

SEMESTER <i>Fifth</i>	DEPARTMENT <i>Control Engineering</i>	COURSE TITLE <i>DC Machines</i>
COURSE CODE <i>EP502</i>	HOURS: 3 UNITS: 3	COURSE SPECIFICATIONS <i>Theoretical Content</i>
1. To understand the Fundamentals of the Theory of Magnetic Circuits: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ Study theory of the DC motor starting, methods for reducing the starting current of DC motors. 		
6. To Study DC Motor Control: <ul style="list-style-type: none"> ➤ 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.