  | 52 |  |