SEMESTER	***DEPARTMENT***	***COURSE TITLE***
Fifth	*Power Engineering*	*DC Machines*
COURSE CODE	***HOURS:*** 3	***COURSE SPECIFICATIONS***
EP502	***UNITS:*** 3	*Theoretical Content*

1. ***To understand the Fundamentals of the Theory of Magnetic Circuits:***
   - Review magnetic circuits and magnetic loop in the core.
   - Define magnetic materials, permeability and magnetic laws.
2. ***Understand The Main Parts of a DC Machine & to Know the Shape and Function of Each of the Machine Windings:***
   - Describes the DC machines, Basic principles Construction, Generator and motor action.
   - Define types of windings, Armature winding, Field winding, Compensating windings, Inter-pole winding, Commutator and commutation.
3. ***Explain the DC Generator. Define the Generator Excitation Methods:***
   - Principles of operation of dc generators, Conclude generated emf equation.
   - Identify methods of excitation.
   - Determine losses and efficiency.
   - Point out applications.
4. ***Explain the Operation Principles of a DC Motor; Its Types and Their Applications:***
   - Principles of operation of DC motors. Back emf.
   - Production of electromagnetic torque. Reversing the direction of rotation.
   - Identify different types of DC motors and draw its characteristics. Define motor ratings, types of loads, selection of motors.
   - Explain reversing the direction of rotation
5. ***To Explain the DC Motor Starting and Improving:***
   - Study theory of the DC motor starting, methods for reducing the starting current of DC motors.
6. ***To Study DC Motor Control:***
   - Explain theory of the DC motor control methods, types, rating motor for each control type.

- Advantages and disadvantages of armature control method.
- Advantages and disadvantages of field control method.

References:

1. ***Electrical machines for technicians and technician engineers***, Stephan F. Jorek, Longman,1972.
2. ***Electrical machinery, transformers, and control***, Harold W. Gaingrich, Printice Hall ,1979.
3. ***Electric machinery fundamentals***, Stephen J. Chapman, 3rd edition, McGraw-Hill, 1999.
4. ***Principles of electric machinery and power electronics***, P.C. Sen , John Wiley & sons, 1989.